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2016

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# MEDICAL IMAGING.

**TECHNICAL PROGRAM**

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Conferences & Courses  
27 February–3 March 2016

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Town & Country Resort and Convention Center  
San Diego, California, USA

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## COOPERATING ORGANIZATIONS

AAPM—American Association of Physicists in  
Medicine

APS—American Physiological Society

IFCARS—Computer Assisted Radiology and Surgery

MIPS—Medical Image Perception Society

RSNA—Radiological Society of North America

SIIM—Society for Imaging Informatics in Medicine

WMIS—World Molecular Imaging Society

The DICOM Standards Committee

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# Welcome to San Diego

The SPIE Medical Imaging meeting is the internationally recognized forum for reporting advancements made in medical imaging. This event focuses on the latest innovations found in underlying fundamental scientific principles, to technology developments, scientific evaluation, and clinical application. This year we are offering a special track on Precision Medicine.

Join your peers at the meeting where collaboration brings ideas to life and technology to market. Hear over 1,000 presentations on the latest research, network with leaders in the field, and see the applications of the future. We look forward to seeing you in San Diego!

## 2016 SYMPOSIUM CHAIRS:



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IMAGING

## DATES

Conferences and Courses  
27 February–3 March 2016

## LOCATION

Town & Country Resort and  
Convention Center  
San Diego, California, USA

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# Contents

Daily Event Schedule	3
Daily Conference Session Schedule	4-6
Plenary Presentation and Awards Session	8-9
Keynote Presentations	10-13
Technical Workshops	14-15
Courses/Workshops	16-18
Poster Presentations	20
Medical Imaging Award Events	21
Social Networking Events	21
Precision Medicine Track	23-25

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## SPIE.

SPIE would like to express its deepest appreciation to the symposium chairs, conference chairs, program committees, session chairs, and authors who have so generously given their time and advice to make this symposium possible.

The symposium, like our other conferences and activities, would not be possible without the dedicated contribution of our participants and members. This program is based on commitments received up to the time of publication and is subject to change without notice.

## TECHNICAL CONFERENCES

Sun-Wed	<b>9783</b>	<b>Physics of Medical Imaging</b> Chairs: <b>Despina Kontos</b> and <b>Thomas G. Flohr</b>	26
Tue-Thu	<b>9784</b>	<b>Image Processing</b> Chairs: <b>Martin A. Styner</b> and <b>Elsa D. Angelini</b>	26
Sun-Wed	<b>9785</b>	<b>Computer-Aided Diagnosis</b> Chairs: <b>Georgia D. Tourassi</b> and <b>Samuel G. Armato III</b>	26
Sun-Tue	<b>9786</b>	<b>Image-Guided Procedures, Robotic Interventions, and Modeling</b> Chairs: <b>Robert J. Webster III</b> and <b>Ziv R. Yaniv</b>	26
Wed-Thu	<b>9787</b>	<b>Image Perception, Observer Performance, and Technology Assessment</b> Chairs: <b>Craig K. Abbey</b> and <b>Matthew A. Kupinski</b>	26
Tue-Thu	<b>9788</b>	<b>Biomedical Applications in Molecular, Structural, and Functional Imaging</b> Chairs: <b>Barjor Gimi</b> and <b>Andrzej Krol</b>	27
Sun-Mon	<b>9789</b>	<b>PACS and Imaging Informatics: Next Generation and Innovations</b> Chairs: <b>Jianguo Zhang</b> and <b>Tessa S. Cook</b>	27
Sun-Mon	<b>9790</b>	<b>Ultrasonic Imaging and Tomography</b> Chairs: <b>Neb Duric</b> and <b>Brecht Heyde</b>	27
Wed-Thu	<b>9791</b>	<b>Digital Pathology</b> Chairs: <b>Metin N. Gurcan</b> and <b>Anant Madabhushi</b>	27
Index of Authors, Chairs, and Committee Members			64-75
Proceedings of SPIE			76
General Information			77-79
Facility Maps			79
SPIE Policies			80-81



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# DAILY EVENT SCHEDULE

SATURDAY 27 February	SUNDAY 28 February	MONDAY 29 February	TUESDAY 1 March	WEDNESDAY 2 March	THURSDAY 3 March
SC086 <b>Fundamentals of Medical Image Processing and Analysis</b> (Deserno) 8:30 am to 5:30 pm, \$570 / \$660	<b>CONFERENCE 9783: Physics of Medical Imaging</b> , p. 26 Chairs: <b>Despina Kontos</b> , The Univ. of Pennsylvania Health System (USA) and <b>Thomas G. Flohr</b> , Siemens Healthcare GmbH (Germany)				
SC1182 <b>ITK in Biomedical Research and Commercial Applications</b> (McCormick, Aylward, Johnson, Lowekamp) 8:30 am to 5:30 pm, \$570 / \$660	<b>CONFERENCE 9784: Image Processing</b> , p. 26 Chairs: <b>Martin A. Styner</b> , The Univ. of North Carolina at Chapel Hill (USA) and <b>Elsa D. Angelini</b> , Columbia Univ. (USA), Télécom ParisTech (France)				
SC1183 <b>Modern Diagnostic X-Ray Sources</b> (Behling) 8:30 am to 12:30 pm, \$490 / \$540	<b>CONFERENCE 9785: Computer-Aided Diagnosis</b> , p. 20 Chairs: <b>Georgia D. Tourassi</b> , Oak Ridge National Lab. (USA) and <b>Samuel G. Armato III</b> , The Univ. of Chicago (USA)				<b>Student Paper Awards 2016, p. 9</b>
SC1127 <b>ROC Analysis and Observer Studies to Evaluate Imaging Technology</b> (Hillis, Nishikawa, Samuelson) 8:30 am to 5:30 pm, \$570 / \$660	<b>CONFERENCE 9786: Image-Guided Procedures, Robotic Interventions, and Modeling</b> , p. 26 Chairs: <b>Robert J. Webster III</b> , Vanderbilt Univ. (USA) and <b>Ziv R. Yaniv</b> , National Library of Medicine (USA)			<b>CONFERENCE 9787: Image Perception, Observer Performance, and Technology Assessment</b> , p. 26 Chairs: <b>Craig K. Abbey</b> , Univ. of California, Santa Barbara (USA) and <b>Matthew A. Kupinski</b> , College of Optical Sciences, The Univ. of Arizona (USA)	
SC829 <b>MIC-GPU: High-Performance Computing for Medical Imaging on Programmable Graphics Hardware (GPU)</b> (Mueller, Ha) 1:30 pm to 5:30 pm, \$360 / \$410	<b>CONFERENCE 9789: PACS and Imaging Informatics: Next Generation and Innovations</b> , p. 27 Chairs: <b>Jianguo Zhang</b> , Shanghai Institute of Technical Physics (China) and <b>Tessa S. Cook</b> , The Univ. of Pennsylvania Health System (USA)		<b>CONFERENCE 9788: Biomedical Applications in Molecular, Structural, and Functional Imaging</b> , p. 27 Chairs: <b>Barjor Gimi</b> , Geisel School of Medicine at Dartmouth (USA) and <b>Andrzej Krol</b> , SUNY Upstate Medical Univ. (USA)		
WS776 <b>Writing for Publication in Medical Imaging</b> (Hanson) 1:30 pm to 5:30 pm, \$125 / \$175	<b>CONFERENCE 9790: Ultrasonic Imaging and Tomography</b> , p. 27 Chairs: <b>Neb Duric</b> , Delphinus Medical Technologies (USA), Barbara Ann Karmanos Cancer Institute (USA) and <b>Brecht Heyde</b> , Katholieke Univ. Leuven (Belgium), Duke Univ. (USA)		9784 Keynote Presentation: <b>Image Processing Pipelines: Applications in Magnetic Resonance Histology</b> (Johnson) 10:10 to 11:10 am, p.12		<b>CONFERENCE 9791: Digital Pathology</b> , p. 27 Chairs: <b>Metin N. Gurcan</b> , The Ohio State Univ. Wexner Medical Ctr. (USA) and <b>Anant Madabhushi</b> , Case Western Reserve Univ. (USA)
			<b>Women's Networking Lunch</b> , 12:10 to 1:20 pm, p.22		
	SC987 <b>Spectral CT Imaging</b> (Schmidt, Flohr, Grant) 8:30 am to 12:30 pm, \$360 / \$410	9785 Keynote Presentation: <b>Radiomics: There is More Than Meets the Eye in Medical Imaging</b> (Aerts) 8:00 to 9:00 am, p.11	9786 Keynote Presentation: <b>Robot-Assisted Tumor Resection: Palpation, Incision, Debridement, and Adhesive Closure</b> (Goldberg) 1:20 to 2:20 pm, p.11	9788 Keynote Presentation: <b>Interesting In-Vivo Magnetic Resonance Experiments that are Not Quite Ready for Prime Time and Some that Are!</b> (Ackerman) 10:10 to 11:10 am, p.12	9787 Keynote Presentation: <b>Image Perception Foundation of Success for NLST</b> (Jacobson) 8:00 to 9:00 am, p.13
<b>SUNDAY WORKSHOPS</b>	SC1129 <b>Photon Counting X-ray Imaging: Technology and Methods</b> (Danielsson) 1:30 pm to 5:30 pm, \$360 / \$410	SC1026 <b>Graph Algorithmic Techniques for Biomedical Image Segmentation</b> (Garvin, Wu) 8:30 am to 12:30 pm, \$360 / \$410	SC1185 <b>Radiation Dosimetry in Diagnostic Radiology: A Primer</b> (Maidment) 1:30 pm to 5:30 pm, \$360 / \$410	9791 Keynote Presentation: <b>Current Challenges in Digital Pathology</b> (Bloom) 1:20 to 2:20 pm, p.12	
TECHNICAL WORKSHOP WK1: <b>Interventional Procedures: Emerging Technologies and Clinical Applications</b> (Kontos, Yaniv) 5:45 to 7:45 pm, p.14	9789 Keynote Presentation: <b>Connecting Images to the Electronic Medical Record: Structured Reporting, Machine Learning, and Natural Language Processing</b> (Langlotz) 8:40 to 9:40 am p.10	SC1184 <b>Methodology for Measuring Functional Connectivity in Neuroimaging Data Analysis</b> (Lei) 8:30 am to 12:30 pm, \$360 / \$410	WS757 <b>Early Career Professional Development in Medical Imaging</b> (Krupinski) 1:30 pm to 5:30 pm, \$125 / \$175	9791 Invited Paper: <b>Cancer diagnostics in Africa: leapfrog technology and volunteers transform care</b> (Holladay) 2:40 to 3:10 pm, p.62	
TECHNICAL WORKSHOP WK4: <b>Sensing Challenges and Prospects in Miniaturizing Surgical Robots and Tools</b> (Burgner-Kahrs) 5:45 to 7:45 pm, p.14	<b>Lunch with the Experts - A Student Networking Event</b> , 12:10 to 1:20 pm, p.22	9790 Keynote Presentation: <b>Enhanced Ultrasound, Ultrasound Tomography for Volume Limb Imaging and Prosthetic Fitting</b> (Anthony) 10:10 to 11:10 am, p.11	SPIE-AAPM-NCI PANEL DISCUSSION: <b>CAD Grand Challenges: Paving the Way for Imaging in the Era of Precision Medicine</b> (Armato) 3:30 to 4:50 pm, p.15		
SPIE/IFCARS JOINT WORKSHOP WK7: <b>Information Management, Systems Integration, Standards, and Approval Issues for the Digital Operating Room</b> (Berliner, Lemke) 5:45 to 7:45 pm, p.14	9783 Keynote Presentation: <b>EXPLORER: Changing the Molecular Imaging Paradigm with Total-Body PET/CT</b> (Cherry) 1:20 to 2:20 pm, p.10	<b>Awards and Plenary Session: The Evolution of Medical Imaging from Qualitative to Quantitative: Opportunities, Challenges, and Approaches</b> (Jackson) 4:00 to 5:15 pm, p.8	TECHNICAL WORKSHOP WK2: <b>Image Syntheses</b> (Prince, Ourselin) 5:00 to 7:00 pm, p.15		
			TECHNICAL WORKSHOP WK3: <b>Live Demonstrations</b> (Chan, Hahn) 5:00 to 7:00 pm, p.15		
			TECHNICAL WORKSHOP WK5: <b>Validation of Medical Image-Perception Models</b> (Abbey, Kupinski) 5:00 to 7:00 pm, p.15		
			TECHNICAL WORKSHOP WK6: <b>NIH Funding Opportunities: Navigating the System and Tips for Applicants</b> (Sastre) 5:00 to 7:00 pm, p.15		

**SPIE STUDENT MEMBERS** receive 50% OFF all courses and workshops.

# DAILY CONFERENCE SESSION SCHEDULE

TIME	Conference 9783	Conference 9784	Conference 9785	Conference 9786	Conference 9787	Conference 9788	Conference 9789	Conference 9790	Conference 9791
<b>SUNDAY - 28 February</b>									
8:00 to 9:40 am	<b>SESSION 1: Tomosynthesis and Digital Subtraction Angiography</b> (Joseph Y. Lo, John M. Sabol)		<b>SESSION 1: Vessels and Heart</b> (Stephen Aylward, Thomas Deserno)	<b>SESSION 1: Cardiac Procedures</b> (Maryam E. Rettmann, David R. Holmes III)			<b>Session 1A: Keynote, 8:40 am</b> (Jianguo Zhang)	<b>SESSION 1: Motion and Deformation Imaging</b> (Brett C. Byram)	
9:40 to 10:10 am	<b>Coffee Break</b>								
10:10 am to 12:10 pm	<b>SESSION 2: Breast Imaging</b> (Andreu Badal, Wei Zhao)		<b>SESSION 2: Musculoskeletal and Miscellaneous</b> (Axel Wismülle Carol L. Novak)	<b>SESSION 2: Segmentation and 2D and 3D Registration</b> (David R. Haynor, Baowei Fei)			<b>SESSION 1: Imaging Informatics for Precision Medicine</b> (Wyatt Tellis)	<b>SESSION 2: Ultrasound Tomography and Reconstruction</b> (Olivier Roy, Torsten Hopp)	
12:10 to 1:20 pm	<b>Lunch Break</b>								
1:20 to 3:00 pm	<b>SESSION 3: Keynote and Dual and Multi Energy CT</b> (Despina Kontos, Thomas G. Flohr)		<b>SESSION 3: Lung and Chest I</b> (Matthew S. Brown, Catalin Fetita)	<b>SESSION 3: Spine and Percutaneous Procedures</b> (Gabor Fichtinger, David J. Hawkes)			<b>SESSION 2: Surgical PACS, 3D Printing, and Imaging Informatics for Non-radiological Applications</b> (Thomas Deserno)	<b>SESSION 3: Ultrasound Image Analysis and Tissue Characterization</b> (Brecht Heyde)	
3:00 to 3:30 pm	<b>Coffee Break</b>								
3:30 to 5:30 pm	<b>SESSION 4: Cone Beam CT I: New Technologies, Corrections</b> (John Yorkston, Hilde Bosmans)		<b>SESSION 4: Breast</b> (Hiroshi Fujita, Karen Drukker)	<b>SESSION 4: Ultrasound Image Guidance:</b> Joint Session with Confs. 9786 and 9790 (Parvin Mousavi, Brecht Heyde)			<b>SESSION 3: Imaging Informatics for Diagnostics and Therapeutic Applications</b> (Maria Y. Law)	<b>SESSION 4: Ultrasound Image Guidance</b> Joint Session with Confs. 9786 and 9790 (Parvin Mousavi, Brecht Heyde)	
5:45 to 7:45 pm	<b>TECHNICAL WORKSHOPS</b>								
<b>MONDAY - 29 February</b>									
8:00 to 9:40 am	<b>SESSION 5: Phase Contrast Imaging</b> (Mini Das, Guang-Hong Chen)		<b>SESSION 5: Keynote and Deep Learning I</b> (Lubomir M. Hadjiiski, Horst K. Hahn)	<b>SESSION 5: Registration</b> (Lena Maier-Hein, Stefanie Speidel)			<b>SESSION 4: Big Data Technologies and Image Sharing in Medical Imaging and Informatics</b> (Brent J. Liu)	<b>SESSION 5: Novel Imaging Strategies and Signal Processing</b> (Mohammad Mehrmohammadi)	
9:40 to 10:10 am	<b>Coffee Break</b>						<b>POSTER AWARD ANNOUNCEMENTS</b>		
10:10 am to 12:10 pm	<b>SESSION 6: Cone Beam CT II: System Optimization, Image Reconstruction</b> (Marc Kachelriess, Maria Drangova)		<b>SESSION 6: Radiomics I</b> (Maryellen L. Giger, Nicholas A. Petrick)	<b>SESSION 6: Robotic Systems and Treatment Planning</b> (David M. Kwartowitz, Cristian A. Linte)			<b>SESSION 5: Cloud Computing and Collaborating for Medical Imaging Services and Applications</b> (Peter R. Bak)	<b>SESSION 6: Keynote and New Applications of Ultrasound in Medicine and Biology</b> (Brian Anthony, Neb Duric)	
12:10 to 1:20 pm	<b>Lunch Break</b>								
1:20 to 3:40 pm	<b>SESSION 7: CT I: Technology, System Characterization, Applications</b> (Christoph Hoeschen, Kirsten Boedeker)		<b>SESSION 7: Deep Learning II</b> (Ronald M. Summers, Hayit Greenspan)	<b>SESSION 7: Tissue Deformation and Motion</b> (Michael I. Miga, Pierre Jannin)				<b>SESSION 7: Transducers and Beamforming</b> (Jørgen Arendt Jensen, Marko Jakovljevic)	
3:30 to 4:00 pm	<b>Coffee Break</b>							<b>POSTER AWARD ANNOUNCEMENTS</b>	
4:00 to 5:15 pm	<b>Best Student Paper Awards and Plenary Presentation</b>								
5:30 to 7:00 pm	<b>SUNDAY/MONDAY POSTER SESSION</b>								

# DAILY CONFERENCE SESSION SCHEDULE

TIME	Conference 9783	Conference 9784	Conference 9785	Conference 9786	Conference 9787	Conference 9788	Conference 9789	Conference 9790	Conference 9791
<b>TUESDAY · 1 March</b>									
8:00 to 9:40 am	<b>SESSION 8: Detectors</b> <i>(John A. Rowlands, Karim S. Karim)</i>	<b>SESSION 1 Quantitative Image Analysis</b> <i>(Marius G. Linguraru, Tomaz Vrtovec)</i>	<b>SESSION 8: Lung and Chest II</b> <i>(Bram van Ginneken, Rafael Wiemker)</i>	<b>SESSION 8: Intraoperative Imaging and Visualization</b> <i>(George J. Grevera, Amber L. Simpson)</i>					
9:40 to 9:45 am	POSTER AWARD ANNOUNCEMENTS		POSTER AWARD ANNOUNCEMENTS	POSTER AWARD ANNOUNCEMENTS					
9:40 to 10:10 am	<b>Coffee Break</b>								
10:10 am to 12:10 pm	<b>SESSION 9: CT II: Image Reconstruction, Artifact Reduction</b> <i>(Joseph W. Stayman, Michael Grass)</i>	<b>SESSION 2: Keynote and Diffusion MRI</b> <i>(Bennett A. Landman)</i>	<b>SESSION 9: Head and Neck</b> <i>(Khan M. Iftekharuddin, Fabrice Meriaudeau)</i>	<b>SESSION 9: Endoscopy/Laparoscopy</b> <i>(Eric J. Seibel, William E. Higgins)</i>					
12:10 to 1:20 pm	<b>Lunch Break</b>								
1:20 to 3:00 pm	<b>SESSION 10: Photon Counting CT I: Instrumentation</b> <i>(Mats Danielsson, Stephen J. Glick)</i>	<b>SESSION 3: Computational Anatomy</b> <i>(Mads Nielsen)</i>	<b>SESSION 10: Radiomics II</b> <i>(Nico Karssemeijer, Heang-Ping Chan)</i>	<b>SESSION 10: Keynote and New Robotic Applications</b> <i>(Robert J. Webster III, Ziv Yaniv)</i>		<b>SESSION 1: Novel Imaging Methods</b> <i>(Andrzej Krol Robert C. Molthen)</i>			
3:00 to 3:30 pm	<b>Coffee Break</b>								
3:30 to 4:50 pm	<b>SESSION 11: PET and MR</b> <i>(Jinyi Qi, Christoph Hoeschen)</i>	<b>SESSION 4: Segmentation: Brain</b> <i>(Miguel Angel González Ballester, Ivana Isgum)</i>	<b>SESSION 11: PANEL DISCUSSION: CAD Grand Challenges: Paving the Way for Imaging in the Era of Precision Medicine</b> <i>(Samuel G. Armato)</i>	<b>SESSION 11: Prostate Procedures</b> <i>(Purang AboImaesumi, Frank Sauer)</i>		<b>SESSION 2: Innovations in Image Processing</b> <i>(Armando Manduca Robert C. Molthen)</i>			
5:00 to 7:00 pm	<b>TECHNICAL WORKSHOPS</b>								
<b>WEDNESDAY · 2 March</b>									
8:00 to 9:40 am	<b>SESSION 12: Photon Counting CT II: Spectral Imaging</b> <i>(Taly G. Gilat-Schmidt, Mats Danielsson)</i>	<b>SESSION 5: Image Enhancement</b>	<b>SESSION 12: Colon and Prostate</b> <i>(Janne J. Näppi, Kenji Suzuki)</i>		<b>SESSION 1: Technology Assessment in Breast Imaging</b> <i>(Robert M. Nishikawa)</i>	<b>SESSION 3: Bone and Skeletal Imaging, Biomechanics</b> <i>(Robert C. Molthen, Axel Wismüll)</i>			
9:40 to 10:10 am	<b>Coffee Break</b>								
10:10 am to 12:10 pm	<b>SESSION 13: New Systems and Technologies</b> <i>(Rebecca Fahrig, Ingrid S. Reiser)</i>	<b>SESSION 6: Shape</b> <i>(Cristian Lorenz)</i>	<b>SESSION 13: Abdominal</b> <i>(Hiroyuki Yoshida, Kensaku Mori)</i>		<b>SESSION 2: Model Observers I</b> <i>(François O. Bochud)</i>	<b>SESSION 4: Keynote and Neurological Imaging</b> <i>(Axel Wismüller, Barjor Gimí)</i>			
12:10 to 1:20 pm	<b>Lunch Break</b>								

# DAILY CONFERENCE SESSION SCHEDULE

TIME	Conference 9783	Conference 9784	Conference 9785	Conference 9786	Conference 9787	Conference 9788	Conference 9789	Conference 9790	Conference 9791
<b>WEDNESDAY Afternoon · 2 March</b>									
1:20 to 3:00 pm	<b>SESSION 14:</b> Scatter and Diffraction Imaging <i>(Mini Das, Guang-Hong Chen)</i>	<b>SESSION 7:</b> Motion/Registration <i>(Kensaku Mori)</i>			<b>SESSION 3:</b> Perception Metrology <i>(Frank W. Samuelson)</i>	<b>SESSION 5:</b> fMRI <i>(Axel Wismüller, Barjor Gimi)</i>			<b>SESSION 1:</b> Keynote and Trends <i>(Metin N. Gurcan, Anant Madabhushi)</i>
3:00 to 3:30 pm	<b>Coffee Break</b>								
3:30 to 5:30 pm	<b>SESSION 15:</b> Task Driven Imaging, Observers, Detectability, Phantom Studies <i>(Hee-Joung Kim, Anders Tingberg)</i>	<b>SESSION 8:</b> Machine Learning <i>(Murray H. Loew)</i>			<b>SESSION 4:</b> Perception <i>(Claudia R. Mello-Thoms)</i>	<b>SESSION 6:</b> Optical <i>(Yu Chen, Baohong Yuan)</i>			<b>SESSION 2:</b> Precision Medicine and Grading <i>(John E. Tomaszewski)</i>
5:30 to 7:00 pm	<b>TUESDAY/WEDNESDAY POSTER SESSION</b>								
<b>THURSDAY · 3 March</b>									
8:00 to 9:40 am		<b>SESSION 9:</b> Model-based Image Analysis and Image Synthesis <i>(Jerry L. Prince)</i>			<b>SESSION 5:</b> Keynote and ROC Analysis <i>(Craig K. Abbey, Matthew A. Kupinski)</i>	<b>SESSION 7:</b> Fluids and Cardiovascular <i>(Armando Manduca, Robert C. Molthen)</i>			<b>SESSION 3:</b> Detection and Segmentation <i>(Anne L. Martel)</i>
9:40 to 9:45 am		<b>POSTER AWARD ANNOUNCEMENTS</b>			<b>POSTER AWARD ANNOUNCEMENTS</b>				<b>POSTER AWARD ANNOUNCEMENTS</b>
9:40 to 10:10 am	<b>Coffee Break</b>								
10:10 am to 12:10 pm		<b>SESSION 10:</b> Segmentation <i>(Aaron Fenster)</i>			<b>SESSION 6:</b> Model Observers II: Search <i>(Howard C. Gifford, Subok Park)</i>	<b>SESSION 8:</b> Cancer Imaging <i>(Barjor Gimi, Baohong Yuan)</i>			<b>SESSION 4:</b> Machine Learning <i>(Aaron D. Ward, Josien P. W. Pluim)</i>
12:10 to 1:20 pm	<b>Lunch Break</b>								
1:20 to 3:00 pm		<b>SESSION 11:</b> Classification/Population <i>(Baowei Fei)</i>			<b>SESSION 7:</b> Breast Imaging II <i>(Pontus A. Timberg)</i>	<b>SESSION 9:</b> Lung <i>(Robert C. Molthen)</i>			<b>SESSION 5:</b> Emerging Technologies <i>(Selim Aksoy, Scott Doyle)</i>  2:40 to 3:10 pm <b>SESSION 6:</b> Emerging Global Opportunities <i>(Metin N. Gurcan, Anant Madabhushi)</i>
3:00 to 3:30 pm	<b>Coffee Break</b>								
3:30 to 5:30 pm		<b>SESSION 12:</b> Registration <i>(Stefan Klein)</i>			<b>SESSION 8:</b> Technology Assessment <i>(Maciej A. Mazurowski)</i>	<b>SESSION 10:</b> Novel MR Techniques and Applications <i>(Barjor Gimi, Axel Wismüller)</i>			
5:30 to 5:35 pm						<b>POSTER AWARD ANNOUNCEMENTS</b>			



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# AWARDS AND PLENARY SESSION

Monday 29 February • 4:00 to 5:15 pm • Location: Town & Country

4:00 to 4:15 pm

## Best Student Paper Awards Announcement

The first place winner and runner up of the Robert F. Wagner All-Conference Student Paper Award will be announced, and conference finalists will be recognized.

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## In Memoriam



### Dr. Lee Allen Rosen

April 15, 1947 - October 22, 2015

When you think of medical imaging research a lot of names come to mind, but when you think of those having the most impact in terms of being an advocate for funding in our field one name stands out: Lee Rosen. Dr. Lee Rosen was a Scientific Review Officer at the National Institutes of Health for 26 years and head of the

BMIT study section, where the majority of our grants go for review. On October 22, 2015 Lee passed away after a short but valiant battle with acute myeloid leukemia.

He will be dearly missed by those who served on his study sections and by those whose careers have been impacted by his constant efforts to make the grant review process as effective, efficient, and fair as possible. Dr. Rosen went out of his way to recruit the best and most appropriate reviewers for his study sections, and also took the added time and energy to talk with applicants about their submissions. His dedication to helping young scientists understand the review process was exemplified by the number of grant workshops he arranged and hosted at numerous scientific meetings over the years. It is impossible to count the number of medical imaging investigators that have benefited from Lee's advocacy, support, wisdom, and above all, friendship. He will be dearly missed by all of us.

Presented by: **Jerry L. Prince**, Johns Hopkins Univ. (USA)

4:15 to 5:15 pm

## The Evolution of Medical Imaging from Qualitative to Quantitative: Opportunities, Challenges, and Approaches



### Edward F. Jackson

Professor and Chair  
Director, Medical Physics Graduate Program  
Department of Medical Physics  
Univ. of Wisconsin-Madison School of Medicine  
and Public Health (USA)

**ABSTRACT:** Over the past decade, there has been an increasing focus on quantitative imaging biomarkers (QIBs), which are defined as “objectively measured characteristics derived from in vivo images as indicators of normal biological processes, pathogenic processes, or response to a therapeutic intervention”<sup>1</sup>. To evolve qualitative imaging assessments to the use of QIBs requires the development and standardization of data acquisition, data analysis, and data display techniques, as well as appropriate reporting structures. As such, successful implementation of QIB applications relies heavily on expertise from the fields of medical physics, radiology, statistics, and informatics as well as collaboration from vendors of imaging acquisition, analysis, and reporting systems. When successfully implemented, QIBs will provide image-derived metrics with known bias and variance that can be validated with anatomically and physiologically relevant measures, including treatment response (and the heterogeneity of that response) and outcome. Such non-invasive quantitative measures can then be used effectively in clinical and translational research and will contribute significantly to the goals of precision medicine. This presentation will focus on 1) outlining the opportunities for QIB applications, with examples to demonstrate applications in both research and patient care, 2) discussing key challenges in the implementation of QIB applications, and 3) providing overviews of efforts to address such challenges from federal, scientific, and professional organizations, including, but not limited to, the RSNA, NCI, FDA, and NIST.

<sup>1</sup>Sullivan, Obuchowski, Kessler, et al. Radiology, epub August 2015.



**BIOGRAPHY:** **Dr. Edward Jackson** is Professor and Chair of the Department of Medical Physics and Professor of Radiology and Human Oncology at the University of Wisconsin-Madison School of Medicine and Public Health. He is the current chair of the RSNA Quantitative Imaging Biomarkers Alliance (QIBA) and is past chair of the ISMRM Ad Hoc Committee on Standards for Quantitative MR. He is a member of the AAPM Science Council and Education Council, and is chair-elect of the Commission on Accreditation of Medical Physics Education Programs (CAMPEP). Dr. Jackson is a fellow of the AAPM and the ACR.

# AWARD FINALISTS

Join us on Monday at 4:00 pm in the Town & Country Room for the recognition of the conference finalists and an announcement of the first place winner and runner up.

## CONGRATULATIONS CONFERENCE FINALISTS

The following student authors will advance to the final round of the Robert F. Wagner Best Student paper competition. Their papers were chosen from 59 submissions.

### PHYSICS OF MEDICAL IMAGING (9783)

#### Rayleigh imaging in spectral mammography

Paper 9783-7

Student Author: **Karl Berggren**, KTH Royal Institute of Technology (Sweden) and Philips Healthcare (Sweden)

#### Design, fabrication, and implementation of voxel-based 3D printed textured phantoms for task-based image quality assessment in CT

Paper 9783-76

Student Author: **Justin Solomon**, Carl E. Ravin Advanced Imaging Labs., Duke Univ. (USA)

### IMAGE PROCESSING (9784)

#### Contour tracking and probabilistic segmentation of tissue phase mapping MRI

Paper 9784-3

Student Author: **Teodora Chitiboi**, Fraunhofer MEVIS (Germany) and Jacobs Univ. Bremen (Germany)

#### Combined registration and motion correction of longitudinal retinal OCT data

Paper 9784-32

Student Author: **Andrew Lang**, Johns Hopkins Univ. (USA)

### COMPUTER-AIDED DIAGNOSIS (9785)

#### Deep convolutional neural networks for automatic coronary calcium scoring in a screening study with low-dose chest CT

Paper 9785-36

Student Author: **Nikolas Lessmann**, Univ. Medical Ctr. Utrecht (Netherlands)

#### Radiomics versus physician assessment for the early prediction of local cancer recurrence after stereotactic radiotherapy for lung cancer

Paper 9785-50

Student Author: **Sarah Mattonen**, Western Univ. (Canada) and Baines Imaging Research Lab., London Regional Cancer Program (Canada)

### IMAGE-GUIDED PROCEDURES, ROBOTIC INTERVENTIONS, AND MODELING (9786)

#### MIND Demons for MR-to-CT deformable image registration in image-guided spine surgery

Paper 9786-16

Student Author: **Sureerat Reangamornrat**, Johns Hopkins Univ. (USA)

#### Image-guided preoperative prediction of pyramidal tract side effect in deep brain stimulation

Paper 9786-29

Student Author: **Clément Baumgarten**, INSERM (France) and Univ. of Rennes 1 (France)

### IMAGE PERCEPTION, OBSERVER PERFORMANCE, AND TECHNOLOGY ASSESSMENT (9787)

#### The classification of normal screening mammograms

Paper 9787-15

Student Author: **Zoey Ang**, The Univ. of Sydney (Australia)

### BIOMEDICAL APPLICATIONS IN MOLECULAR, STRUCTURAL, AND FUNCTIONAL IMAGING (9788)

#### Modeling the brain morphology distribution in the general aging population

Paper 9788-17

Student Author: **Wyke Huizinga**, Erasmus MC (Netherlands)

#### A semi-automatic framework of measuring pulmonary arterial metrics at anatomic airway locations using CT imaging

Paper 9788-41

Student Author: **Dakai Jin**, Univ. of Iowa, (USA)

### PACS AND IMAGING INFORMATICS: NEXT GENERATION AND INNOVATIONS (9789)

#### A handheld computer-aided diagnosis system and simulated analysis

Paper 9789-23

Student Author: **Ming Jian Su**, Guangxi Univ. (China)

### ULTRASONIC IMAGING AND TOMOGRAPHY (9790)

#### Development and evaluation of a novel VEGFR2-targeted nanoscale ultrasound contrast agents

Paper 9790-28

Student Author: **Houqiang Yu**, Huazhong Univ. of Science and Technology (China)

#### Dynamic programming on a tree for ultrasound elastography

Paper 9790-50

Student Author: **Roozbeh Shams**, Concordia Univ. (Canada)

### DIGITAL PATHOLOGY (9791)

#### Evaluating stability of histomorphometric features across scanner and staining variations: predicting biochemical recurrence from prostate cancer whole slide images

Paper 9791-25

Student Author: **Patrick Leo**, Case Western Reserve Univ. (USA)

#### Cell nuclei attributed relational graphs for efficient representation and classification of gastric cancer in digital histopathology

Paper 9791-31

Student Author: **Harshita Sharma**, Technische Univ. Berlin (Germany)

## ROBERT F. WAGNER AWARD

Robert F. Wagner was an active scientist in the SPIE Medical Imaging meeting, starting with the first meeting in 1972 and continuing throughout his career. He ensured that the BRH, and subsequently the CDRH, was a sponsor for the early and subsequent Medical Imaging meetings, helping to launch and ensure the historical success of the meeting.



The Robert F. Wagner All Conference Best Student Paper Award (established 2014) is acknowledgment of his many important contributions to the Medical Imaging meeting and his many important advances to the field of medical imaging.

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## CONGRATULATIONS TO THE 2015 ROBERT F. WAGNER BEST STUDENT PAPER AWARD RECIPIENTS

### 1ST PLACE

**Ibrahim Sadek**, Univ. de Bourgogne (France)

Automatic discrimination of color retinal images using the bag of words approach [9414-54]

### RUNNER-UP

**Fumin Guo**, Robarts Research Institute (Canada)

Automated pulmonary lobar ventilation measurements using volume-matched thoracic CT and MRI [9417-42]



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**PACS AND IMAGING INFORMATICS: NEXT GENERATION AND INNOVATIONS**

CONFERENCE 9789 · Paper Number 9789-100

**Connecting Images to the Electronic Medical Record: Structured Reporting, Machine Learning, and Natural Language Processing**

Sunday 28 February 2016  
8:40 to 9:40 am · Location: San Diego



**Curtis Langlotz**  
Stanford Univ. Medical Ctr. (USA)

**ABSTRACT:** The imaging report is an essential source of clinical imaging information. It documents critical information about the patient's health and provides a professional interpretation of the images. However, the vast majority of report information remains narrative, a major obstacle to the rapid extraction and re-use of discrete imaging data. Structured reporting facilitates linking of imaging observations to clinical and genomic data, and is increasingly being adopted by clinical imaging practices. However, most imaging reports are used only once by the clinician who ordered the imaging study and are rarely used again for clinical care, research, or analytics. This presentation will describe the likely future of the imaging report, including efforts underway to standardize radiology report information, and the use of machine learning and natural language processing techniques to extract the semantic elements of the radiology report. These novel technologies enable connections between images and the electronic health record, and represent a vital part of medical imaging's future.

**BIOGRAPHY:** **Dr. Langlotz** has published over 100 scholarly articles, and is author of the recently published book "The Radiology Report: A Guide to Thoughtful Communication for Radiologists and Other Medical Professionals". Over the past decade, Dr. Langlotz has led many national and international efforts to improve the quality of radiology reporting, including the RadLex terminology standard, the RadLex Playbook of radiology exam codes, and the report template library of the Radiological Society of North America. His research is focused on improving the accuracy and consistency of radiology communication through real-time decision support systems and other information technologies. His biomedical informatics laboratory develops novel machine learning and natural language processing algorithms that provide intelligent assistance to radiologists, clinicians, patients, and other consumers of images and reports.

**PHYSICS OF MEDICAL IMAGING**

CONFERENCE 9783 · Paper Number 9783-12

**EXPLORER: Changing the Molecular Imaging Paradigm with Total-Body PET/CT**

Sunday 28 February 2016  
1:20 to 2:20 pm · Location: Town & Country



**Simon Cherry**  
Univ. of California, Davis (USA)

**ABSTRACT:** Positron emission tomography (PET) is the highest sensitivity technique for human whole-body imaging studies. However, current clinical PET scanners do not make full use of the available signal, as they only permit imaging of a 15-25 cm segment of the body at one time. Given the limited sensitive region, whole-body imaging with clinical PET scanners requires relatively long scan times and subjects the patient to higher than necessary radiation doses.

The EXPLORER initiative aims to build a 2-meter axial length PET scanner to allow imaging the entire subject at once, capturing nearly the entire available PET signal. EXPLORER will acquire data with ~40-fold greater sensitivity leading to a six-fold increase in reconstructed signal-to-noise ratio for imaging the total body. Alternatively, total-body images with the EXPLORER scanner will be able to be acquired in ~30 seconds or with ~0.15 mSv injected dose, while maintaining current PET image quality.

The superior sensitivity will open many new avenues for biomedical research. Specifically for cancer applications, high sensitivity PET will enable detection of smaller lesions. Additionally, greater sensitivity will allow imaging out to 10 half-lives of positron emitting radiotracers. This will enable 1) metabolic ultra-staging with FDG by extending the uptake and clearance time to 3-5 hours to significantly improve contrast and 2) improved kinetic imaging with short-lived radioisotopes such as C-11, crucial for drug development studies. Frequent imaging studies of the same subject to study disease progression or to track response to therapy will be possible with the low dose capabilities of the EXPLORER scanner. The low dose capabilities will also open up new imaging possibilities in pediatrics and adolescents to better study developmental disorders. This talk will review the basis for developing total-body PET, potential applications, and review progress to date in developing EXPLORER, the first total-body PET scanner

**BIOGRAPHY:** **Dr. Cherry's** research interests center around biomedical imaging and in particular the development and application of in vivo molecular imaging systems. His major accomplishments have been in developing and applying high resolution systems for positron emission tomography (PET), in particular the invention of the microPET technology that was subsequently widely adopted in academia and industry. He has contributed to the development of very high performance detectors for PET, and to multimodality imaging systems, including the first hybrid PET/MRI (magnetic resonance imaging) systems. He is currently co-leading the effort to develop the world's first total body PET scanner.



## COMPUTER-AIDED DIAGNOSIS

CONFERENCE 9785 · Paper Number 9785-23

### Radiomics: There is More than Meets the Eye in Medical Imaging

Monday 29 February 2016  
8:00 am to 9:00 am · Location: Golden West



#### Hugo Aerts

Dana-Farber Cancer Institute, Brigham and Women's Hospital, Harvard Medical School (USA)

ABSTRACT: Imaging-based techniques have traditionally been restricted to the diagnosis of cancer and staging of cancer. But technological advances are moving imaging modalities into the heart of patient care. Radiomics uses imaging assays to develop biomarkers which complement those derived from biopsies. The ultimate goal of radiomics is to improve personalized medicine strategies by allowing clinicians to monitor disease in real time as patients move through treatment. Several studies in different cancer types have demonstrated that radiomic biomarkers have strong prognostic performance, and are associated with underlying mutation and gene-expression patterns. In this talk, Dr. Aerts will discuss recent developments from his lab and collaborators performing research at the intersection of radiology and bioinformatics. Also, he will discuss recent work of building a computational image analysis system to extract a rich radiomics set and use these features to build prognostic radiomics signatures. The presentation will conclude with a discussion of future work on building integrative systems incorporating both molecular and phenotypic data to improve cancer therapies.

BIOGRAPHY: **Dr. Hugo Aerts** is Director of the Computational Imaging and Bioinformatics Laboratory (CIBL) at Harvard-DFCI. Dr. Aerts' group focuses on the development and application of advanced computational approaches applied to medical imaging data, pathology, and genomic data. Furthermore, he is a PI-member of the Quantitative Imaging Network (QIN) and Informatics Technology for Cancer Research (ITCR) initiative of the NIH.

## ULTRASONIC IMAGING AND TOMOGRAPHY

CONFERENCE 9790 · Paper Number 9790-25

### Enhanced Ultrasound, Ultrasound Tomography for Volume Limb Imaging and Prosthetic Fitting

Monday 29 February 2016  
10:10 to 11:10 am · Location: Royal Palm One



#### Brian Anthony

Massachusetts Institute of Technology (USA)

ABSTRACT: Ultrasound imaging methods hold the potential to deliver low-cost, high-resolution, operator-independent and non-ionizing imaging systems – such systems couple appropriate algorithms with imaging devices and techniques. The increasing demands on general practitioners motivate us to develop more usable and productive diagnostic imaging equipment. Ultrasound, specifically freehand ultrasound, is a low cost and safe medical imaging technique. It doesn't expose a patient to ionizing radiation. Its safety and versatility make it very well suited for the increasing demands on general practitioners, or for providing improved medical care in rural regions or the developing world. However it typically suffers from sonographer variability; we will discuss techniques to address user variability. As with any medical imaging technique, methods are developed for imaging specific regions of the body; ultrasound is typically used to image soft tissues of the body. Ultrasound methods have been developed for applications involving pre-natal health, cardiac imaging, detection of breast cancer and therapeutic uses, however, ultrasound systems for 3-D imaging and quantification of hard tissues like bone in vivo are currently non-existent. We will discuss our work to combine cylindrical scanning systems with state of the art inversion algorithms to deliver ultrasound systems for imaging and quantifying limbs in 3-D in vivo. Such systems have the potential to track the progression of bone health at a low cost and without radiation exposure, as well as, improve prosthetic socket fitting. Current methods of prosthetic socket fabrication remain subjective and ineffective at creating an interface to the human body that is both comfortable and functional. Though there has been recent success using methods like magnetic resonance imaging and biomechanical modeling, a low-cost, streamlined, and quantitative process for prosthetic cup design and fabrication has not been fully demonstrated. Medical ultrasonography may inform the design process of prosthetic sockets in a more objective manner. This talk presents the results of progress in this area.

BIOGRAPHY: **Dr. Anthony** is Co-Director of MIT's Medical Electronic Device Realization Center, Director of MIT's Master of Engineering in Manufacturing Program. He designs instruments and techniques to monitor and control physical systems. His work involves systems analysis and design, calling upon mechanical, electrical and optical engineering, along with computer science and optimization, to create solutions. Dr. Anthony won an Emmy - from the Academy of Television Arts and Sciences - in broadcast technical innovation using high-speed video.

## IMAGE PROCESSING

CONFERENCE 9784 · Paper Number 9784-6

### Image Processing Pipelines: Applications in Magnetic Resonance Histology

Tuesday 1 March 2016  
10:10 to 11:10 am · Location: San Diego



#### G. Allan Johnson

Duke Ctr. for In Vivo Microscopy (USA)

ABSTRACT: Image processing has become ubiquitous in virtually all imaging research—so ubiquitous that it is easy to lose track of how diverse this processing has become. The Duke Center for In Vivo Microscopy has pioneered the development of Magnetic Resonance Histology (MRH), which generates large multi-dimensional data sets that can easily reach into the 10s of gigabytes. A series of dedicated image-processing workstations and associated software have been assembled to optimize each step of acquisition, reconstruction, post-processing, registration, visualization, and dissemination. This talk will describe the image-processing pipelines from acquisition to dissemination that have become critical to our everyday work.

BIOGRAPHY: **Dr. G. Allan Johnson** completed his Ph.D. in physics under Duke Professor Walter Gordy in 1974. He joined the Department of Radiology that same year where he worked on the first CT system at Duke. From 1979-2009 he served as Director of Diagnostic Physics, where he was engaged in translating CT and MR technology into application. He was responsible for the installation of the world's first clinical high-field (1.5 T) MR system from 1982-1989. He founded the Center for In Vivo Microscopy <http://www.civm.duhs.duke.edu/> in 1986. He is the inaugural Charles E. Putman Professor of Radiology, Physics, and Biomedical Engineering.

## IMAGE-GUIDED PROCEDURES, ROBOTIC INTERVENTIONS, AND MODELING

CONFERENCE 9786 · Paper Number 9786-49

### Robot-Assisted Tumor Resection: Palpation, Incision, Debridement, and Adhesive Closure

Tuesday 1 March 2016

1:20 to 2:20 pm · Location: California



**Ken Goldberg**

Univ. of California, Berkeley (USA)

ABSTRACT: With Doug Boyd at UC Davis, we are developing tooling and learning algorithms to facilitate supervised automation of surgical subtasks. We'll discuss our recent work on palpation, dissection, retraction, debridement, and adhesive closure.

BIOGRAPHY: **Ken Goldberg** is an artist and UC Berkeley professor. He and his students investigate robotics, automation, art, and social media. Ken is Director of the People and Robots Initiative (a CITRIS multicampus multidisciplinary research program established in April 2015) and UC Berkeley's Automation Sciences Research Lab (since 1995). Ken earned dual degrees in Electrical Engineering and Economics from the University of Pennsylvania (1984) and MS and PhD degrees from Carnegie Mellon University (1990). He joined the UC Berkeley faculty in 1995 where he is Professor of Industrial Engineering and Operations Research (IEOR), with secondary appointments in Electrical Engineering/Computer Science (EECS), Art Practice, the School of Information, and in the Department of Radiation Oncology at the UCSF Medical School.

Ken has published over 200 peer-reviewed technical papers on algorithms for robotics, automation, and social information filtering; his inventions have been awarded eight US Patents. He is Editor-in-Chief of the IEEE Transactions on Automation Science and Engineering (T-ASE), Co-Founder of the Berkeley Center for New Media (BCNM), the African Robotics Network (AFRON), the Center for Automation and Learning for Medical Robotics (CAL-MR), the CITRIS Data and Democracy Initiative (DDI), Hybrid Wisdom Labs, and Moxie Institute.

Ken's art installations are related to his research and have been exhibited at venues including the Whitney Biennial, Berkeley Art Museum, SF Contemporary Jewish Museum, Pompidou Center, Buenos Aires Biennial, and the ICC in Tokyo. Ken co-wrote three award-winning Sundance documentary films, "The Tribe", "Yelp", and "Connected: An Autobiography of Love, Death, and Technology" and co-directed the Emmy-Nominated Short Doc "Why We Love Robots." Ken's artwork is represented by the Catharine Clark Gallery in San Francisco and he is Founding Director of UC Berkeley's Art, Technology, and Culture Lecture Series (since 1997).

Ken was awarded the Presidential Faculty Fellowship in 1995 by Bill Clinton, the National Science Foundation Faculty Fellowship in 1994, the Joseph Engelberger Robotics Award in 2000, and elected IEEE Fellow in 2005. He lives in the Bay Area with his daughters and wife, filmmaker and Webby Awards founder Tiffany Shlain.

## BIOMEDICAL APPLICATIONS IN MOLECULAR, STRUCTURAL, AND FUNCTIONAL IMAGING

CONFERENCE 9788 · Paper Number 9788-15

### Interesting *in-Vivo* Magnetic Resonance Experiments that are Not Quite Ready for Prime Time and Some that Are!

Wednesday 2 March 2016

10:10 to 11:10 am · Location: Royal Palm One



**Joseph Ackerman**

Washington Univ. in St. Louis (USA)

ABSTRACT: Magnetic resonance imaging (MRI) offers the advantages of full field-(depth)-of-view, no exposure to ionizing radiation, and myriad endogenous (and exogenous) contrasts. Disadvantages are related to low signal-to-noise sensitivity, which for biomedical related experiments relegates most protocols to detection of the water 1H (proton) MR signal and, for a given contrast, results in long scanning times (minutes). Despite these limitations, MRI has proven to provide remarkable functional and structural insights into intact functioning biological systems, from the cultured cell to mouse to man.

Our laboratory and collaborators are focused on the development and implementation of MRI methods that elucidate and take advantage of the biophysics underlying the "structure" of the MR signal to more deeply characterize tissue biology and pathophysiology. This presentation will focus on four active areas of investigation: (i) development of a mouse model of Gamma Knife-induced late time-to-onset radiation necrosis and the subsequent monitoring of its remarkable drug-enabled mitigation, (ii) use of N-acetyl-aspartate (NAA) as an MR-active intra-neuronal marker of "intracellular" diffusion, and changes therein in stroke, (iii) measurement of the intracellular water residence/pre-exchange lifetime in neurons and in astrocytes via the "Brains-on-Beads" system, and (iv) determination of the longitudinal (spin-lattice) 1H MR relaxation of tissue water to map dissolved oxygen content (pO<sub>2</sub>).

BIOGRAPHY: **Joseph J. H. Ackerman, Ph.D.**, is the William Greenleaf Eliot Professor of Chemistry at Washington University in Saint Louis and holds joint appointments in the Departments of Radiology and Internal Medicine. Ackerman received his Chemistry B.A. from Boston University and Ph.D. from Colorado State University. He was an NIH Postdoctoral Fellow at the University of Oxford, Oxford, UK. Ackerman is a Gold Medal awardee and Fellow of the International Society for Magnetic Resonance in Medicine (ISMRM).

## DIGITAL PATHOLOGY

CONFERENCE 9791 · Paper Number 9791-1

### Current Challenges in Digital Pathology

Wednesday 2 March 2016

1:20 to 2:20 pm · Location: Golden West



**Kenneth Bloom**

Clairent, Inc. (USA)

ABSTRACT: Digital Pathology is an enabling technology that holds the promise to transform anatomic pathology into an objective science, but major hurdles still exist. The regulatory landscape of WSI (whole slide imaging) is still evolving. In the United States,

the US Food and Drug Administration has indicated that WSI systems are class III medical devices and thus will require premarket approval. Several vendors are in the process of obtaining approval to use these systems for primary diagnosis, but the value of digital pathology extends far beyond replacing the microscope. Once untethered from the microscope pathologists will be able to utilize the full power of the next generation of tools and techniques waiting to be developed. Multiplexing, machine learning, quantitative image analysis, interpreting spatial relationships and integration with other large data sets are but a few of the applications waiting to be perfected. I will discuss the current challenges in digital pathology, where and how I believe basic research will be most effective and future trends in pathology.

BIOGRAPHY: **Kenneth J. Bloom, MD** has been the Chief Medical Officer since 2005 and was the original Medical Director of Clarent Diagnostic SeNices. Dr. Bloom's career spans more than 30 years including key positions in start-up companies, University-based Medical Centers and commercial laboratories. As an early adopter of information technology, Dr. Bloom developed the Pathology Information System at Rush Medical Center and helped design the hospital's Tumor Registry and Surgical Information System. Using this technology, Dr. Bloom co-founded Initiate Systems, which just prior to its sale to IBM, was estimated to hold an 80% share of the software market that linked individual patient records across various healthcare databases. During his residency, Dr. Bloom developed the first commercial Telepathology system and co-authored the key technical papers. He was an invited speaker at the First International Conference on Clinical Application of Telemedicine in Tromsø, Norway in 1993.

Dr. Bloom came to Clarent from Irvine CA-based U.S. Lobs, where he served as Senior Medical Director since 2002. Dr. Bloom's academic posts have included Clinical Professor of Pathology at USC, Keck School of Medicine, Associate Professor of Pathology at Rush Medical College and one year as a visiting Professor in the Department of Computer Science at DePaul University. Over the past 15 years, Dr. Bloom has held more than 10 appointed positions at Chicago-based Rush Presbyterian-St. Luke's Medical Center, one of the leading cancer research hospitals in the US. Those positions included Director of Laboratory Operations, Director of Immunohistochemistry, Consultant to the Rush Breast Cancer Center, and Director of Information Services for the Rush Cancer Institute.

## IMAGE PERCEPTION, OBSERVER PERFORMANCE, AND TECHNOLOGY ASSESSMENT

CONFERENCE 9787 · Paper Number 9787-1

### Image Perception Foundation of Success for NLST

Thursday 3 March 2016

8:00 to 9:00 am · Location: California



**Francine Jacobson**  
Brigham & Women's Hospital (USA)

**ABSTRACT:** The introduction of helical CT, allowing imaging of lungs during a single breath-hold provided unprecedented non-invasive visualization of lung parenchyma. Advances in technology required a new paradigm for viewing CT and MR images. My image perception research began with the exploration of

stacked image viewing, serving as an observer and as an investigator of features that drew radiologist attention while searching for simulated nodules in known locations. Nodule detection is fundamental to lung cancer screening CT. Multidetector CT technology has continued to increase our understanding of the features of early lung cancer and lung parenchyma. Precision medicine demands attention to many previously overlooked features that have phenotypic significance for disease classification, treatment, and outcome. Quantitative evaluation of lung parenchyma now provides valuable data although subjective evaluation by the expert observer remains important for validation of findings and identification of subtle features that do not lend themselves to quantitative measurement. The potential for lung cancer screening CT to improve health extends beyond cancer to the detection of subtle lung disease and coronary artery calcifications. Radiologists face new challenges for integration of quantitative and qualitative information at a level usually associated with clinical trials for the 9 million Americans who meet current lung cancer screening CT guidelines. It is time for new paradigms in image viewing and assessment of technology and observer performance that are central to image perception science.

**BIOGRAPHY:** **Dr. Francine Jacobson** piloted the MD-MPH program and the University of Miami School of Medicine receiving both degrees in May, 1986, followed by internship and residency at Maine Medical Center, and fellowship in thoracic radiology at Brigham and Women's Hospital. She joined the faculty in 1992 and currently oversees The Brigham and Women's Health Care Lung Cancer Screening program at Brigham and Women's Hospital, Dana-Farber Cancer Institute, Brigham and Women's Faulkner Hospital, and Cape Cod Hospital. She served as the initial site PI for NLST, co-chaired the AATS Task Force for Lung Cancer Screening and Surveillance, and currently serves as site radiologist for COPDGene.

## New SPIE Books

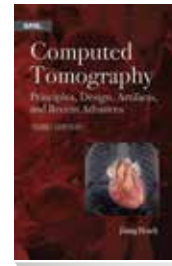


### Multimodality Breast Imaging: Diagnosis and Treatment

**Editors: E. Y. K. Ng, Jasjit S. Suri, Rangaraj M. Rangayyan, U. Rajendra Acharya**

**Vol. PM227**

Print: SPIE Member \$114  
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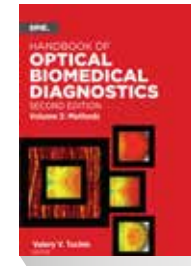
### Computed Tomography: Principles, Design, Artifacts, and Recent Advances, Third Edition

**Jiang Hsieh**

**Vol. PM259**

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# TECHNICAL WORKSHOPS

These technical workshops are included with your registration.

SUNDAY WORKSHOPS · 5:45 to 7:45 pm

## Interventional Procedures: Emerging Technologies and Clinical Applications

**WK1 TECHNICAL WORKSHOP: PHYSICS OF MEDICAL IMAGING (CONFERENCE 9783) AND IMAGE-GUIDED PROCEDURES, ROBOTIC INTERVENTIONS AND MODELING (CONFERENCE 9786)**

Sunday 28 February 2016 · 5:45 to 7:45 pm  
Location: Town & Country

WORKSHOP CHAIRS:

**Despina Kontos**, The Univ. of Pennsylvania Health System (USA)

**Ziv Yaniv**, National Library of Medicine (USA)

Recent advances in the technology of interventional imaging are currently making possible unprecedented opportunities for innovative procedures that will change clinical management of patients to more accurately detect disease and better guide therapeutic procedures. From novel angiography techniques, to artery embolization, radiofrequency ablation, and minimally-invasive surgery, these advances are moving Interventional Radiology towards a more personalized, precision medicine approach, that will improve both patient quality of life and long-term outcomes. This workshop will include a panel of experts that will cover topics from developments in basic imaging science and imaging technology engineering, to commercial product development and translation in clinical applications, aiming to provide a broad overview of recent advances in interventional imaging procedures and spearhead related discussion among panel attendees.

SPEAKERS:

**Terry Peters**, Robarts Research Institute (USA)

*Imaging Systems for Minimally-Invasive Surgery*

**Jeffrey H. Siewerdsen**, Johns Hopkins Univ. (USA)

*Interventional Imaging Technologies for Therapy Guidance*

**Kullervo Kynnyen**, Sunnybrook Health Sciences Ctr. (Canada)

*Applications of Non-Invasive Surgery and Targeted Therapeutics*

**Dorin Comaniciu**, Siemens Healthcare (USA)

*Technology Transfer of Interventional Imaging Technologies to the Clinic*

## Sensing Challenges and Prospects in Miniaturizing Surgical Robots and Tools

**WK4 TECHNICAL WORKSHOP: IMAGE-GUIDED PROCEDURES, ROBOTIC INTERVENTIONS, AND MODELING (CONFERENCE 9786)**

Sunday 28 February 2016 · 5:45 to 7:45 pm  
Location: California

WORKSHOP CHAIR:

**Jessica Burgner-Kahrs**, Leibniz Univ. Hannover (Germany)

The workshop brings together experts in computer aided and robot-assisted surgery and experts in small scale sensor technology. The current challenges in further miniaturizing surgical robots and tools in terms of mechanical and sensory requirements will be elaborated. We will in particular regard needle-size surgical manipulators such as concentric tube continuum robots which are very promising for minimally invasive interventions through natural orifices such as transnasal skull base surgery and transurethral urologic surgery. Afterwards, current developments in flexible electronics and miniaturized sensors will be presented. Finally, we will discuss integration requirements and prospects for surgical applications in a panel discussion.

Each speaker will give a short presentation followed by a panel discussion.

PANELISTS:

**Jenny Dankelman**, TU Delft (Netherlands)

*Novel designs to miniaturize needles, catheters, and surgical tools*

**Dan Popa**, Univ. of Louisville (USA)

*A view from microns and millimeters to human size*

**Robert J. Webster III**, Vanderbilt Univ. (USA)

*Why the design, sensing, and planning communities must collaborate to create optical surgical robots*

SPIE/IFCARS JOINT WORKSHOP

## Information Management, Systems Integration, Standards, and Approval Issues for the Digital Operating Room

**WK7 COMPUTER AIDED DIAGNOSIS (CONFERENCE 9785) AND PACS AND IMAGING INFORMATICS: NEXT GENERATION AND INNOVATIONS (CONFERENCE 9789)**

Sunday 28 February 2016 · 5:45 to 7:45 pm  
Location: Golden West

WORKSHOP CHAIRS:

**Leonard Berliner**, New York Methodist Hospital (USA)

**Heinz Lemke**, Computer Assisted Radiology and Surgery (Germany)

It has been challenging to put into practice in the Operating Room (OR) many of the new technological and system advances, associated interventional procedures and the corresponding redesign of healthcare infrastructures. Four main areas of technology development for the Digital OR (DOR) can be identified:

1. Devices, including signal detection and recording, robotics, guidance systems, simulation technologies, which allow precision in the delivery of personalized operative healthcare;
2. IT Infrastructure, including DICOM, IHE, EMR, Therapy Imaging and Model Management System (TIMMS) infrastructure for the storage, integration, processing and transmission of patient specific data;
3. Functionalities, including specific interventional processes, patient specific modelling, optimization of surgical workflow, TIMMS engines and,
4. Visualization, including the processing, transmission, display and storage of images, video, and physiologic signals (e.g. a type of surgical PACS).

A PACS-like architecture and its application for the management of image and model guided therapy has been the subject of discussions in the DICOM and IHE standard activities. With the initiation of the new IHE Surgery Domain, this SPIE / IFCARS Joint Workshop focuses on presentations and discussions on topics such as:

- The Digital OR infrastructure and IHE Surgery
- OR.NET - the German OR-IT integration project
- SCOT - the Japanese OR-IT integration project
- MD PnP - a USA OR-IT integration project
- Viewpoints from industry and bridging the Radiology - Surgery gap
- IHE Surgery Planning and Technical Committee Work Tasks
- Proposal for IHE Integration Profiles,
- Approval and certification strategies

PANELISTS/SPEAKERS:

**Yoshihiro Muragaki**, Tokyo Women's Medical University, (Japan)

**Kirby Vosburgh**, Brigham and Women's Hospital, (USA)

**Ron Schilling**, EchoPixel, Inc., (USA)

**Erik Schreiber**, University of Leipzig, ICCAS, (Germany)

**Armin Janss**, RWTH, Aachen, (Germany)

**David Hilderbrand**, 3si Surgical Workflow (USA)



# TECHNICAL PANEL AND WORKSHOPS

TUESDAY PANEL · 3:30 to 4:50 pm

## SPIE-AAPM-NCI PANEL DISCUSSION CAD Grand Challenges: Paving the Way for Imaging in the Era of Precision Medicine

Tuesday 1 March 2016 • 3:30 to 4:50 pm  
Location: Golden West

MODERATOR:  
**Samuel G. Armato III**, The Univ. of Chicago (USA)

PANELISTS:  
**Maryellen Giger**, The Univ. of Chicago (USA)  
**Ronald M. Summers**, National Institutes of Health (USA)  
**Joel H. Saltz**, Stony Brook Univ. (USA)  
**Fabrice Meriaudeau**, Univ. de Bourgogne (France)  
**Hugo Aerts**, Dana-Farber Cancer Institute (USA)

As part of the 2016 SPIE Medical Imaging Symposium, the CAD Conference will host a panel discussion to explore current imaging challenges that are worthy of becoming the subject of a future CAD Grand Challenge. The successful LUNGx Challenge that was held in conjunction with the 2015 SPIE Medical Imaging Symposium (Armato III, et al., *Journal of Medical Imaging*, 2015) involved quantitative image analysis methods (radiomics) for the classification of malignant and benign lung nodules on thoracic CT scans—an important and clinically significant issue, but one that has been under investigation for decades. This panel discussion will encourage attendees to think about the next generation of radiologic tasks that should be advanced through the commitment of a Grand Challenge. The panel also will touch on the technical requirements necessary to develop an open-source informatics infrastructure for the support of grand challenges and the evaluation of clinical support systems.

## Image Synthesis

WK2 IMAGE PROCESSING (CONFERENCE 9784)

Tuesday 1 March 2016 • 5:00 to 7:00 pm  
Location: San Diego

WORKSHOP CHAIRS:  
**Jerry Prince**, Johns Hopkins Univ. (USA)  
**Sebastien Ourselin**, Univ. College London (United Kingdom)

Acquisition of truly calibrated magnetic resonance images is not currently possible. Scanners and pulse sequences are different—in subtle ways sometimes and quite dramatic ways more often. As a consequence, the use of MR images for automatic image analysis yields inconsistent results. Image synthesis can be used to normalize and impute imaging data from missing pulse sequences, both of which can improve subsequent image processing steps such as segmentation and registration. Cross modality synthesis can also be used to create patient-specific models and priors, informing complex image analysis processes such as the reconstruction of PET/MR data using MR-derived synthetic CT images.

These are just two key applications where image synthesis is proving to be useful in medical imaging. In fact, there has been considerable recent research on both the methods and applications of image synthesis in medical imaging. Despite literature on the general topic going back at least two decades, however, its practice remains somewhat controversial. This workshop will be split into three parts. First, the chairs will present a historical background on image synthesis, framing key developments in medical imaging, computer vision, and image processing that relate to the current practice. Second, the speakers will describe key methods that have been shown to work well for certain modern applications. Third, the chairs and speakers will together form a panel to engage the audience in a conversation about the current practice and applications of image synthesis and to speculate about its future.

WORKSHOP SPEAKERS:  
**Snehashis Roy**, Henry M. Jackson Foundation (USA)  
**M. Jorge Cardoso**, Univ. College London (United Kingdom)

TUESDAY WORKSHOPS · 5:00 to 7:00 pm

## Live Demonstrations

WK3 TECHNICAL WORKSHOP: COMPUTER-AIDED  
DIAGNOSIS (CONFERENCE 9785)

Tuesday 1 March 2016 • 5:00 to 7:00 pm  
Location: Grand Exhibit Hall

WORKSHOP CHAIRS:  
**Dr. Heang-Ping Chan**, Univ. of Michigan Health System, (USA)  
**Dr. Horst Hahn**, Fraunhofer MEVIS, (Germany)

The goal of this workshop is to provide a forum for systems and algorithms developers to show off their creations. The intent is for the audience to be inspired to conduct derivative research, for the demonstrators to receive feedback and find new collaborators, and for all to learn about the rapidly evolving field of medical imaging. The Live Demonstration Workshop will be held as part of the 2016 SPIE Medical Imaging Conference on Tuesday, 1 March 2016 from 5:00 pm to 7:00 pm.

The Live Demonstration Workshop invites participation from all of the conferences that comprise the SPIE Medical Imaging Conference. We encourage the CAD, Digital Pathology, Image Processing, PACS, Perception, Physics, Visualization, and all other conferences to participate.

This workshop features interactive demonstrations that are complementary to the topics of SPIE Medical Imaging. Workshop demonstrations include samples, systems, and software demonstrations that depict the implementation, operation, and utility of cutting-edge as well as mature research. Having an accepted SPIE Medical Imaging paper is not required for giving a Live Demonstration; however, authors of SPIE Medical Imaging papers are encouraged to submit demonstrations that are complimentary to their oral and poster presentations.

## NIH Funding Opportunities: Navigating the System and Tips for Applicants

WK6 PHYSICS OF MEDICAL IMAGING (WK6 PHYSICS OF MEDICAL IMAGING (9783))

Tuesday 1 March 2016 • 5:00 to 7:00 pm  
Location: Town & Country

WORKSHOP CHAIR:  
**Antonio Sastre**, National Institute of Biomedical Imaging and Bioengineering (USA)

The Workshop will provide an introduction and refresher to NIH funding opportunities for both beginners and more experienced applicants. Topics to be covered include:

- how to find your “home” among the 24 NIH Institutes and Centers that fund grants,
- how to select the best grant mechanism for your research topic, the state of development of your ideas and the amount of supporting preliminary data,

## Validation of Medical Image- Perception Models

WK5 IMAGE PERCEPTION, OBSERVER PERFORMANCE,  
AND TECHNOLOGY ASSESSMENT (CONFERENCE 9787)

Tuesday 1 March 2016 • 5:00 to 7:00 pm  
Location: California

WORKSHOP CHAIRS:  
**Craig K. Abbey**, Univ. of California, Santa Barbara, (USA)  
**Matthew A. Kupinski**, College of Optical Sciences, The Univ. of Arizona, (USA)

Computational models that perform or mimic the performance of diagnostic tasks are playing a greater role in support of improved diagnoses in medical imaging. Examples of applications in which such models are used include computer-aided diagnosis, display calibration, and image quality assessment. Given the breadth and complexity of perceptual processes in medical imaging, appropriate validation of models is a crucial component of their development.

This workshop will focus on rigorous methods to validate models of perception and performance in diagnostic tasks. The panel will present various perspectives on this topic, including the relation to general prediction algorithms, validation of optimal models, validation of CAD algorithms, and broader clinical considerations in model validation.

PANELISTS:  
**Craig K. Abbey**, Univ. of California, Santa Barbara, (USA)  
**Jovan B. Brankov**, Illinois Institute of Technology, (USA)  
**Matthew A. Kupinski**, College of Optical Sciences, The Univ. of Arizona, (USA)  
**Frank W. Samuelson**, U.S. Food and Drug Administration (USA)  
**Robert M. Nishikawa**, Univ. of Pittsburgh (USA)

- how to evaluate the best fit between your grant application and the many review panels at the NIH Center for Scientific Review,
- suggestions and program perspective on how to structure grant applications to best convey your ideas,
- guidance on the various NIH staff who are available to help at different stages of the process.

The Workshop will also cover the very different programmatic and review considerations for some of the more common grant mechanisms, such as R21s, R01s, and BRPs.



## COURSES

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SPIE has applied to CAMPEP to award MPCECs (Medical Physics Continuing Education Credits) for courses at Medical Imaging 2015. If you attend one of our Medical Imaging courses and meet CAMPEP's qualifications you may apply for these credits at no charge. CAMPEP is a continuing professional education accreditation organization specific to the medical imaging community.

SPIE reserves the right to cancel a course due to insufficient advance registration.



## GET SMARTER

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### Fundamentals of Medical Image Processing and Analysis



**SC086 • Course Level: Intermediate • CEU: 0.65**  
**\$570 Members | \$660 Non-Members USD**  
**Saturday 8:30 am to 5:30 pm**

Instructor: **Thomas Deserno**

This course gives an overview of medical image formation, enhancement, analysis, visualization, and communication with many examples from medical applications. It starts with a brief introduction to medical imaging modalities and acquisition systems. Basic approaches to display one-, two-, and three-dimensional (3D) biomedical data are introduced. As a focus, image enhancement techniques, segmentation, texture analysis and their application in diagnostic imaging will be discussed. To complete this overview, storage, retrieval, and communication of medical images are also introduced.

In addition to this theoretical background, a 45 min practical demonstration with ImageJ is given. For this course, ImageJ is appropriately configured with useful plug-ins (e.g. DICOM import, 3D rendering) and distributed on CD-ROM. Attendees are welcome to perform on their own laptop computers.

### Graph Algorithmic Techniques for Biomedical Image Segmentation

**SC1026 • Course Level: Intermediate • CEU: 0.35**  
**\$360 Members • \$410 Non-Members USD**  
**Monday 8:30 am to 12:30 pm**

Instructors: **Mona Garvin and Xiaodong Wu**

This course provides an in-depth overview of two state-of-the-art graph-based methods for segmenting three-dimensional structures in medical images: graph cuts and the LOGISMOS (Layered Optimal Graph Image Segmentation of Multiple Objects and Surfaces) approach. Such graph-based approaches are becoming increasingly used in the medical image analysis community, in part, due to their ability to efficiently produce globally optimal three-dimensional segmentations in a single pass (not requiring an iterative numerical scheme). Additionally, LOGISMOS enables the simultaneous optimal detection of multiple surfaces in volumetric images, which is important in many medical image segmentation applications. In the first part of the course, we provide a broad overview of both graph cuts and the LOGISMOS approach, including the presentation of a number of example applications. In the second and third parts of the course, we present the algorithmic details of graph cuts and the LOGISMOS approach, respectively. In the final part of the course, we discuss the design of cost functions, which is of paramount importance in any graph-based approach.

### ROC Analysis and Observer Studies to Evaluate Imaging Technology

**SC1127 • Course Level: Introductory • CEU: 0.65**  
**\$570 Members • \$660 Non-Members USD**  
**Saturday 8:30 am to 5:30 pm**

Instructors: **Stephen Hillis, Robert Nishikawa, and Frank Samuelson**

Short of a clinical trial, observer studies are used to measure the performance of radiologists and to compare different imaging technologies with the aim of understanding how the technology might be used clinically. The goal of this course is to provide guidance on how to design, conduct, and analyze an observer study. We will examine how to plan an observer study, step by step, and then how to implement the plan in detail. The focus will be on pitfalls and common mistakes.

We will review basic ROC analysis and commonly used methods for analyzing multireader, multicase (MRMC) ROC observer data. Related software and sample-size estimation will also be discussed and demonstrated using real datasets.

The participants will take part in some simulated reader studies using a computer interface, compete for prizes, and depart with a better understanding of reader studies of diagnostic imaging devices.

***Class participants should bring a laptop or tablet computer to the course. Participants will use this computer for analyzing data, performing sample-size estimation, and participating in live interactive reader studies.***

### Photon Counting X-ray Imaging: Technology and Methods

**SC1129 • Course Level: Introductory • CEU: 0.35**  
**\$360 Members • \$410 Non-Members USD**  
**Sunday 1:30 pm to 5:30 pm**

Instructors: **Mats Danielsson and Fredrik Grönberg**

This course explains the principles of photon counting detectors for spectral x-ray imaging. Typical technical implementations are described and fundamental differences to energy integrating systems are pointed out. In particular, the issues of high-rate handling and the effect of detector cross talk on energy resolution are described. Requirements on electronics for spectral imaging in computed tomography is also discussed.

A second objective of the course is to describe how energy sensitive counting detectors make use of the energy sampling of the linear attenuation coefficients of the background and target materials for any given imaging task; methods like material basis decomposition and optimal energy weighting will be explained.

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## ITK in Biomedical Research and Commercial Applications NEW

**SC1182 • Course Level: Introductory • CEU: 0.65**  
**\$570 Members • \$660 Non-Members USD**  
**Saturday 8:30 am to 5:30 pm**

Instructors: **Matthew McCormick, Stephen Aylward, Hans Johnson, and Bradley Lowekamp**

The Insight Segmentation and Registration Toolkit ([www.itk.org](http://www.itk.org)) has become a standard in academia and industry for medical image analysis. In recent years, the ITK developers' community has focused on providing programming interfaces to ITK from Python, Java, and Javascript and making ITK available via leading applications such as Slicer and ImageJ.

In this course we present best practices for taking advantage of ITK in your imaging research and commercial products. Via interactive examples that attendees can run on their laptops during the course, we show how ITK can speed research and commercial product development. We demonstrate how script writing and interactive GUIs can be used to access the algorithms in ITK and the multitude of ITK extensions that are freely available on the web. We also cover the opportunities and challenges with using open-source software in research and in commercial applications: from prototypes that can lead to venture capital funding to applications for first-in-human trials and ultimately for regulatory approval.

## Modern Diagnostic X-Ray Sources NEW

**SC1183 • Course Level: Introductory • CEU: 0.35**  
**\$490 Members • \$540 Non-Members USD**  
**Saturday 8:30 am to 12:30 pm**

Instructor: **Rolf Behling**

This lecture will provide a sound basis for understanding the physics of production of "clinical" X-rays for diagnostics and briefly touch therapeutic use. It will treat functional principles of X-ray sources including high voltage supply. Design aspects, special features, radiation protection, and modern performance metric, manufacturing technology, and cost aspects will be discussed. Why is vacuum technology not at all outdated? Will we find the X-ray LED, compact X-ray Lasers or flat panel sources in medical imaging soon? Why do hundreds of tube types populate the market? The lecture will cover system performance aspects related to the source, material boundary conditions, and manufacturing technology.

The quest for affordable healthcare demands for trade-offs between value and cost, and objective

comparison of tube types. Initial costs and costs of tube replacement will be discussed as well as means to extend tube life and to save natural resources. Last but not least, the lecture may spark fascination for this species of off-the-mainstream vacuum electronics light sources.

COURSE PRICE INCLUDES the text *Modern Diagnostic X-Ray Sources, Technology, Manufacturing, Reliability* (CRC Press, 2015) by Rolf Behling.

## Methodology for Measuring Functional Connectivity in Neuroimaging Data Analysis NEW

**SC1184 • Course Level: Intermediate • CEU: 0.35**  
**\$360 Members • \$410 Non-Members USD**  
**Monday 8:30 am to 12:30 pm**

Instructor: **Tianhu Lei**

A dynamic version of neuroimaging data analysis not only emphasizes the functional specifications of brain regions, but also focuses on the massively parallel nature of distributed and interacting regions that are hypothesized to process the functional tasks under investigations. Studying brain interactions leads to an emerging field: Functional Connectivity.

Functional connectivity between two brain units (neuron columns, recording sites, regions) are generally defined as the temporal correlation among their time courses. Its objective is to capture the dynamic, context-dependent processes that may lead to preferential recruitment of some units over others.

Five classical measures – Mutual and Magnitude coherence, Phase synchronization, Mutual Information, Coefficient of determination, and Phase-Locking value are developed to assess Functional connectivity. They are applied to different neuroimaging disciplines: functional Magnetic Resonance Imaging (fMRI), Magnetoencephalography (MEG), and Electroencephalography (EEG).

To tackle problems inherent in classical measures – i.e., the assumption of stationarity of Time Series, the time-invariance of Functional connectivity, and the lack of directional information flow between brain units – a methodology for Dynamic Functional Connectivity is also developed.

## Radiation Dosimetry in Diagnostic Radiology: A Primer NEW

**SC1185 • Course Level: Introductory • CEU: 0.35**  
**\$360 Members • \$410 Non-Members USD**  
**Tuesday 1:30 pm to 5:30 pm**

Instructor: **Andrew Maidment**

This course provides a foundation of knowledge in radiation dosimetry for scientists and engineers who need to work with dosimetric quantities. Topics to be covered include: a review of the medical uses of ionizing radiation; the basics of radiation biology, including the bioeffects of radiation and radiation injury mechanisms; the concepts of kerma and dose; measurement methods for kerma and dose; the uncertainty of these measurements; application specific dosimetric quantities (such as those for mammography or CT); and methods for reporting dose including DICOM dose structured reports. The course will serve to separate fact from fiction. At the conclusion of the course, attendees should understand the various dosimetric quantities reported with modern medical images.

## MIC-GPU: High-Performance Computing for Medical Imaging on Programmable Graphics Hardware (GPU)

**SC829 • Course Level: Intermediate • CEU: 0.35**  
**\$360 Members • \$410 Non-Members USD**  
**Saturday 1:30 pm to 5:30 pm**

Instructor: **Klaus Mueller and Sungsoo Ha**

Advanced graphics boards have become a standard ingredient in any mid-range and high-end PC, and aside from enabling stunning interactive graphics effects in computer games, their rich programmability allows speedups (over CPU-based code) of 1-2 orders of magnitude also in general-purpose computations. This course explains, in gentle ways, how to exploit this powerful computing platform to accelerate various popular medical imaging applications, such as CT, MRI, image processing, and data visualization. It begins by introducing the basic GPU architecture and its programming model, which establishes a solid understanding on how general computing tasks must be structured and implemented on the GPU to achieve the desired high speedups. Next, it examines a number of standard 2D and 3D medical imaging operators, such as filtering, sampling, statistical analysis, transforms, projectors, etc, and explains how these can be effectively accelerated on the GPU. Finally, it

puts this all together by describing the full GPU-accelerated computing pipeline for a representative set of medical imaging applications, such as analytical and iterative CT, MRI, image enhancement chains, and volume visualization.

## Spectral CT Imaging

**SC987 • Course Level: Intermediate • CEU: 0.35**  
**\$360 Members • \$410 Non-Members USD**  
**Sunday 8:30 am to 12:30 pm**

Instructors: **Bernhard Schmidt, Thomas Flohr, and Katharine Grant**

This course provides attendees with an advanced knowledge of spectral CT imaging. The course focuses on the properties of a spectral CT measurement and the main applications in spectral CT reconstruction and spectral CT image post-processing. Many clinical examples of spectral CT imaging applications are provided to illustrate the diagnostic outcome of this technique.

## Early Career Professional Development in Medical Imaging

**WS757 • Course Level: Introductory • CEU: 0.35**  
**\$125 Members | \$175 Non-Members USD**  
**Tuesday 1:30 pm to 5:30 pm**

Instructor: **Elizabeth Krupinski**

This course provides attendees with strategies and ideas for navigating through the early years of Medical Imaging research in the academic environment. The course focuses on strategic career planning topics such as effective CV development, understanding the Promotion & Tenure process, resource negotiating tips, time management & organizational skills, and writing and winning research grants.

## Writing for Publication in Medical Imaging

**WS776 • Course Level: Introductory • CEU: 0.35**  
**\$125 Members | \$175 Non-Members USD**  
**Saturday 1:30 pm to 5:30 pm**

Instructor: **Kenneth Hanson**

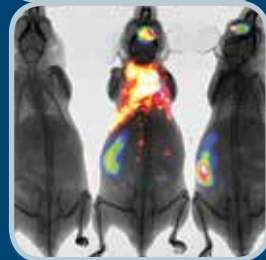
This course teaches attendees the skills needed to create well-written scientific articles for publication in journals or proceedings. We discuss the structure of a paper and the roles of its various parts. You will learn the principles of good technical writing and how to avoid common pitfalls. We will discuss how to use writer's aids, many of which are available on line.



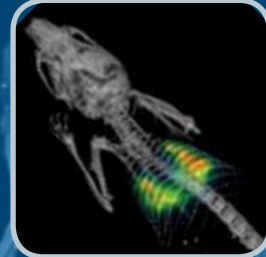
# Nine Imaging Modalities, Unlimited Research Capabilities



MRI  
MPI\*



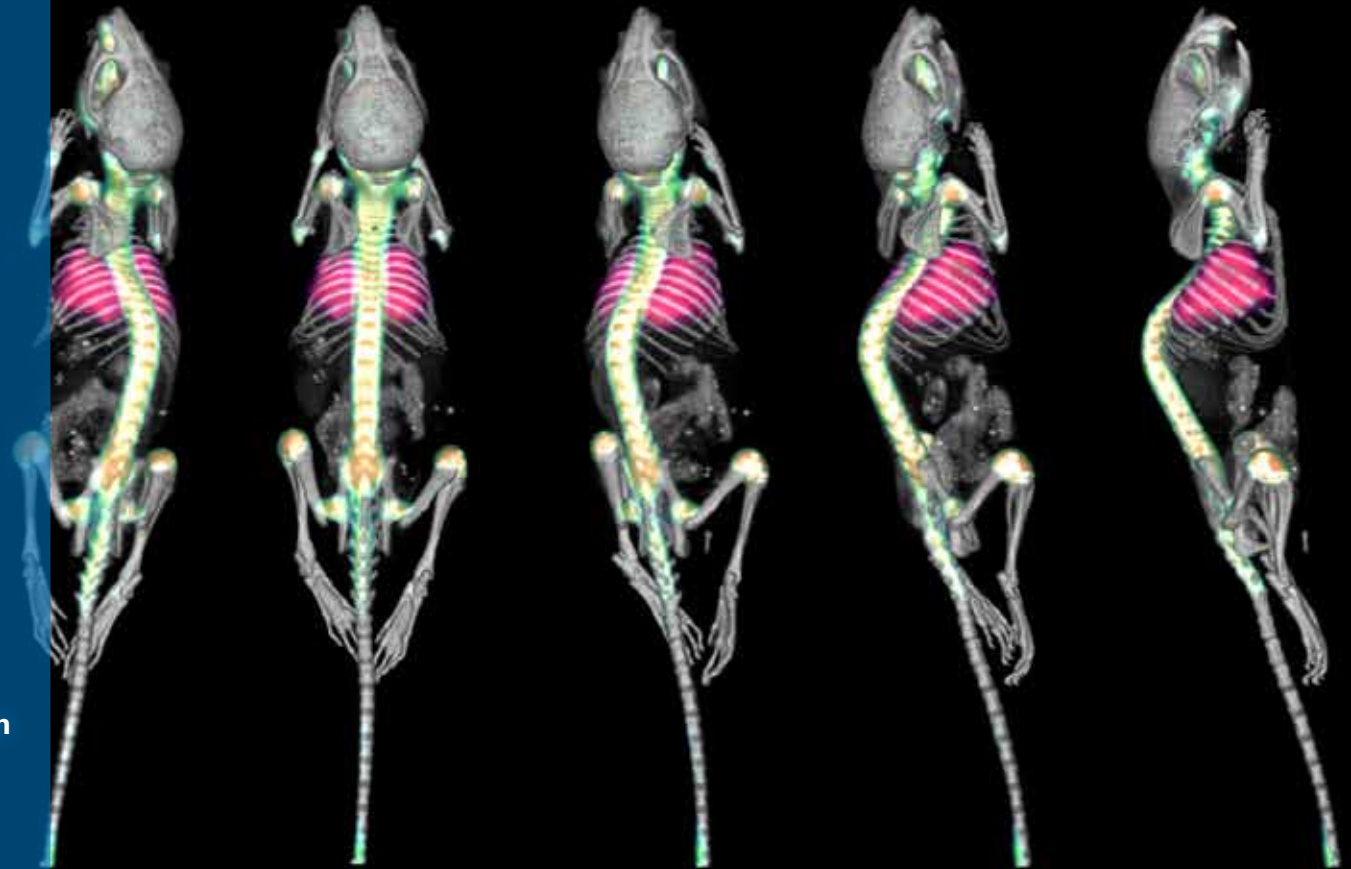
Fluorescence  
Luminescence  
Radioisotopic



PET  
SPECT  
CT



High Resolution  
Micro-CT



[www.bruker.com/preclinicalimaging](http://www.bruker.com/preclinicalimaging)

## POSTER PRESENTATIONS/RECEPTIONS

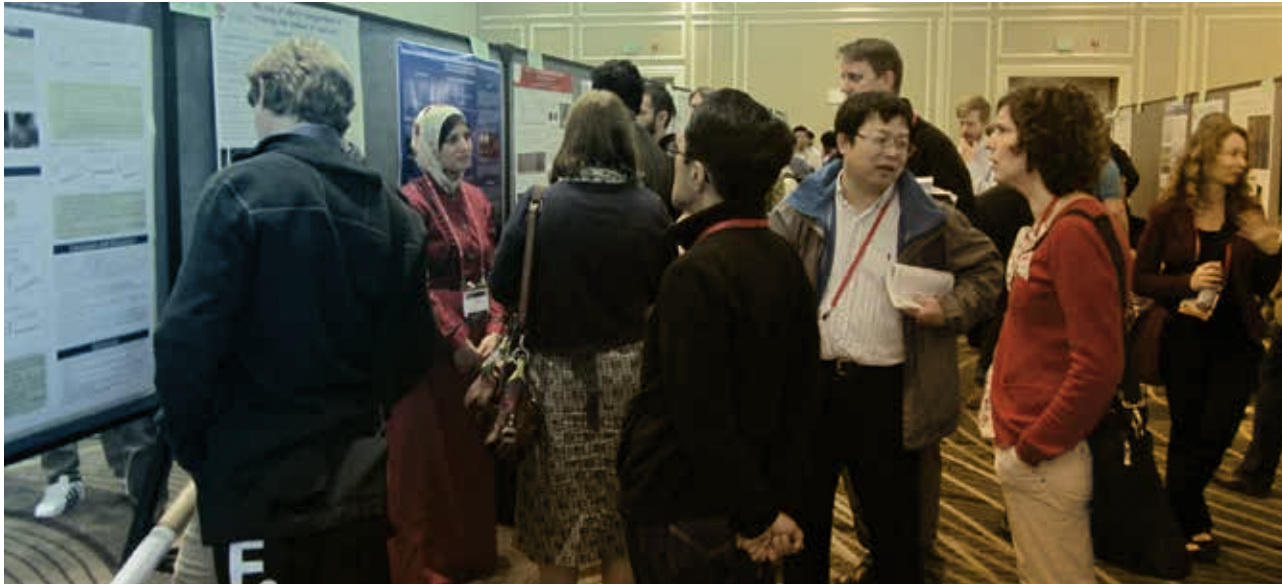


Photo courtesy of Ken Hanson

### POSTER SESSION INFORMATION

Location: Grand Exhibit Hall

Two poster sessions are scheduled. Poster authors will be in attendance during the Interactive Poster Sessions to answer questions. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field.

#### SUNDAY/MONDAY POSTER SESSION

Poster presentations from the Physics of Medical Imaging; Computer-Aided Diagnosis; Image-guided Procedures, Robotic Interventions, and Modeling; PACS and Imaging Informatics: Next Generation and Innovations; and Ultrasonic Imaging and Tomography conferences will be included.

**AUTHOR SET-UP TIME:** Sunday after 12:00 pm (noon)

Posters should remain on display until the end of the Interactive Poster Session on Monday.

**INTERACTIVE POSTER SESSION AND RECEPTION:**

Monday from 5:30 to 7:00 pm

**NOTE:** Extended poster viewing until 9:00 pm on Sunday and Tuesday.

Poster award winners will be recognized and certificates distributed in the conference meeting rooms. Check conference schedules for times and locations. Ribbons will identify winning posters during the Interactive Poster Sessions.

### 2016 Poster Awards Information

Location: Poster Awards presented in the Conference Rooms - Check the conference schedule for exact times.

Each conference will recognize selected poster presentations of exceptional quality at either the Cum Laude or Honorable Mention level. Winners will be chosen by members of conference review committees.

The winning posters will be identified during the receptions with award ribbons. Winners will be recognized and certificates distributed in the conference meeting rooms. See conference schedules for times and locations.

In addition, cum laude poster award recipients will be recognized in the Proceedings of SPIE volumes and the following year's Call for Papers.

#### RECOGNITION LEVELS:

**Each conference will recognize a selected poster at the cum laude level for the quality of work presented as well as the presentation. A number of posters, limited to no more than five percent, will receive honorable mention.**

#### BASIS FOR SELECTION:

Work should be of a standard of excellence as judged by the quality and quantity of results presented. It should include results that are both significant and new to the field of study. Conclusions should be well supported by the results, and relevant references should be cited.

Presentation should be well organized, clear, and concise. It should be self-contained, giving adequate background, concise results, and relevant references. Graphic design will be considered only to the extent that it contributes to the clarity of presentation.

A conference may give preference to first authors who are students or who are within five years of their terminal degrees..

#### TUESDAY/WEDNESDAY POSTER SESSION

Poster presentations from the Image Processing; Image Perception, Observer Performance, and Technology Assessment; Biomedical Applications in Molecular, Structural, and Functional Imaging; and Digital Pathology conferences will be included.

**AUTHOR SET-UP TIME:** Tuesday after 9:30 am

Posters should remain on display until the end of the Interactive Poster Session on Wednesday.

**INTERACTIVE POSTER SESSION AND RECEPTION:**

Wednesday from 5:30 to 7:00 pm

## MEDICAL IMAGING AWARD EVENTS

### 2016 Conference Awards

Award announcements will take place in the conference rooms on Tuesday before the morning coffee break.

#### Image-Guided Procedures Young Scientist Award

(CONFERENCE 9786)

Tuesday 1 March 2016  
9:40 to 9:45 am · Location: California

This award is specific to papers in the Image-Guided Procedures, Robotic Interventions, and Modeling conference 9786.

The young scientist award is a prize awarded to first authors of high-quality papers within the Image-Guided Procedures conference.

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#### Image-Guided Procedures Poster Presentation Awards

(CONFERENCE 9786)

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The Image-Guided Procedures, Robotic Interventions, and Modeling conference will offer cash prizes as part of the poster presentation awards. Poster presentations must be displayed early on the first day of the Sunday/Monday poster session to enter the competition. The space will be available to display posters beginning at 12:00 pm on Sunday. Award announcements will take place in the conference room before morning coffee break on Tuesday.

#### Physics of Medical Imaging Student Paper Award

(CONFERENCE 9783)

Tuesday 1 March 2016  
9:40 to 9:45 am · Location: Town & Country

This award is specific to papers in the Physics of Medical Imaging conference 9783.

The student paper award is a prize awarded to first authors of high-quality papers within the Physics of Medical Imaging conference.

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#### Physics of Medical Imaging Poster Presentation Awards

(CONFERENCE 9783)

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The Physics of Medical Imaging conference will offer cash prizes as part of the poster presentation awards. Poster presentations must be displayed early on the first day of the Sunday/Monday poster session to enter the competition. The space will be available to display posters beginning at 12:00 pm on Sunday. Award announcements will take place in the conference room before morning coffee break on Tuesday.

## SOCIAL NETWORKING EVENTS

Join your colleagues at these relaxed events, including a Student Lunch with the Experts and Women's Networking Lunch—events not to be missed!

Open to all paid conference attendees.  
May require ticket and/or sign-up.

#### Lunch with the Experts - A Student Networking Event

Sunday 28 February 2016 · 12:10 to 1:20 pm  
Location: Grand Exhibit Hall

*Open to Student Attendees  
Lunch ticket required*

Enjoy a casual meal with colleagues at this engaging networking opportunity. Hosted by SPIE Student Services, this event features experts willing to share their experience and wisdom on career paths in optics and photonics. Seating is limited and will be granted on a first-come, first-served basis.

#### Women's Networking Lunch

Tuesday 1 March · 12:10 to 1:20 pm  
Location: Royal Palm Five

*Lunch ticket required.*

Join other women in the field for informal discussions and networking during the scheduled lunch on Tuesday.

Sign up at registration required before morning coffee break on Tuesday.

## Journal of Medical Imaging

Maryellen Giger, The University of Chicago  
Editor-in-Chief

The *Journal of Medical Imaging* publishes peer-reviewed papers on the scientific development of fundamental and translational research and applications focused on medical imaging, which continue to yield physical and biomedical advancements in the early detection, diagnostics, and therapy of disease, as well as in the understanding of normal.

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## Hear the latest advances in Precision Medicine

The SPIE Medical Imaging Precision Medicine track highlights papers that showcase innovative ways to apply this multidimensional / multidisciplinary technology.

### PRECISION MEDICINE

An emerging approach for disease treatment and prevention that takes into account individual variability in genes, environment, and lifestyle for each person is being highlighted in this year's program. Information regarding the Precision Medicine Initiative is available at: [www.whitehouse.gov/precision-medicine](http://www.whitehouse.gov/precision-medicine).

## Sunday 28 February 2016

### Cognitive tools pipeline for assistance of mitral valve surgery

Paper 9786-2 • Sunday 28 February 2016 • 8:20 AM  
**Nicolai J. Schoch**, UniversitätsKlinikum Heidelberg (Germany), et al.  
 Conference 9786: Image-Guided Procedures, Robotic Interventions, and Modeling  
 SESSION 1: Cardiac Procedures

### Random walk based segmentation for the prostate on 3D transrectal ultrasound images

Paper 9786-6 • Sunday 28 February 2016 • 10:10 AM  
**Baowei Fei**, Emory Univ. (USA), et al.  
 Conference 9786: Image-Guided Procedures, Robotic Interventions, and Modeling  
 SESSION 2: Segmentation and 2D and 3D Registration

### Patient-tailored multimodal neuroimaging, visualization and quantification of human intra-cerebral hemorrhage

Paper 9789-1 • Sunday 28 February 2016 • 10:10 AM  
**Andrei Irimia**, The Univ. of Southern California (USA), et al.  
 Conference 9789: PACS and Imaging Informatics: Next Generation and Innovations  
 SESSION 1: Imaging Informatics for Precision Medicine

### Rayleigh imaging in spectral mammography

Paper 9783-7 • Sunday 28 February 2016 • 10:30 AM  
**Erik Fredenberg**, Philips Healthcare (Sweden), et al.  
 Conference 9783: Physics of Medical Imaging  
 SESSION 2: Breast Imaging

### Radiogenomic analysis of breast cancer: dynamic contrast enhanced -magnetic resonance imagingbased features are associated with molecular subtypes

Paper 9789-2 • Sunday 28 February 2016 • 10:30 AM  
**Lihua Li**, Hangzhou Dianzi Univ. (China), et al.  
 Conference 9789: PACS and Imaging Informatics: Next Generation and Innovations  
 SESSION 1: Imaging Informatics for Precision Medicine  
 Date and Time:

### Dynamic contrast-enhanced magnetic resonance imaging for prediction of response to neoadjuvant chemotherapy in breast cancer

Paper 9789-3 • Sunday 28 February 2016 • 10:50 AM  
**Lihua Li**, Hangzhou Dianzi Univ. (China), et al.  
 Conference 9789: PACS and Imaging Informatics: Next Generation and Innovations  
 SESSION 1: Imaging Informatics for Precision Medicine  
 Date and Time:

### Medical Sieve: A Cognitive Assistant for Radiologists and Cardiologists

Paper 9785-9 • Sunday 28 February 2016 • 11:10 AM  
**Tanveer F. Syeda-Mahmood**, IBM Research - Almaden (USA), et al.  
 Conference 9785: Computer-Aided Diagnosis  
 SESSION 2: Musculoskeletal and Miscellaneous

### Automatic lung nodule classification with radiomics approach

Paper 9789-4 • Sunday 28 February 2016 • 11:10 AM  
**Jun Zhao**, Shanghai Jiao Tong Univ. (China), et al.  
 Conference 9789: PACS and Imaging Informatics: Next Generation and Innovations  
 SESSION 1: Imaging Informatics for Precision Medicine

### Acne image analysis: lesion localization and classification

Paper 9785-10 • Sunday 28 February 2016 • 11:30 AM  
**Fazly S. Abas**, The Ohio State Univ. (USA), et al.  
 Conference 9785: Computer-Aided Diagnosis  
 SESSION 2: Musculoskeletal and Miscellaneous

### 3D printed cardiac phantom for procedural planning of a transcatheter native mitral valve replacement

Paper 9789-6 • Sunday 28 February 2016 • 1:40 PM  
**Richard L. Izzo**, The Jacobs Institute (USA), et al.  
 Conference 9789: PACS and Imaging Informatics: Next Generation and Innovations  
 SESSION 2: Surgical PACS, 3D Printing, and Imaging Informatics for Non-radiological Applications

### Dictionary-based image denoising for dual-energy computed tomography

Paper 9783-13 • Sunday 28 February 2016 • 2:20 PM  
**Peter B. Noël**, Klinikum rechts der Isar der Technischen Univ. München (Germany), et al.  
 Conference 9783: Physics of Medical Imaging  
 Session 3: Keynote and Dual and Multi Energy CT

## Monday February 29 2016

### Mutual Information-based feature selection for radiomics

Paper 9789-19 • Monday 29 February 2016 • 9:00 AM  
**Estanislao Oubel**, Median Technologies (France), et al.  
 Conference 9789: PACS and Imaging Informatics: Next Generation and Innovations  
 SESSION 4: Big Data Technologies and Image Sharing in Medical Imaging and Informatics

### Increasing cancer detection yield of breast MRI using a new CAD scheme of mammograms

Paper 9785-26 • Monday 29 February 2016 • 10:10 AM  
**Bin Zheng**, The Univ. of Oklahoma (USA), et al.  
 Conference 9785: Computer-Aided Diagnosis  
 SESSION 6: Radiomics I

### Predicting Ki67% expression from DCE-MR images of breast tumors using textural kinetic features in tumor habitats

Paper 9785-28 • Monday 29 February 2016 • 10:50 AM  
**Baishali Chaudhury**, Univ. of South Florida (USA), et al.  
 Conference 9785: Computer-Aided Diagnosis  
 SESSION 6: Radiomics I

### Applying quantitative adiposity feature analysis models to predict benefit of bevacizumab-based chemotherapy in ovarian cancer patients

Paper 9785-29 • Monday 29 February 2016 • 11:10 AM  
**Bin Zheng**, The Univ. of Oklahoma (USA), et al.  
 Conference 9785: Computer-Aided Diagnosis  
 SESSION 6: Radiomics I

### Radiogenomics of glioblastoma: a pilot multi-institutional study to investigate a relationship between tumor shape features and tumor molecular subtype

Paper 9785-30 • Monday 29 February 2016 • 11:30 AM  
**Kal L. Clark**, Duke Univ. (USA), et al.  
 Conference 9785: Computer-Aided Diagnosis  
 SESSION 6: Radiomics I

### Estimation of organ dose under tube current modulated CT for 58 patients across diverse protocols

Paper 9783-120 • Monday 29 February 2016 • 5:30 PM  
**Wanyi Fu**, Duke Univ. (USA), et al.  
 Conference 9783: Physics of Medical Imaging  
 SESSION PS4: Posters: CT: Technology, System Characterization, Dose, Applications

### Calcium scoring with dual-energy CT in men and women: an anthropomorphic phantom study

Paper 9783-148 • Monday 29 February 2016 • 5:30 PM  
**Nicholas A. Petrick**, U.S. Food and Drug Administration (USA), et al.  
 Conference 9783: Physics of Medical Imaging  
 SESSION PS6: Posters: Dual and Multi Energy CT  
 Date and Time:

### Neutron spectroscopic imaging for precision medical diagnostics

Paper 9783-176 • Monday 29 February 2016 • 5:30 PM  
**Anuj J. Kapadia**, Duke Univ. (USA), et al.  
 Conference 9783: Physics of Medical Imaging  
 SESSION PS9: Posters: New Systems and Technologies

### Validation of coded aperture coherent scatter spectral imaging for normal and neoplastic breast tissues via surgical pathology

Paper 9783-211 • Monday 29 February 2016 • 5:30 PM  
**Robert E. Morris**, Duke Univ. Medical Ctr. (USA), et al.  
 Conference 9783: Physics of Medical Imaging  
 SESSION PS14: Posters: Scatter and Diffraction Imaging

## Synthesized interstitial lung texture for use in anthropomorphic computational phantoms

Paper 9783-216 • Monday 29 February 2016 • 5:30 PM  
**Marc Becchetti**, Duke Univ. (USA), et al.  
 Conference 9783: Physics of Medical Imaging  
 SESSION PS15: Posters: Task Driven Imaging, Observers, Detectability, Phantom Studies

## Quantitative breast MRI radiomics for cancer risk assessment and the monitoring of high-risk populations

Paper 9785-67 • Monday 29 February 2016 • 5:30 PM  
**Kayla R. Mendel**, The Univ. of Chicago (USA), et al.  
 Conference 9785: Computer-Aided Diagnosis  
 SESSION PS1: Posters: Breast

## Computer-aided Global Breast MR Image Feature Analysis for Prediction of Tumor Response to Chemotherapy: Performance Assessment

Paper 9785-73 • Monday 29 February 2016 • 5:30 PM  
**Faranak Aghaei**, The Univ. of Oklahoma (USA), et al.  
 Conference 9785: Computer-Aided Diagnosis  
 SESSION PS1: Posters: Breast

## Deep learning in the small sample size setting: cascaded feed forward neural networks for medical image segmentation

Paper 9785-89 • Monday 29 February 2016 • 5:30 PM  
**Bilwaj K. Gaonkar**, Univ. of California, Los Angeles (USA), et al.  
 Conference 9785: Computer-Aided Diagnosis  
 SESSION PS3: Posters: Head and Neck

## A fully automatic framework for cell segmentation on non-confocal adaptive optics images

Paper 9785-90 • Monday 29 February 2016 • 5:30 PM  
**Jianfei Liu**, National Institutes of Health (USA), et al.  
 Conference 9785: Computer-Aided Diagnosis  
 SESSION PS3: Posters: Head and Neck

## Predicting outcomes in glioblastoma patients using computerized analysis of tumor shape: preliminary data

Paper 9785-101 • Monday 29 February 2016 • 5:30 PM  
**Kal L. Clark**, Duke Univ. (USA), et al.  
 Conference 9785: Computer-Aided Diagnosis  
 SESSION PS3: Posters: Head and Neck  
 Date and Time:

## Glioma grading using cell nuclei morphologic features in digital pathology images

Paper 9785-102 • Monday 29 February 2016 • 5:30 PM  
**Khan M. Iftekharuddin**, Old Dominion Univ. (USA), et al.  
 Conference 9785: Computer-Aided Diagnosis  
 SESSION PS3: Posters: Head and Neck

## Change descriptors for determining nodule malignancy in National Lung Screening Trial CT screening images

Paper 9785-113 • Monday 29 February 2016 • 5:30 PM  
**Benjamin E. Geiger**, Univ. of South Florida (USA), et al.  
 Conference 9785: Computer-Aided Diagnosis  
 SESSION PS4: Posters: Lung and Chest

## Visual design and verification tool for collision-free dexterous patient specific neurosurgical instruments

Paper 9786-57 • Monday 29 February 2016 • 5:30 PM  
**Margaret A. Hess**, Lab. for Percutaneous Surgery (Canada), et al.  
 Conference 9786: Image-Guided Procedures, Robotic Interventions, and Modeling  
 SESSION PSMon: Poster-Sunday/Monday  
 Date and Time:

## Kinect based real-time position calibration for nasal endoscopic surgical navigation system

Paper 9786-59 • Monday 29 February 2016 • 5:30 PM  
**Jian Yang**, Beijing Institute of Technology (China), et al.  
 Conference 9786: Image-Guided Procedures, Robotic Interventions, and Modeling  
 SESSION PSMon: Poster-Sunday/Monday

## A motorized ultrasound system for MRI-ultrasound fusion guided prostatectomy

Paper 9786-88 • Monday 29 February 2016 • 5:30 PM  
**Reza Seifabadi**, National Institutes of Health (USA), et al.  
 Conference 9786: Image-Guided Procedures, Robotic Interventions, and Modeling  
 SESSION PSMon: Poster-Sunday/Monday

## Interactive visualization for scar transmural in cardiac resynchronization therapy

Paper 9786-100 • Monday 29 February 2016 • 5:30 PM  
**Sabrina Reiml**, Siemens Healthcare (Germany), et al.  
 Conference 9786: Image-Guided Procedures, Robotic Interventions, and Modeling  
 SESSION PSMon: Poster-Sunday/Monday

## Semantic information extracting system for classification of radiological reports in radiology information system (RIS)

Paper 9789-26 • Monday 29 February 2016 • 5:30 PM  
**Liehang Shi**, Shanghai Institute of Technical Physics (China), et al.  
 Conference 9789: PACS and Imaging Informatics: Next Generation and Innovations  
 SESSION PSMon: Sunday/Monday Posters

## Building hybrid high-dimensional imaging database for content-based image search

Paper 9789-28 • Monday 29 February 2016 • 5:30 PM  
**Qinpei Sun**, Shanghai Institute of Technical Physics (China), et al.  
 Conference 9789: PACS and Imaging Informatics: Next Generation and Innovations  
 SESSION PSMon: Sunday/Monday Posters

## Determining cardiac fiber orientation using FSL and registered ultrasound/DTI volumes

Paper 9790-40 • Monday 29 February 2016 • 5:30 PM  
**Baowei Fei**, Emory Univ. (USA), et al.  
 Conference 9790: Ultrasonic Imaging and Tomography  
 SESSION PS1: Poster SESSION: Motion and Deformation Imaging

## Observations of liver cancer cells in scanning probe acoustic microscope: a preliminary study

Paper 9790-65 • Monday 29 February 2016 • 5:30 PM  
**Xiaohui Chen**, Huazhong Univ. of Science and Technology (China), et al.  
 Conference 9790: Ultrasonic Imaging and Tomography  
 SESSION PS7: Poster SESSION: Transducers and Beamforming

## Tuesday 1 March 2016

### A computational model for estimating tumor margins in complementary tactile and 3D ultrasound images

Paper 9786-41 • Tuesday 1 March 2016 • 9:00 AM  
**Arefin M. Shamsil**, Canadian Surgical Technologies and Advanced Robotics (Canada), et al.  
 Conference 9786: Image-Guided Procedures, Robotic Interventions, and Modeling  
 SESSION 8: Intraoperative Imaging and Visualization

### An open library of CT patient projection data

Paper 9783-44 • Tuesday 1 March 2016 • 10:10 AM  
**Baiyu Chen**, Mayo Clinic (USA), et al.  
 Conference 9783: Physics of Medical Imaging  
 SESSION 9: CT II: Image Reconstruction, Artifact Reduction

### Computer-aided detection of human cone photoreceptor inner segments using multi-scale circular voting

Paper 9785-45 • Tuesday 1 March 2016 • 10:50 AM  
**Jianfei Liu**, National Institutes of Health (USA), et al.  
 Conference 9785: Computer-Aided Diagnosis  
 SESSION 9: Head and Neck  
 Date and Time:

### Applying a radiomics approach to predict prognosis of lung cancer patients

Paper 9785-49 • Tuesday 1 March 2016 • 1:20 PM  
**Bin Zheng**, The Univ. of Oklahoma (USA), et al.  
 Conference 9785: Computer-Aided Diagnosis  
 SESSION 10: Radiomics II

### Spatiotemporal-atlas-based dynamic speech imaging

Paper 9788-3 • Tuesday 1 March 2016 • 2:00 PM  
**Maojing Fu**, Univ. of Illinois at Urbana-Champaign (USA), et al.  
 Conference 9788: Biomedical Applications in Molecular, Structural, and Functional Imaging  
 SESSION 1: Novel Imaging Methods

### Performance modeling of a wearable Brain PET (BET) camera

Paper 9788-5 • Tuesday 1 March 2016 • 2:40 PM  
**Andrzej Krol**, SUNY Upstate Medical Univ. (USA), et al.  
 Conference 9788: Biomedical Applications in Molecular, Structural, and Functional Imaging  
 SESSION 1: Novel Imaging Methods

## Wednesday 2 March 2016

### Discriminatory power of common genetic variants in personalized breast cancer diagnosis

Paper 9787-24 • Wednesday 2 March 2016 • 9:20 AM  
**Yirong Wu**, Univ. of Wisconsin-Madison (USA), et al.  
 Conference 9787: Image Perception, Observer Performance, and Technology Assessment  
 SESSION 1: Technology Assessment in Breast Imaging

### Evaluating effects of methylphenidate on brain activity in cocaine addiction: a machine-learning approach

Paper 9788-23 • Wednesday 2 March 2016 • 2:40 PM  
**Irina Rish**, IBM Thomas J. Watson Research Ctr. (USA), et al.  
 Conference 9788: Biomedical Applications in Molecular, Structural, and Functional Imaging  
 SESSION 5: fMRI

### Slide specific models for segmentation of differently stained digital histopathology whole slide images

Paper 9784-35 • Wednesday 2 March 2016 • 3:30 PM  
**Nicolas Brieu**, Definiens AG (Germany), et al.  
 Conference 9784: Image Processing  
 SESSION 8: Machine Learning

### Intraoperative neuropathology of glioma recurrence: cell detection and classification

Paper 9791-8 • Wednesday 2 March 2016 • 4:50 PM  
**Fazly S. Abas**, The Ohio State Univ. (USA), et al.  
 Conference 9791: Digital Pathology  
 SESSION 2: Precision Medicine and Grading

### Image similarity ranking of focal computed tomography liver lesions using a 2AFC technique

Paper 9787-20 • Wednesday 2 March 2016 • 5:10 PM  
**Jessica Faruque**, National Institutes of Health (USA), et al.  
 Conference 9787: Image Perception, Observer Performance, and Technology Assessment  
 SESSION 4: Perception

### Capturing population based patient-specific characters for prostate segmentation on 3D CT images

Paper 9784-78 • Wednesday 2 March 2016 • 5:30 PM  
**Baowei Fei**, Emory Univ. (USA), et al.  
 Conference 9784: Image Processing  
 SESSION PS1: Posters: Classification and Machine Learning

### A framework for probabilistic atlas-based organ segmentation

Paper 9784-104 • Wednesday 2 March 2016 • 5:30 PM  
**Chunhua Dong**, Ritsumeikan Univ. (Japan), et al.  
 Conference 9784: Image Processing  
 SESSION PS2: Posters: Segmentation

## A utility/cost analysis of breast cancer risk prediction algorithms

Paper 9787-55 • Wednesday 2 March 2016 • 5:30 PM  
**Craig K. Abbey**, Univ. of California, Santa Barbara (USA), et al.  
 Conference 9787: Image Perception, Observer Performance, and Technology Assessment  
 SESSION PWed: Posters-Tuesday/Wednesday

## Transcranial direct current stimulation transiently increases the blood-brain barrier solute permeability in vivo

Paper 9788-68 • Wednesday 2 March 2016 • 5:30 PM  
**Bingmei Fu**, The City College of New York (USA), et al.  
 Conference 9788: Biomedical Applications in Molecular, Structural, and Functional Imaging  
 SESSION PS4: Posters: Neurological Imaging

## Respiratory-gated electrical impedance tomography: a potential technique for quantifying stroke volume

Paper 9788-84 • Wednesday 2 March 2016 • 5:30 PM  
**Saaid H. Arshad**, Thayer School of Engineering at Dartmouth (USA), et al.  
 Conference 9788: Biomedical Applications in Molecular, Structural, and Functional Imaging  
 SESSION PS7: Posters: Fluids and Cardiovascular

## Nonrigid 2D registration of fluoroscopic coronary artery image sequence with layered motion

Paper 9788-87 • Wednesday 2 March 2016 • 5:30 PM  
**Taewoo Park**, Hankuk Univ. of Foreign Studies (Korea, Republic of), et al.  
 Conference 9788: Biomedical Applications in Molecular, Structural, and Functional Imaging  
 SESSION PS7: Posters: Fluids and Cardiovascular

## Deciphering protein signatures using color, morphological, and topological analysis of immunohistochemically stained human tissues

Paper 9791-27 • Wednesday 2 March 2016 • 5:30 PM  
**Maria Gabrani**, IBM Research - Zürich (Switzerland), et al.  
 Conference 9791: Digital Pathology  
 SESSION PSWed: Posters-Tuesday/Wednesday

## Pathological Gleason prediction through gland ring morphometry in immunofluorescent prostate cancer images

Paper 9791-29 • Wednesday 2 March 2016 • 5:30 PM  
**Faisal Khan**, Rutgers, The State Univ. of New Jersey (USA), et al.  
 Conference 9791: Digital Pathology  
 SESSION PSWed: Posters-Tuesday/Wednesday

## Automatic extraction of a novel imaging biomarker from fluorescence microscopic imaging of TRA-8/DR5 oligomers to predict TRA-8 therapeutic efficacy in breast and pancreatic cancer mouse models

Paper 9791-33 • Wednesday 2 March 2016 • 5:30 PM  
**Hyunki Kim**, The Univ. of Alabama at Birmingham (USA), et al.  
 Conference 9791: Digital Pathology  
 SESSION PSWed: Posters-Tuesday/Wednesday

## Identification of immune cell infiltration in hematoxylin-eosin stained breast cancer samples: Texture-based classification of tissue morphologies

Paper 9791-34 • Wednesday 2 March 2016 • 5:30 PM  
**Riku Turkki**, Univ. of Helsinki (Finland), et al.  
 Conference 9791: Digital Pathology  
 SESSION PSWed: Posters-Tuesday/Wednesday

## Deep learning-based gland quantification in digitized tissue samples from patients with colorectal cancer: associations with clinical data and outcome

Paper 9791-39 • Wednesday 2 March 2016 • 5:30 PM  
**Dmitrii Bychkov**, Univ. of Helsinki (Finland), et al.  
 Conference 9791: Digital Pathology  
 SESSION PSWed: Posters-Tuesday/Wednesday

## Hierarchical nucleus segmentation in digital pathology images

Paper 9791-41 • Wednesday 2 March 2016 • 5:30 PM  
**Yi Gao**, Stony Brook Univ. (USA), et al.  
 Conference 9791: Digital Pathology  
 SESSION PSWed: Posters-Tuesday/Wednesday

## The role of imaging based prostate biopsy morphology in a data fusion paradigm for transducing prognostic predictions

Paper 9791-43 • Wednesday 2 March 2016 • 5:30 PM  
**Faisal Khan**, Rutgers, The State Univ. of New Jersey (USA), et al.  
 Conference 9791: Digital Pathology  
 SESSION PSWed: Posters-Tuesday/Wednesday

## Toward phenotypic analysis of whole zebrafish from synchrotron microCT images: Automated detection and segmentation of cell nuclei

Paper 9791-44 • Wednesday 2 March 2016 • 5:30 PM  
**Yifu Ding**, Penn State College of Medicine (USA), et al.  
 Conference 9791: Digital Pathology  
 SESSION PSWed: Posters-Tuesday/Wednesday

## Thursday 3 March 2016

### A dual energy CT study on vascular effects of gold nanoparticles in radiation therapy

Paper 9788-31 • Thursday 3 March 2016 • 8:20 AM  
**Cristian T. Badea**, Duke Univ. (USA), et al.  
 Conference 9788: Biomedical Applications in Molecular, Structural, and Functional Imaging  
 SESSION 7: Fluids and Cardiovascular

### Adaptive local thresholding for robust nucleus segmentation utilizing shape priors

Paper 9791-11 • Thursday 3 March 2016 • 8:20 AM  
**Shawn Wang**, Ventana Medical Systems, Inc. (USA), et al.  
 Conference 9791: Digital Pathology  
 SESSION 3: Detection and Segmentation

## Non-uniform object counting method in large-format pyramid images applied to CD31 vessel counting in whole-mount digital pathology sections

Paper 9791-12 • Thursday 3 March 2016 • 8:40 AM  
**Mayan Murray**, Sunnybrook Research Institute (Canada), et al.  
 Conference 9791: Digital Pathology  
 SESSION 3: Detection and Segmentation

## Multimodal in vivo imaging of tumor xenografts using novel receptor-targeted peptide tracers

Paper 9788-35 • Thursday 3 March 2016 • 10:10 AM  
**Sarah Erdmann**, Charité Universitätsmedizin Berlin (Germany), et al.  
 Conference 9788: Biomedical Applications in Molecular, Structural, and Functional Imaging  
 SESSION 8: Cancer Imaging

## Predicting response before initiation of neoadjuvant chemotherapy in breast cancer using new methods for the analysis of dynamic contrast enhanced MRI (DCE MRI) data

Paper 9788-36 • Thursday 3 March 2016 • 10:30 AM  
**Julio Cárdenas-Rodríguez**, The Univ. of Arizona (USA), et al.  
 Conference 9788: Biomedical Applications in Molecular, Structural, and Functional Imaging  
 SESSION 8: Cancer Imaging

## Hyperspectral imaging of neoplastic progression in a mouse model of oral carcinogenesis

Paper 9788-37 • Thursday 3 March 2016 • 10:50 AM  
**Baowei Fei**, Emory Univ. (USA), et al.  
 Conference 9788: Biomedical Applications in Molecular, Structural, and Functional Imaging  
 SESSION 8: Cancer Imaging

## Optimal retinal cyst segmentation from OCT images

Paper 9784-49 • Thursday 3 March 2016 • 11:10 AM  
**Ipek Oguz**, The Univ. of Iowa (USA), et al.  
 Conference 9784: Image Processing  
 SESSION 10: Segmentation

## Superpixel-based spectral classification for the detection of head and neck cancer with hyperspectral imaging

Paper 9788-38 • Thursday 3 March 2016 • 11:10 AM  
**Baowei Fei**, Emory Univ. (USA), et al.  
 Conference 9788: Biomedical Applications in Molecular, Structural, and Functional Imaging  
 SESSION 8: Cancer Imaging

## Evaluation of 6-([18F] fluoroacetamido)-1-hexanoic-anilide (18F-FAHA) as imaging probe in tumor xenograft mice model

Paper 9788-39 • Thursday 3 March 2016 • 11:30 AM  
 Author(s): **Fiona Li**, Western Univ. (Canada), et al.  
 Conference 9788: Biomedical Applications in Molecular, Structural, and Functional Imaging  
 SESSION 8: Cancer Imaging

## Quantitative diagnosis of tongue cancer from histological images in an animal model

Paper 9791-20 • Thursday 3 March 2016 • 11:50 AM  
**Baowei Fei**, Emory Univ. (USA), et al.  
 Conference 9791: Digital Pathology  
 SESSION 4: Machine Learning  
 Date and Time:

## Multi-scale learning based segmentation of glands in digital colonrectal pathology images

Paper 9791-21 • Thursday 3 March 2016 • 1:20 PM  
**Yi Gao**, Stony Brook Univ. (USA), et al.  
 Conference 9791: Digital Pathology  
 SESSION 5: Emerging Technologies

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# TECHNICAL CONFERENCES

## CONFERENCE 9783

Room: Town & Country

Sun.-Wed. 28 Feb.-2 March 2016  
Proceedings of SPIE Vol. 9783

### Physics of Medical Imaging

*Conference Chairs:* **Despina Kontos**, The Univ. of Pennsylvania Health System (USA); **Thomas G. Flohr**, Siemens Healthcare GmbH (Germany)

*Conference Co-Chair:* **Joseph Y. Lo**, Duke Univ. Medical Ctr. (USA)

*Program Committee:* **Andreu Badal**, U.S. Food and Drug Administration (USA); **Kirsten Boedeker**, Toshiba Medical Research Institute USA (USA); **Hilde Bosmans**, Katholieke Univ. Leuven (Belgium); **Guang-Hong Chen**, Univ. of Wisconsin-Madison (USA); **Mini Das**, Univ. of Houston (USA); **Mats E. Danielsson**, KTH Royal Institute of Technology (Sweden); **Maria Drangova**, Robarts Research Institute (Canada); **Rebecca Fahrig**, Siemens Healthcare GmbH (Germany), Stanford Univ. School of Medicine (USA); **Taly Gilat-Schmidt**, Marquette Univ. (USA); **Stephen J. Glick**, U.S. Food and Drug Administration (USA), Univ. of Massachusetts Medical School (USA); **Michael Grass**, Philips Research (Germany); **Christoph Hoeschen**, Helmholtz Zentrum München GmbH (Germany); **Marc Kachelriess**, Deutsches Krebsforschungszentrum (Germany); **Karim S. Karim**, Univ. of Waterloo (Canada); **Hee-Joung Kim**, Yonsei Univ. (Korea, Republic of); **Jinyi Qi**, Univ. of California, Davis (USA); **Magdalena Rafecas**, Univ. zu Lübeck (Germany); **Ingrid S. Reiser**, The Univ. of Chicago (USA); **John A. Rowlands**, Thunder Bay Regional Research Institute (Canada); **John M. Sabol**, GE Healthcare (USA); **Joseph W. Stayman**, Johns Hopkins Univ. (USA); **Anders Tingberg**, Lund Univ. (Sweden); **John Yorkston**, Carestream Health, Inc. (USA); **Wei Zhao**, Stony Brook Medicine (USA)

Posters for this conference will be on display Sunday and Monday in Grand Exhibit Hall. The interactive poster session will be Monday evening from 5:30 to 7:00 pm. Poster awards will be announced in the conference meeting room on Tuesday morning.

9783 continues on page 28

## CONFERENCE 9784

Room: San Diego

Tues.-Thurs. 1-3 March 2016  
Proceedings of SPIE Vol. 9784

### Image Processing

*Conference Chairs:* **Martin A. Styner**, The Univ. of North Carolina at Chapel Hill (USA); **Elsa D. Angelini**, Columbia Univ. (USA), Télécom ParisTech (France)

*Program Committee:* **Rafeef Abugarbieh**, The Univ. of British Columbia (Canada); **Paul Aljabar**, King's College London (UK); **Mostafa Analoui**, Livingston Securities, LLC (USA); **Brian B. Avants**, Univ. of Pennsylvania (USA); **Meritxell Bach-Cudra**, Univ. de Lausanne (Switzerland); **Kyongtae Ty Bae**, Univ. of Pittsburgh Medical Ctr. (USA); **Christian Barillot**, IRISA / INRIA Rennes (France); **Benoit M. Dawant**, Vanderbilt Univ. (USA); **Marleen de Bruijne**, Erasmus MC (Netherlands); **Alexandre X. Falcão**, Univ. Estadual de Campinas (Brazil); **Baowei Fei**, Emory Univ. (USA); **Aaron Fenster**, Robarts Research Institute (Canada); **Alejandro F. Frangi**, The Univ. of Sheffield (UK); **Mona K. Garvin**, The Univ. of Iowa (USA); **James C. Gee**, Univ. of Pennsylvania (USA); **Guido Gerig**, The Univ. of Utah (USA); **Benjamin Glocker**, Imperial College London (UK); **Miguel Angel González Ballester**, Univ. Pompeu Fabra (Spain); **Hayit Greenspan**, Tel Aviv Univ. (Israel); **Ghassan Hamarneh**, Simon Fraser Univ. (Canada); **David R. Haynor**, Univ. of Washington (USA); **Tobias Heimann**, Siemens AG (Germany); **Ivana Išgum**, Univ. Medical Ctr. Utrecht (Netherlands); **Stefan Klein**, Erasmus MC (Netherlands); **Bennett A. Landman**, Vanderbilt Univ. (USA); **Tianhu Lei**, MD Imaging Research (USA); **Boudewijn P. F. Lelieveldt**, Leiden Univ. Medical Ctr. (Netherlands); **Marius George Linguraru**, Children's National Medical Ctr. (USA); **Murray H. Loew**, The George Washington Univ. (USA); **Cristian Lorenz**, Philips Research (Germany); **Frederik Maes**, Katholieke Univ. Leuven (Belgium); **Diana Mateus**, Technische Univ. München (Germany); **Vincent A. Magnotta**, The Univ. of Iowa Hospitals and Clinics (USA); **Sunanda D. Mitra**, Texas Tech Univ. (USA); **Kensaku Mori**, Nagoya Univ. (Japan); **Nassir Navab**, Technische Univ. München (Germany), Johns Hopkins Univ. (USA); **Mads Nielsen**, Niels Bohr Institute (Denmark); **Wiro J. Niessen**, Erasmus MC (Netherlands); **Brian Nutter**, Texas Tech Univ. (USA); **Sébastien Ourselin**, Univ. College London (UK); **Dzung L. Pham**, Henry Jackson Foundation/USU (USA), National Institutes of Health (USA), Johns Hopkins Univ. (USA); **Jerry L. Prince**, Johns Hopkins Univ. (USA); **Sonia Pujol**, Brigham and Women's Hospital (USA); **Punam K. Saha**, The Univ. of Iowa (USA); **Olivier Salvado**, Commonwealth Scientific and Industrial Research Organisation (Australia); **Lin Shi**, The Chinese Univ. of Hong Kong (China); **Marius Staring**, Leiden Univ. Medical Ctr. (Netherlands); **Philippe Thevenaz**, Ecole Polytechnique Fédérale de Lausanne (Switzerland); **Jayaram K. Udupa**, Univ. of Pennsylvania (USA); **Koen Van Leemput**, Harvard Medical School (USA), Massachusetts General Hospital (USA); **Tom K. Vercauteren**, Univ. College London (UK); **Tomaž Vrtovec**, Univ. of Ljubljana (Slovenia); **Wolfgang Wein**, ImFusion GmbH (Germany)

Posters for this conference will be on display Tuesday and Wednesday in Grand Exhibit Hall. The interactive poster session with authors in attendance will be Wednesday evening from 5:30 to 7:00 pm. Poster awards will be announced in the conference meeting room on Thursday morning.

9784 continues on page 46

## CONFERENCE 9785

Room: Golden West

Sun.-Wed. 28 Feb.-2 March 2016  
Proceedings of SPIE Vol. 9785

### Computer-Aided Diagnosis

*Conference Chairs:* **Georgia D. Tourassi**, Oak Ridge National Lab. (USA); **Samuel G. Armato III**, The Univ. of Chicago (USA)

*Program Committee:* **Susan M. Astley**, The Univ. of Manchester (UK); **Stephen Aylward**, Kitware, Inc. (USA); **Kyongtae Ty Bae**, Univ. of Pittsburgh Medical Ctr. (USA); **Matthew S. Brown**, Univ. of California, Los Angeles (USA); **Heang-Ping Chan**, Univ. of Michigan Health System (USA); **Marleen de Bruijne**, Erasmus MC (Netherlands); **Thomas M. Deserno**, RWTH Aachen (Germany); **Karen Drukker**, The Univ. of Chicago (USA); **Catalin Fetita**, Télécom SudParis (France); **Hiroshi Fujita**, Gifu Univ. School of Medicine (Japan); **Maryellen L. Giger**, The Univ. of Chicago (USA); **Hayit Greenspan**, Tel Aviv Univ. (Israel); **Lubomir M. Hadjiiski**, Univ. of Michigan Health System (USA); **Horst Karl Hahn**, Fraunhofer MEVIS (Germany); **Khan M. Iftekharuddin**, Old Dominion Univ. (USA); **Nico Karssemeijer**, Radboud Univ. Nijmegen Medical Ctr. (Netherlands); **JongHyo Kim**, Seoul National Univ. Hospital (Korea, Republic of); **Marius George Linguraru**, Children's National Medical Ctr. (USA); **Fabrice Meriaudeau**, Univ. de Bourgogne (France); **Kensaku Mori**, Nagoya Univ. (Japan); **Janne J. Näppi**, Massachusetts General Hospital (USA); **Noboru Niki**, Univ. of Tokushima (Japan); **Carol L. Novak**, Siemens Corp., Corporate Technology (USA); **Nicholas A. Petrick**, U.S. Food and Drug Administration (USA); **Clarisa I. Sánchez**, Radboud Univ. Nijmegen Medical Ctr. (Netherlands); **Ronald M. Summers**, National Institutes of Health (USA); **Kenji Suzuki**, Illinois Institute of Technology (USA); **Bram van Ginneken**, Radboud Univ. Nijmegen Medical Ctr. (Netherlands); **Eva M. van Rikxoort**, Radboud Univ. Nijmegen Medical Ctr. (Netherlands); **Rafael Wiemker**, Philips Research (Germany); **Axel Wismüller**, Univ. of Rochester Medical Ctr. (USA); **Xiaofeng Yang**, Emory Univ. (USA); **Hiroyuki Yoshida**, Massachusetts General Hospital (USA)

Posters for this conference will be on display Sunday and Monday in Grand Exhibit Hall. The interactive poster session will be Monday evening from 5:30 to 7:00 pm. Poster awards will be announced in the conference meeting room on Tuesday morning.

9785 continues on page 28

## CONFERENCE 9786

Room: California

Sun.-Tues. 28 Feb.-1 March 2016  
Proceedings of SPIE Vol. 9786

### Image-Guided Procedures, Robotic Interventions, and Modeling

*Conference Chairs:* **Robert J. Webster III**, Vanderbilt Univ. (USA); **Ziv R. Yaniv**, National Library of Medicine (USA)

*Program Committee:* **Purang Abolmaesumi**, The Univ. of British Columbia (Canada); **Wolfgang Birkfellner**, Medizinische Univ. Wien (Austria); **Sandrine de Ribaupierre**, Western Univ. (Canada); **Baowei Fei**, Emory Univ. (USA); **Gabor Fichtinger**, Queen's Univ. (Canada); **George J. Grevera**, Saint Joseph's Univ. (USA); **David Hawkes**, Univ. College London (UK); **David R. Haynor**, Univ. of Washington (USA); **William E. Higgins**, The Pennsylvania State Univ. (USA); **David R. Holmes III**, Mayo Clinic (USA); **Pierre Jannin**, Univ. de Rennes 1 (France); **David M. Kwartowitz**, Clemson Univ. (USA); **Cristian A. Linte**, Rochester Institute of Technology (USA); **Lena Maier-Hein**, Deutsches Krebsforschungszentrum (Germany); **Michael I. Miga**, Vanderbilt Univ. (USA); **Kensaku Mori**, Nagoya Univ. (Japan); **Parvin Mousavi**, Queen's Univ. (Canada); **Maryam E. Rettmann**, Mayo Clinic (USA); **Frank Sauer**, Siemens Corp., Corporate Technology (USA); **Eric J. Seibel**, Univ. of Washington (USA); **Guy Shechter**, Philips Healthcare (USA); **Amber L. Simpson**, Memorial Sloan-Kettering Cancer Ctr. (USA); **Stefanie Speidel**, Karlsruher Institut für Technologie (Germany); **Andrew D. Wiles**, Northern Digital Inc. (Canada); **Ivo Wolf**, Hochschule Mannheim (Germany)

Posters for this conference will be on display Sunday and Monday in Grand Exhibit Hall. The interactive poster session will be Monday evening from 5:30 to 7:00 pm. Poster awards will be announced in the conference meeting room on Tuesday morning.

9786 continues on page 28

## CONFERENCE 9787

Room: California

Wed.-Thurs. 2-3 March 2016  
Proceedings of SPIE Vol. 9787

### Image Perception, Observer Performance, and Technology Assessment

*Conference Chairs:* **Craig K. Abbey**, Univ. of California, Santa Barbara (USA); **Matthew A. Kupinski**, College of Optical Sciences, The Univ. of Arizona (USA)

*Program Committee:* **François O. Bochud**, Ctr. Hospitalier Univ. Vaudois (Switzerland); **Jovan G. Brankov**, Illinois Institute of Technology (USA); **Alastair G. Gale**, Loughborough Univ. (UK); **Howard C. Gifford**, Univ. of Houston (USA); **Stephen L. Hillis**, The Univ. of Iowa (USA); **Elizabeth A. Krupinski**, The Univ. of Arizona (USA); **Maciej A. Mazurowski**, Duke Univ. (USA); **Anthony J. Maeder**, The Univ. of Western Australia (Australia); **Mark F. McEntee**, The Univ. of Sydney (Australia); **Claudia R. Mello-Thoms**, The Univ. of Sydney (Australia), Univ. of Pittsburgh (USA); **Robert M. Nishikawa**, Univ. of Pittsburgh (USA); **Subok Park**, U.S. Food and Drug Administration (USA); **Ljiljana Platiša**, Univ. Gent (Belgium); **Frank W. Samuelson**, U.S. Food and Drug Administration (USA); **Sian Taylor-Phillips**, The Univ. of Warwick (UK); **Pontus A. Timberg**, Scania Univ. Hospital (Sweden); **David L. Wilson**, Case Western Reserve Univ. (USA)

Posters for this conference will be on display Tuesday and Wednesday in Grand Exhibit Hall. The interactive poster session with authors in attendance will be Wednesday evening from 5:30 to 7:00 pm. Poster awards will be announced in the conference meeting room on Thursday morning.

9787 continues on page 56



# TECHNICAL CONFERENCES

## CONFERENCE 9788

Room: Royal Palm One  
Tues.–Thurs. 1–3 March 2016  
Proceedings of SPIE Vol. 9788

### Biomedical Applications in Molecular, Structural, and Functional Imaging

*Conference Chairs:* **Barjor Gimi**, Geisel School of Medicine at Dartmouth (USA); **Andrzej Krol**, SUNY Upstate Medical Univ. (USA)

*Program Committee:* **David Abookasis**, Ariel Univ. (Israel); **Amir A. Amini**, Univ. of Louisville (USA); **Juan R. Cebal**, George Mason Univ. (USA); **Anne V. Clough**, Marquette Univ. (USA); **Alejandro F. Frangi**, The Univ. of Sheffield (UK); **Xavier Intes**, Rensselaer Polytechnic Institute (USA); **Vikram Kodibagkar**, Arizona State Univ. (USA); **Changqing Li**, Univ. of California, Merced (USA); **Armando Manduca**, Mayo Clinic College of Medicine (USA); **Robert C. Molthen**, GE Healthcare (USA), Marquette Univ. (USA), Medical College of Wisconsin (USA); **Nicholas J. Tustison**, Univ. of Virginia (USA); **John B. Weaver**, Dartmouth Hitchcock Medical Ctr. (USA); **Axel Wismüller**, Univ. of Rochester Medical Ctr. (USA); **Baohong Yuan**, The Univ. of Texas at Arlington (USA)

Posters for this conference will be on display Tuesday and Wednesday in Grand Exhibit Hall. The interactive poster session with authors in attendance will be Wednesday evening from 5:30 to 7:00 pm. Poster awards will be announced in the conference meeting room on Thursday afternoon.

9788 continues on page 48 ➔

## CONFERENCE 9789

Room: San Diego  
Sun.–Mon. 28–29 Feb. 2019  
Proceedings of SPIE Vol. 9789

### PACS and Imaging Informatics: Next Generation and Innovations

*Conference Chairs:* **Jianguo Zhang**, Shanghai Institute of Technical Physics (China); **Tessa S. Cook**, The Univ. of Pennsylvania Health System (USA)

*Program Committee:* **Peter R. Bak**, McMaster Univ. (Canada); **William W. Boonn**, The Univ. of Pennsylvania Health System (USA); **Thomas M. Deserno**, RWTH Aachen (Germany); **Steven C. Horii**, The Univ. of Pennsylvania Health System (USA); **Maria Y. Law**, Hong Kong Sanatorium and Hospital (Hong Kong, China); **Heinz U. Lemke**, Computer Assisted Radiology and Surgery (Germany); **Brent J. Liu**, The Univ. of Southern California (USA); **Eliot L. Siegel**, Univ. of Maryland Medical Ctr. (USA); **Wyatt Tellis**, Univ. of California, San Francisco (USA)

Posters for this conference will be on display Sunday and Monday in Grand Exhibit Hall. The interactive poster session will be Monday evening from 5:30 to 7:00 pm. Poster awards will be announced in the conference meeting room on Monday morning.

9789 continues on page 28 ➔

## CONFERENCE 9790

Room: Royal Palm One  
Sun.–Mon. 28–29 Feb. 2016  
Proceedings of SPIE Vol. 9790

### Ultrasonic Imaging and Tomography

*Conference Chairs:* **Neb Duric**, Delphinus Medical Technologies (USA), Barbara Ann Karmanos Cancer Institute (USA); **Brecht Heyde**, Univ. of Leuven (Belgium), Duke Univ. (USA)

*Program Committee:* **Mark A. Anastasio**, Washington Univ. in St. Louis (USA); **Jeffrey C. Bamber**, The Royal Marsden NHS Foundation Trust (UK); **Johan G. Bosch**, Erasmus Univ. Rotterdam (Netherlands); **Jan D'hooge**, Univ. of Leuven (Belgium); **Marvin M. Doyley**, Univ. of Rochester (USA); **Stanislav Y. Emelianov**, The Univ. of Texas at Austin (USA); **Mostafa Fatemi**, Mayo Clinic College of Medicine (USA); **Aaron Fenster**, Roberts Research Institute (Canada); **Jérémie Fromageau**, The Institute of Cancer Research (UK); **James F. Greenleaf**, Mayo Clinic (USA); **Emma J. Harris**, The Institute of Cancer Research (UK); **Martin Christian Hemmsen**, Technical Univ. of Denmark (Denmark); **Michael Jaeger**, Univ. Bern (Switzerland); **Jørgen Arendt Jensen**, Technical Univ. of Denmark (Denmark); **Hyung Ham Kim**, Univ. of Southern California (USA); **Roman G. Maev**, Univ. of Windsor (Canada); **Stephen A. McAleavey**, Univ. of Rochester (USA); **Mohammad Mehrmohammadi**, Wayne State Univ. (USA); **Serge Mensah**, Aix-Marseille Univ. (France); **Svetoslav I. Nikolov**, BK Medical (Denmark); **Olivier Roy**, Karmanos Cancer Institute (USA); **Nicole V. Ruiter**, Karlsruher Institut für Technologie (Germany); **Kai E. Thomenius**, Massachusetts Institute of Technology (USA); **William F. Walker**, Univ. of Virginia (USA)

Posters for this conference will be on display Sunday and Monday in Grand Exhibit Hall. The interactive poster session will be Monday evening from 5:30 to 7:00 pm. Poster awards will be announced in the conference meeting room on Monday afternoon.

9790 continues on page 28 ➔

## CONFERENCE 9791

Room: Golden West  
Wed.–Thurs. 2–3 March 2016  
Proceedings of SPIE Vol. 9791

### Digital Pathology

*Conference Chairs:* **Metin N. Gurcan**, The Ohio State Univ. Wexner Medical Ctr. (USA); **Anant Madabhushi**, Case Western Reserve Univ. (USA)

*Program Committee:* **Selim Aksoy**, Bilkent Univ. (Turkey); **Ulysses J. Balis**, Univ. of Michigan Health System (USA); **Rohit Bhargava**, Univ. of Illinois at Urbana-Champaign (USA); **Ulf-Dietrich Braumann**, Hochschule für Technik, Wirtschaft und Kultur Leipzig (Germany); **Eric Cosatto**, NEC Labs. America, Inc. (USA); **Scott Doyle**, Rutgers, The State Univ. of New Jersey (USA); **Michael D. Feldman**, The Univ. of Pennsylvania Health System (USA); **David J. Foran**, Rutgers Cancer Institute of New Jersey (USA); **Brandon D. Gallas**, U.S. Food and Drug Administration (USA); **Marios A. Gavrielides**, U.S. Food and Drug Administration (USA); **Tom R. L. Kimpe**, Barco N.V. (Belgium); **Elizabeth A. Krupinski**, The Univ. of Arizona (USA); **Richard M. Levenson**, Univ. of California, Davis (USA); **Olivier Lezoray**, Univ. de Caen Basse-Normandie (France); **Derek R. Magee**, Univ. of Leeds (UK); **Anne L. Martel**, Sunnybrook Research Institute (Canada); **Erik Meijering**, Erasmus MC (Netherlands); **James P. Monaco**, Inspirata, Inc. (USA); **Mehdi Moradi**, IBM Research - Almaden (USA); **Bahram Parvin**, Lawrence Berkeley National Lab. (USA); **Josien P. W. Pluim**, Image Sciences Institute (Netherlands); **Nasir M. Rajpoot**, Qatar Univ. (Qatar); **Gustavo Kunde Rohde**, Carnegie Mellon Univ. (USA); **Berkman Sahiner**, U.S. Food and Drug Administration (USA); **Chukka Srinivas**, Ventana Medical Systems, Inc. (USA); **John E. Tomaszewski**, Univ. at Buffalo (USA); **Darren Treanor**, Univ. of Leeds (UK); **Jeroen van der Laak**, Radboud Univ. Nijmegen Medical Ctr. (Netherlands); **Aaron D. Ward**, The Univ. of Western Ontario (Canada); **Martin J. Yaffe**, Sunnybrook Research Institute (Canada); **Bülent Yener**, Rensselaer Polytechnic Institute (USA)

Posters for this conference will be on display Tuesday and Wednesday in Grand Exhibit Hall. The interactive poster session with authors in attendance will be Wednesday evening from 5:30 to 7:00 pm. Poster awards will be announced in the conference meeting room on Thursday morning.

9791 continues on page 58 ➔

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# SUNDAY 28 FEBRUARY

## CONFERENCE 9783

Physics of Medical Imaging

Room: Town & Country

### SESSION 1

Room: Town & Country . . . Sun 8:00 to 9:40 am

#### Tomosynthesis and Digital Subtraction Angiography

Session Chairs: **Joseph Y. Lo**, Duke Univ. (USA);

**John M. Sabol**, GE Healthcare (USA)

8:00 am: **Quantification of resolution in multiplanar reconstructions for digital breast tomosynthesis**, Trevor L. Vent, Raymond J. Acciavatti, Young Joon Kwon, Andrew D. A. Maidment, Univ. of Pennsylvania (USA) . . . . . [9783-1]

8:20 am: **Tomosynthesis for coronary artery calcium scoring**, Gongting Wu, Jiong Wang, Marci Potuzko, Allison Harman, Caleb Pearce, Jing Shan, Yueh Z. Lee M.D., Otto Zhou, Jianping Lu, The Univ. of North Carolina at Chapel Hill (USA) . . . . . [9783-2]

8:40 am: **A new generation of stationary digital breast tomosynthesis system with wider angular span and faster scanning time**, Jabari Calliste, The Univ. of North Carolina at Chapel Hill (USA); Bo Gao, Philip E. Laganis, Derrek Spronk, Houman Jafari, Kyle Olson, XinRay Systems Inc. (USA); Jianping Lu, Otto Zhou, The Univ. of North Carolina at Chapel Hill (USA) . . . . . [9783-3]

9:00 am: **Detection of microcalcification clusters by 2D-mammography and narrow and wide angle digital breast tomosynthesis**, Andria Hadjipanteli, The Royal Surrey County Hospital NHS Trust (UK); Premkumar Elangovan, Ctr. for Vision Speech and Signal Processing, Univ. of Surrey (UK); Pdraig T. Looney, Alistair Mackenzie, The Royal Surrey County Hospital NHS Trust (UK); Kevin Wells, Ctr. for Vision, Speech and Signal Processing, Univ. of Surrey (UK); David R. Dance, Kenneth C. Young, The Royal Surrey County Hospital NHS Trust (UK) . . [9783-4]

9:20 am: **Feasibility of reduced-dose 3D/4D-DSA using a weighted edge preserving filter**, Erick L. Oberstar, Michael A. Speidel, Brian J. Davis, Charles M. Strother, Charles A. Mistretta, Univ. of Wisconsin-Madison (USA) . . . . . [9783-5]

Coffee Break . . . Sun 9:40 am to 10:10 am

## CONFERENCE 9785

Computer-Aided Diagnosis

Room: Golden West

### SESSION 1

Room: Golden West . . . . Sun 8:00 to 9:40 am

#### Vessels and Heart

Session Chairs: **Stephen Aylward**, Kitware, Inc. (USA); **Thomas Deserno**, Uniklinik RWTH Aachen (Germany)

8:00 am: **Inner and outer coronary vessel wall segmentation from CCTA using an active contour model with machine learning-based 3D voxel context-aware image force**, Udhayaraj Sivalingam, Technische Univ. München (Germany) and Siemens Healthcare GmbH (Germany); Michael G. Wels, Siemens Healthcare GmbH (Germany); Markus Rempfler, Technische Univ. München (Germany); Stefan Grosskopf, Michael Suehling, Siemens Healthcare GmbH (Germany); Bjoern H. Menze, Technische Univ. München (Germany) . . . . . [9785-1]

8:20 am: **Automated identification of best-quality coronary artery segments from multiple-phase coronary CT angiography (cCTA) for vessel analysis**, Chuan Zhou, Heang-Ping Chan, Lubomir M. Hadjiiski, Aamer R. Chughtai, Jun Wei, Ella A. Kazerooni M.D., Univ. of Michigan Health System (USA) . . . . . [9785-2]

8:40 am: **3D assessment of the carotid artery vessel wall volume: an imaging biomarker for diagnosis of the Atherosclerotic Disease**, Mariam Afshin, Tishan Maraj, Tina Bineshmarvasti, Navneet Singh, Sunnybrook Health Sciences Ctr. (Canada); Alan Moody, Univ. of Toronto (Canada) . . . . . [9785-3]

9:00 am: **A system for automatic aorta sections measurements on chest CT**, Yitzchak Pfeffer, RADLogics Inc. (Israel); Arnaldo Mayer, The Chaim Sheba Medical Ctr., Tel Hashomer (Israel); Adi Zholkover, RADLogics Inc. (Israel); Eli Konen M.D., The Chaim Sheba Medical Ctr., Tel Hashomer (Israel) . . . . . [9785-4]

9:20 am: **Quantitative MRI myocarditis analysis by a PCA- based object recognition algorithm**, Rocco Romano, Univ. degli Studi di Salerno (Italy); Igino De Giorgi, Azienda Ospedaliera Univ. (Italy); Fausto Acernese, Gerardo Giordano, Univ. degli Studi di Salerno (Italy); Antonio Orientale, Giovanni Babino, Azienda Ospedaliera Univ. San Giovanni di Dio e Ruggi D'Aragona (Italy); Fabrizio Barone, Univ. degli Studi di Salerno (Italy) . [9785-5]

Coffee Break . . . Sun 9:40 am to 10:10 am

## CONFERENCE 9786

Image-Guided Procedures, Robotic Interventions, and Modeling

Room: California

### SESSION 1

Room: California . . . Sun 8:00 am to 9:40 am

#### Cardiac Procedures

Session Chairs: **Maryam E. Rettmann**, Mayo Clinic (USA); **David R. Holmes III**, Mayo Clinic (USA)

8:00 am: **Improved image guidance technique for minimally invasive mitral valve repair using tracked 3D ultrasound**, Adam Rankin, John T. Moore, Robarts Research Institute (Canada) and The Univ. of Western Ontario (Canada); Daniel Bainbridge, The Univ. of Western Ontario (Canada) and London Health Sciences Ctr. (Canada); Terry M. Peters, Robarts Research Institute (Canada) and The Univ. of Western Ontario (Canada) . . . . . [9786-1]

8:20 am: **Cognitive tools pipeline for assistance of mitral valve surgery**, Nicolai J. Schoch, UniversitätsKlinikum Heidelberg (Germany); Patrick Philipp, Tobias Weller, Karlsruher Institut für Technologie (Germany); Sandy Engelhardt, Deutsches Krebsforschungszentrum (Germany); Mykola Volovyk, Karlsruher Institut für Technologie (Germany); Andreas Fetzer, Marco Nolden, Deutsches Krebsforschungszentrum (Germany); Raffaele de Simone, UniversitätsKlinikum Heidelberg (Germany); Ivo Wolf, Deutsches Krebsforschungszentrum (Germany); Maria Maleshkova, Achim Rettinger, Rudi Studer, Karlsruher Institut für Technologie (Germany); Vincent Heuveline, Ruprecht-Karls- Univ. Heidelberg (Germany) . . . . . [9786-2]

8:40 am: **Dynamic tracking of prosthetic valve motion and deformation from bi-plane x-ray views: feasibility study**, Charles R. Hatt, Martin G. Wagner, Amish N. Raval, Michael A. Speidel, Univ. of Wisconsin-Madison (USA) . . . . . [9786-3]

9:00 am: **Classification of calcium in intravascular OCT images for the purpose of intervention planning**, Ronny Y. Shalev, Case Western Reserve Univ. (USA); Daisuke Nakamura, Setsu Nishino, Univ. Hospitals of Cleveland (USA); Andrew Rollins, Case Western Reserve Univ. (USA); Hiram Bezerra, Univ. Hospitals Case Medical Ctr. (USA); Soumya Ray, David L. Wilson, Case Western Reserve Univ. (USA) . . . . . [9786-4]

9:20 am: **Fusion of CTA and XA data using 3D centerline registration for plaque visualization during coronary intervention**, Gaurav Kaila, Technische Univ. Delft (Netherlands); Pieter Kitslaar, Leiden Univ. Medical Ctr. (Netherlands) and Medis Medical Imaging Systems B.V. (Netherlands); Boudewijn Lelieveldt, Jouke Dijkstra, Leiden Univ. Medical Ctr. (Netherlands); Shengxian Tu, Shanghai Jiao Tong Univ. (China); Martin Penicka, Onze-Lieve-Vrouw Gasthuis vzw (Belgium) . . . . . [9786-5]

Coffee Break . . . Sun 9:40 am to 10:10 am

## CONFERENCE 9789

PACS and Imaging Informatics: Next Generation and Innovations

Room: San Diego

### SESSION 1A

Room: San Diego . . . . . Sun 8:40 to 9:40 am

#### Keynote

Session Chair: **Jianguo Zhang**, Shanghai Institute of Technical Physics (China)

8:40 am: **Connecting images to the electronic medical record: structured reporting, machine learning, and natural language processing (Keynote Presentation)**, Curtis P. Langlotz M.D., Stanford Univ. Medical Ctr. (USA) . . . . . [9789-100]

Coffee Break . . . Sun 9:40 am to 10:10 am

## CONFERENCE 9790

Ultrasonic Imaging and Tomography

Room: Royal Palm One

### SESSION 1

Room: Royal Palm One . Sun 8:00 to 9:40 am

#### Motion and Deformation Imaging

Session Chair: **Brett C. Byram**, Vanderbilt Univ. (USA)

8:00 am: **Perfusion imaging with non-contrast ultrasound**, Jaime E. Tierney, Douglas M. Dumont, Brett C. Byram, Vanderbilt Univ. (USA) . . . . . [9790-1]

8:20 am: **Estimation of the velocity of the popliteal vein using transverse oscillation**, Thor Bechsgaard M.D., Kristoffer L. Hansen M.D., Andreas H. Brandt M.D., Rigshospitalet (Denmark); Simon Holbek, Technical Univ. of Denmark (Denmark); Charlotte Strandberg M.D., Niels Bækgaard M.D., Gentofte Hospital (Denmark); Jørgen A. Jensen, Technical Univ. of Denmark (Denmark); Michael B. Nielsen M.D., Rigshospitalet (Denmark) . . . . . [9790-2]

8:40 am: **High frame rate synthetic aperture vector flow imaging for transthoracic echocardiography**, Carlos A. Villagomez Hoyos, Matthias B. Stuart, Technical Univ. of Denmark (Denmark); Thor Bechsgaard M.D., Rigshospitalet (Denmark); Jørgen A. Jensen, Technical Univ. of Denmark (Denmark); Michael B. Nielsen, Rigshospitalet (Denmark) . [9790-3]

9:00 am: **3D vector flow using a row-column addressed CMUT array**, Simon Holbek, Ctr. for Fast Ultrasound Imaging (Denmark); Thomas L. Christiansen, Mathias Engholm, DTU Nanotech (Denmark); Mathias B. Stuart, Ctr. for Fast Ultrasound Imaging (Denmark); Christopher Beers, Sound Technology, Inc. (USA); Lars N. Moesner, BK Ultrasound (Denmark); Erik V. Thomsen, DTU Nanotech (Denmark); Jørgen A. Jensen, Ctr. for Fast Ultrasound Imaging (Denmark) . . . . . [9790-4]

9:20 am: **Fast myocardial strain estimation from 3D ultrasound through elastic image registration with analytic regularization**, Bidisha Chakraborty, Brecht Heyde, Martino Alessandrini, Jan D'hooge, KU Leuven (Belgium) . . [9790-5]

Coffee Break . . . Sun 9:40 am to 10:10 am



# SUNDAY 28 FEBRUARY

## CONFERENCE 9783

Physics of Medical Imaging

Room: Town & Country

### SESSION 2

Room: Town & Country . Sun 10:10 am to 12:10 pm

#### Breast Imaging

Session Chairs: **Andreu Badal**, U.S. Food and Drug Administration (USA); **Wei Zhao**, Stony Brook Medicine (USA)

10:10 am: **Simulation of 3D synthetic breast blocks**, Premkumar Elangovan, Univ. of Surrey (UK); David R. Dance, Kenneth C. Young, The Royal Surrey County Hospital NHS Trust (UK); Kevin Wells, Univ. of Surrey (UK) . . . . . [9783-6]

10:30 am: **Rayleigh imaging in mammography**, Karl Berggren, Philips Healthcare (Sweden) and KTH Royal Institute of Technology (Sweden); Mats Danielsson, KTH Royal Institute of Technology (Sweden); Erik Fredenberg, Philips Healthcare (Sweden) . . . . . [9783-7]

10:50 am: **Reproducing 2D breast mammography images with 3D printed phantoms**, Matthew Clark, Univ. of Maryland, College Park (USA); Bahaa Ghamraoui, Andreu Badal, U.S. Food and Drug Administration (USA) . . . . . [9783-8]

11:10 am: **Breast ultrasound tomography with two parallel transducer arrays**, Lianjie Huang, Junseob Shin, Ting Chen, Youzuo Lin, Kai Gao, Miranda Intrator, Kenneth Hanson, Los Alamos National Lab. (USA) . . . . . [9783-9]

11:30 am: **A new open-source multi-modality digital breast phantom**, Christian G. Graff, U.S. Food and Drug Administration (USA) . . . . . [9783-10]

11:50 am: **Estimating breast thickness for dual-energy subtraction in contrast-enhanced digital mammography using calibration phantoms**, Kristen C. Lau, Young Joon Kwon, Moez K. Aziz, Andrew D. A. Maidment, The Univ. of Pennsylvania Health System (USA) . . . . . [9783-11]

Lunch Break . . . . Sun 12:10 pm to 1:20 pm

## CONFERENCE 9785

Computer-Aided Diagnosis

Room: Golden West

### SESSION 2

Room: Golden West . Sun 10:10 am to 12:10 pm

#### Musculoskeletal and Miscellaneous

Session Chairs: **Axel Wismüller M.D.**, Univ. of Rochester Medical Ctr. (USA); **Carol L. Novak**, Siemens Corp., Corporate Technology (USA)

10:10 am: **Differentiation of fat, muscle, and edema in thigh MRIs using random forest classification**, William Kovacs, Chia-Ying Liu, Ronald M. Summers, Jianhua Yao, National Institutes of Health (USA) . . [9785-6]

10:30 am: **Assessing vertebral fracture risk on volumetric quantitative computed tomography by geometric characterization of trabecular bone structure**, Walter

Chechetsky, Anas Z. Abidin, Mahesh B. Nagarajan, Univ. of Rochester (USA); Jan S. Bauer, Thomas H. Baum, Technische Univ. München (Germany); Axel Wismüller M.D., Univ. of Rochester (USA) and Ludwig-Maximilians Univ. München (Germany) [9785-7]

10:50 am: **Classification of voting patterns to improve the generalized Hough transform for epiphyses localization**, Ferdinand Hahmann, Gordon Böer, Eric Gabriel, Fachhochschule Kiel (Germany); Thomas M. Deserno, Uniklinik RWTH Aachen (Germany); Carsten Meyer, Hauke Schramm, Fachhochschule Kiel (Germany) and Christian-Albrechts-Universität Kiel (Germany) . . . . . [9785-8]

11:10 am: **Medical Sieve: a cognitive assistant for radiologists and cardiologists**, Tanveer F. Syeda-Mahmood, IBM Research - Almaden (USA) . . . . [9785-9]

11:30 am: **Acne image analysis: lesion localization and classification**, Fazly S. Abas, Benjamin Kaffenberger, Joseph Bikowski, The Ohio State Univ. (USA); Metin N. Gurcan, The Ohio State Univ. Wexner Medical Ctr. (USA) . . . . . [9785-10]

11:50 am: **Classification of melanoma lesions using sparse coded features and random forests**, Mojdeh Rastgo Dastjerdi, Guillaume Lemaître, Univ. de Girona (France) and Univ. de Bourgogne (France); Olivier Morel, Joan Massich, Univ. de Bourgogne (France); Rafael Garcia, Univ. de Girona (Spain); Fabrice Meriaudeau, Franck Marzani, Désiré Sidibé, Univ. de Bourgogne (France) . . . . [9785-11]

Lunch Break . . . . Sun 12:10 pm to 1:20 pm

## CONFERENCE 9786

Image-Guided Procedures, Robotic Interventions, and Modeling

Room: California

### SESSION 2

Room: California . Sun 10:10 am to 12:10 pm

#### Segmentation and 2D and 3D Registration

Session Chairs: **David R. Haynor**, Univ. of Washington (USA); **Baowei Fei**, Emory Univ. (USA)

10:10 am: **Random walk based segmentation for the prostate on 3D transrectal ultrasound images**, Baowei Fei, Emory Univ. (USA); Ling Ma, Emory Univ. (USA) and Beijing Institute of Technology (China); Rongrong Guo, Zhiqiang Tian, Emory Univ. (USA); Rajesh Venkataraman, Saradwata Sarkar, Eigen Inc. (USA); Xiabi Liu, Beijing Institute of Technology (China); Peter T. Nieh, Viraj Master, David M. Schuster, Emory Univ. (USA) . . . . . [9786-6]

10:30 am: **Resection planning for robotic acoustic neuroma surgery**, Kepra McBrayer, Vanderbilt Univ. (USA); George B. Wanna M.D., Vanderbilt Univ. Medical Ctr. (USA); Benoit M. Dawant, Vanderbilt Univ. (USA); Ramya Balachandran, Robert F. Labadie M.D., Vanderbilt Univ. Medical Ctr. (USA); Jack H. Noble, Vanderbilt Univ. (USA) . . . . . [9786-7]

10:50 am: **Fat segmentation on chest CT images via fuzzy models**, Yubing Tong, Jayaram K. Udupa, Caiyun Wu, Gargi Pednekar, Janani R. Subramanian, Univ. of Pennsylvania (USA); David J. Lederer, Columbia Univ. Medical Ctr. (USA); Jason Christie, Drew A. Torigian, Univ. of Pennsylvania (USA) . . . . . [9786-8]

11:10 am: **Automatic masking for robust 3D-2D image registration in image-guided spine surgery**, Michael D. Ketcha, Tharindu De Silva, Ali Uneri, Johns Hopkins Univ. (USA); Gerhard Kleinszig, Siemens AG (Germany); Sebastian Vogt, Siemens Medical Solutions USA, Inc. (Germany); Jean-Paul Wolinsky, Jeffrey H. Siewerdsen, Johns Hopkins Univ. (USA) . . . . . [9786-9]

11:30 am: **Robust patella motion tracking using intensity-based 2D-3D registration on dynamic bi-plane fluoroscopy: toward quantitative assessment in MPFL reconstruction surgery**, Yoshito Otake, Matthieu Esnault, Nara Institute of Science and Technology (Japan); Robert Grupp, Johns Hopkins Univ. (USA); Shinichi Kosugi, Nara Prefecture Western Medical Ctr. (Japan); Yoshinobu Sato, Nara Institute of Science and Technology (Japan) . . [9786-10]

11:50 am: **Fast generation of digitally reconstructed radiograph through an efficient preprocessing of ray attenuation values**, Soheil Ghafurian, Dimitris Metaxas, Virak Tan, Kang Li, Rutgers, The State Univ. of New Jersey (USA) . . . . . [9786-11]

Lunch Break . . . . Sun 12:10 pm to 1:20 pm

## CONFERENCE 9789

PACS and Imaging Informatics: Next Generation and Innovations

Room: San Diego

### SESSION 1

Room: San Diego . . Sun 10:10 am to 1:20 pm

#### Imaging Informatics for Precision Medicine

Session Chair: **Wyatt Tellis**, Univ. of California, San Francisco (USA)

10:10 am: **Patient-tailored multimodal neuroimaging, visualization and quantification of human intra-cerebral hemorrhage**, Sheng-Yang M. Goh, Andrei Irimia, The Univ. of Southern California (USA); Paul M. Vespa, Univ. of California, Los Angeles (USA); John D. Van Horn, The Univ. of Southern California (USA) . [9789-1]

10:30 am: **Radiogenomic analysis of breast cancer: dynamic contrast enhanced -MRI based features are associated with molecular subtypes**, Shijian Wang, Ming Fan, Hangzhou Dianzi Univ. (China); Juan Zhang, Zhejiang Cancer Hospital (China); Bin Zheng, The Univ. of Oklahoma (USA); Xiaojia Wang, Zhejiang Cancer Hospital (China); Lihua Li, Hangzhou Dianzi Univ. (China) . . . [9789-2]

10:50 am: **Dynamic contrast-enhanced MR imaging for prediction of response to neoadjuvant chemotherapy in breast cancer**, Juzhong Fu, Ming Fan, Hangzhou Dianzi Univ. (China); Bin Zheng, The Univ. of Oklahoma (USA); Guoliang Shao, Juan Zhang, Zhejiang Cancer Hospital (China); Lihua Li, Hangzhou Dianzi Univ. (China) . . . . . [9789-3]

11:10 am: **Automatic lung nodule classification with radiomics approach**, Jingchen Ma, Qian Wang, Yacheng Ren, Haibo Hu, Jun Zhao, Shanghai Jiao Tong Univ. (China) . . . . . [9789-4]

Lunch Break . . . . Sun 11:30 am to 1:20 pm

## CONFERENCE 9790

Ultrasonic Imaging and Tomography

Room: Royal Palm One

### SESSION 2

Room: Royal Palm One . . . . Sun 10:10 am to 12:10 pm

#### Ultrasound Tomography and Reconstruction

Session Chairs: **Olivier Roy**, Delphinus Medical Technologies, Inc. (USA); **Torsten Hopp**, Karlsruher Institut für Technologie (Germany)

10:10 am: **Breast tumour visualization using 3D quantitative ultrasound spectroscopy**, Mehrdad J. Gangeh, Univ. of Toronto (Canada); Abdul Raheem, Sunnybrook Research Institute (Canada); Hadi Tadayyon, Univ. of Toronto (Canada); Simon Liu, Farnooosh Hadizad, Sunnybrook Research Institute (Canada); Gregory J. Czarnota, Sunnybrook Health Sciences Ctr. (Canada) . . . . . [9790-6]

10:30 am: **Spatial smoothing coherence factor for ultrasound computed tomography**, Cuijuan Lou, Mengling Xu, Ming Yue Ding, Ming Yuchi, Huazhong Univ. of Science and Technology (China) . [9790-7]

10:50 am: **Analysis of patient movement during 3D USCT data acquisition**, Nicole V. Ruitter, Torsten Hopp, Michael Zapf, Ernst Kretzek, Hartmut E. Gemmeke, Karlsruher Institut für Technologie (Germany) . . [9790-8]

11:10 am: **3D ultrasound computer tomography: update from a clinical study**, Torsten Hopp, Michael Zapf, Ernst Kretzek, Julia Henrich, Alexey Tukalo, Hartmut E. Gemmeke, Nicole V. Ruitter, Karlsruher Institut für Technologie (Germany) . . . . . [9790-9]

11:30 am: **Ultrasound breast imaging using frequency domain reverse time migration**, Olivier Roy, Delphinus Medical Technologies, Inc. (USA); Mohammad Akbar Hosain Zuberi, Gerhard Pratt, Western Univ. (Canada); Neb Duric, Delphinus Medical Technologies, Inc. (USA) . . . . . [9790-10]

11:50 am: **Frequency-domain ultrasound waveform tomography breast attenuation imaging**, Gursharan S. Sandhu, Cuiping Li, Delphinus Medical Technologies, Inc. (USA) and Karmanos Cancer Institute (USA); Olivier Roy, Delphinus Medical Technologies (USA) and Karmanos Cancer Institute (USA); Erik West, Katelyn Montgomery, Delphinus Medical Technologies, Inc. (USA); Neb Duric, Delphinus Medical Technologies, Inc. (USA) and Karmanos Cancer Institute (USA) . . . . . [9790-11]

Lunch Break . . . . Sun 12:10 pm to 1:20 pm

CONFERENCE 9783

Physics of Medical Imaging

Room: Town & Country

CONFERENCE 9785

Computer-Aided Diagnosis

Room: Golden West

CONFERENCE 9786

Image-Guided Procedures, Robotic Interventions, and Modeling

Room: California

CONFERENCE 9789

PACS and Imaging Informatics: Next Generation and Innovations

Room: San Diego

CONFERENCE 9790

Ultrasonic Imaging and Tomography

Room: Royal Palm One

SESSION 3

Room: Town & Country . . . Sun 1:20 to 3:00 pm

Keynote and Dual and Multi Energy CT

Session Chairs: **Despina Kontos**, Univ. of Pennsylvania (USA); **Thomas G. Flohr**, Siemens Healthcare GmbH (Germany)

1:20 pm: **Explorer: Changing the molecular imaging paradigm with total-body PET/CT** (*Keynote Presentation*), Simon R. Cherry, Univ. of California, Davis (USA) . . . . . [9783-12]

2:20 pm: **Dictionary-based image denoising for dual-energy computed tomography**, Korbinian Mechlem, Sebastian Allner, Technische Univ. München (Germany); Kai Mei, Klinikum rechts der Isar der Technischen Univ. München (Germany); Franz Pfeiffer, Technische Univ. München (Germany) and Klinikum rechts der Isar der Technischen Univ. München (Germany); Peter B. Noël, Klinikum rechts der Isar der Technischen Univ. München (Germany) and Technische Univ. München (Germany) . . . . . [9783-13]

2:40 pm: **Reconstruction of limited-angle multi-energy CT using joint clustering prior and sparsity regularization**, Huayu Zhang, Univ. of Wisconsin-Madison (USA); Yuxiang Xing, Tsinghua Univ. (China) . . . . . [9783-14]

Coffee Break . . . . . Sun 3:00 pm to 3:30 pm

SESSION 3

Room: Golden West . . Sun 1:20 pm to 3:00 pm

Lung and Chest I

Session Chairs: **Matthew S. Brown**, Univ. of California, Los Angeles (USA); **Catalin Fetita**, Télécom SudParis (France)

1:20 pm: **Localized Fisher vector representation for pathology detection in chest radiographs**, Ofer Geva, Tel Aviv Univ. (Israel); Sivan Lieberman, Eli Konen, The Chaim Sheba Medical Ctr., Tel Hashomer (Israel); Hayit Greenspan, Tel Aviv Univ. (Israel) . . . . . [9785-12]

1:40 pm: **Intensity targeted radial structure tensor analysis and its application for automated mediastinal lymph node detection from CT volumes**, Hirohisa Oda, Yukitaka Nimura, Masahiro Oda, Nagoya Univ. (Japan); Takayuki Kitasaka, Aichi Institute of Technology (Japan); Shingo Iwano, Nagoya Univ. (Japan); Hirotochi Honma, Sapporo Kosei Hospital (Japan); Hirotosugu Takabatake, Minami Sanryo Hospital (Japan); Masaki Mori, Sapporo Kosei Hospital (Japan); Hiroshi Natori, Keiwakai Nishioka Hospital (Japan); Kensaku Mori, Nagoya Univ. (Japan) [9785-13]

2:00 pm: **Automatic aortic root segmentation in CT: a whole-body dataset**, Xinpei Gao, Pieter Kitslaar, Arthur J. H. A. Scholte, Boudewijn P. F. Lelieveldt, Jouke Dijkstra, Johan H. C. Reiber, Leiden Univ. Medical Ctr. (Netherlands) . . . . . [9785-14]

2:20 pm: **Effects of CT dose and nodule characteristics on CAD performance in a cohort of 90 National Lung Screening Trial patients**, Stefano Young, Pechin Lo, John M. Hoffman, Hyun J. G. Kim, Matthew S. Brown, Michael F. McNitt-Gray, Univ. of California, Los Angeles (USA) . . . . . [9785-15]

2:40 pm: **An automated lung nodule detection system for CT images using synthetic minority oversampling**, Shrikant A. Mehre, Sudipta Mukhopadhyay, Indian Institute of Technology Kharagpur (India); Anirvan Dutta, Birla Institute of Technology Mesra (India); Nagam C. Harsha, National Institute of Technology, Durgapur (India); Ashis K. Dhara, Indian Institute of Technology Kharagpur (India); Niranjan Khandelwal, Postgraduate Institute of Medical Education & Research (India) . . . . . [9785-16]

Coffee Break . . . . . Sun 3:00 pm to 3:30 pm

SESSION 3

Room: California . . . Sun 1:20 pm to 3:00 pm

Spine and Percutaneous Procedures

Session Chairs: **Gabor Fichtinger**, Lab. for Percutaneous Surgery (Canada); **David J. Hawkes**, Univ. College London (UK)

1:20 pm: **Accurate biopsy-needle depth estimation in limited-angle tomography using multi-view geometry**, Fons van der Sommen, Svitlana Zinger, Peter H. N. de With, Technische Univ. Eindhoven (Netherlands) . . . . . [9786-12]

1:40 pm: **Automatic geometric rectification for patient registration in image-guided spinal surgery**, Yunliang Cai, Jonathan Olson, Xiaoyao Fan, Thayer School of Engineering at Dartmouth (USA); Linton Evans, Dartmouth Hitchcock Medical Ctr. (USA); Keith D. Paulsen, Thayer School of Engineering at Dartmouth (USA) and Dartmouth Hitchcock Medical Ctr (USA); David Roberts, Sohail Mirza, Stuart S. Lollis, Dartmouth Hitchcock Medical Ctr. (USA); Songbai Ji, Thayer School of Engineering at Dartmouth (USA) and Dartmouth Hitchcock Medical Ctr. (USA) . . . . . [9786-13]

2:00 pm: **Real-time self-calibration of a tracked augmented reality display**, Zachary M. C. Baum, Andras Lasso, Tamas Ungi M.D., Gabor Fichtinger, Lab. for Percutaneous Surgery (Canada) . . . . . [9786-14]

2:20 pm: **Study into clinical workflow for spinal curvature measurement with portable ultrasound**, Reza Tabanfar, Queen's Univ. (Canada) and Lab. for Percutaneous Surgery (Canada); Christina Yan, Lab. for Percutaneous Surgery (Canada); Michael Kempston, Daniel Borschneck, Queen's Univ. (Canada); Tamas Ungi, Gabor Fichtinger, Lab. for Percutaneous Surgery (Canada) . [9786-15]

2:40 pm: **MIND demons for MR-to-CT deformable image registration in image-guided spine surgery**, Sureerat Reaungamornrat, Tharindu De Silva, Ali Uneri, Johns Hopkins Univ. (USA); Jean-Paul Wolinsky, The Johns Hopkins Hospital (USA); Akhil J. Khanna, Johns Hopkins Health Care & Surgery Ctr. (USA); Gerhard Klienszig, Sebastian Vogt, Siemens AG (Germany); Jerry L. Prince, Jeffrey H. Siewerdsen, Johns Hopkins Univ. (USA) . . . . . [9786-16]

Coffee Break . . . . . Sun 3:00 pm to 3:30 pm

SESSION 2

Room: San Diego . . . Sun 1:20 pm to 3:00 pm

Surgical PACS, 3D Printing, and Imaging Informatics for Non-radiological Applications

Session Chair: **Thomas Deserno**, Uniklinik RWTH Aachen (Germany)

1:20 pm: **Development of a gestural interface with message hooking for manipulating medical images in the operating room**, Ben Joonyeon Park, Taekjin Jang, Jong Woo Choi M.D., Namkug Kim, Asan Medical Ctr. (Korea, Republic of) . . . . . [9789-5]

1:40 pm: **3D printed cardiac phantom for procedural planning of a transcatheter native mitral valve replacement**, Richard L. Izzo, The Jacobs Institute (USA) and Toshiba Stroke and Vascular Research Ctr. (USA) and Univ. at Buffalo (USA); Ryan P. O'Hara, Toshiba Stroke and Vascular Research Ctr. (USA) and Univ. at Buffalo (USA); Stephen Rudin, Toshiba Stroke and Vascular Research Ctr. (USA); Michael Springer, The Jacobs Institute (USA); Ciprian N. Ionita, Toshiba Stroke and Vascular Research Ctr. (USA) and Univ. at Buffalo (USA) . . . . . [9789-6]

2:00 pm: **Advanced 3D mesh manipulation in stereolithographic files and post-print processing for the manufacturing of patient-specific vascular flow phantoms**, Ryan P. O'Hara, Arpita Chand, Sowmya Vidiyala, Toshiba Stroke and Vascular Research Ctr. (USA) and Univ. at Buffalo (USA); Stacie M. Archavala, Univ. of Miami (USA) and Toshiba Stroke and Vascular Research Ctr. (USA); Stephen Rudin, Ciprian N. Ionita, Toshiba Stroke and Vascular Research Ctr. (USA) and Univ. at Buffalo (USA) . . [9789-7]

2:20 pm: **A deep semantic mobile application for thyroid cytopathology**, Edward Kim, Miguel Corte-Real, Villanova Univ. (USA); Zubair W. Baloch, Perelman School of Medicine, Univ. of Pennsylvania (USA) . . . . . [9789-8]

2:40 pm: **Interconnecting smartphone, image analysis server, and case report forms in clinical trials for automatic skin lesion tracking in clinical trials**, Daniel Haak, Aliaa Doma, Alexander Gombert, Thomas Deserno, Uniklinik RWTH Aachen (Germany) . . . . . [9789-9]

Coffee Break . . . . . Sun 3:00 pm to 3:30 pm

SESSION 3

Room: Royal Palm One . . Sun 1:20 to 3:00 pm

Ultrasound Image Analysis and Tissue Characterization

Session Chair: **Brecht Heyde**, Univ. of Leuven (Belgium), Duke Univ. (USA)

1:20 pm: **Automatic left-atrial segmentation from cardiac 3D ultrasound: a dual-chamber model-based approach**, Nuno Almeida, KU Leuven (Belgium) and GE Vingmed Ultrasound AS (Norway); Sebastian Imre Sarvari, Oslo Univ. Hospital (Norway) and Ctr. for Cardiological Innovation (Norway); Fredrik Orderud, Olivier Gerard, GE Vingmed Ultrasound AS (Norway); Jan D'hooge, KU Leuven (Belgium); Egil Samset, GE Vingmed Ultrasound AS (Norway) and Ctr. for Cardiological Innovation (CCI) (Norway) . . . . . [9790-12]

1:40 pm: **Automatic short axis orientation of the left ventricle in 3D ultrasound recordings**, João Pedrosa, Brecht Heyde, Piet Claus, Jan D'hooge, Lab. on Cardiovascular Imaging and Dynamics (Belgium) . . . . . [9790-13]

2:00 pm: **Robust spatio-temporal registration of 4D cardiac ultrasound sequences**, Jørn Bersvendsen, GE Vingmed Ultrasound (Norway) and Univ. I Oslo (Norway) and Ctr. for Cardiological Innovation (Norway); Matthew Toews, École de Technologie Supérieure (Canada); Adriyana Danudibroto, KU Leuven (Belgium); William M. Wells III, Brigham and Women's Hospital (USA) and Harvard Medical School (USA); Stig Urheim M.D., Oslo Univ. Hospital (Norway); Raúl San José Estépar, Brigham and Women's Hospital (USA) and Harvard Medical School (USA); Egil Samset, GE Vingmed Ultrasound (Norway) and Univ. I Oslo (Norway) and Ctr. for Cardiological Innovation (Norway) . . . . . [9790-14]

2:20 pm: **A new approach to ultrasonic elasticity imaging**, Cameron Hoerig, Jamshid Ghaboussi, Michael F. Insana, Univ. of Illinois at Urbana-Champaign (USA) . . . . . [9790-15]

2:40 pm: **Experimental characterization, comparison, and image quality assessment of two ultrasound contrast Agents: optison and definity**, Amy Hughes, Steven Day, Cristian A. Linte, Rochester Institute of Technology (USA); Karl Q. Schwarz M.D., Univ. of Rochester Medical Ctr. (USA) . . . . . [9790-16]

Coffee Break . . . . . Sun 3:00 pm to 3:30 pm

9783 continues on page 31 ➡

9785 continues on page 31 ➡

9786 continues on page 31 ➡

9789 continues on page 31 ➡

9790 continues on page 31 ➡



**CONFERENCE 9783**

Physics of Medical Imaging

Room: Town & Country

**SESSION 4**

Room: Town & Country . . . Sun 3:30 to 5:30 pm

**Cone Beam CT I: New Technologies, Corrections**

Session Chairs: **John Yorkston**, Carestream Health, Inc. (USA); **Hilde Bosmans**, KU Leuven (Belgium)

3:30 pm: **Multipurpose robotic x-ray system for 2D radiographic and 3D cone-beam CT imaging**, Andreas Fieselmann, Jan Steinbrener, Anna K. Jerebko, Thomas Mertelmeier, Siemens AG (Germany) . . . . . [9783-15]

3:50 pm: **Image-based motion compensation for high-resolution extremities cone-beam CT**, Alejandro Sisniega, Joseph W. Stayman, Qian Cao, Johns Hopkins Univ. (USA); John Yorkston, Carestream Health, Inc. (USA); Jeffrey H. Stewerdsen, Wojciech Zbijewski, Johns Hopkins Univ. (USA) . . . . . [9783-16]

4:10 pm: **Striped ratio grids for scatter estimation**, Scott S. Hsieh, Stanford Univ. (USA); Adam S. Wang, Josh M. Star-Lack, Varian Medical Systems, Inc. (USA) . [9783-17]

4:30 pm: **Five-dimensional motion compensation for respiratory and cardiac motion with cone-beam CT of the thorax region**, Sebastian Sauppe, Andreas Hahn, Deutsches Krebsforschungszentrum (Germany); Marcus Brehm, Pascal Paysan, Varian Medical Systems, Inc. (Switzerland); Marc Kachelriess, Deutsches Krebsforschungszentrum (Germany) [9783-18]

4:50 pm: **Over-exposure correction in knee cone-beam CT imaging with automatic exposure control using a partial low-dose scan**, Jang-Hwan Choi, Kerstin Muller, Scott S. Hsieh, Stanford Univ. (USA); Andreas K. Maier, Friedrich-Alexander-Univ. Erlangen-Nürnberg (Germany); Garry Gold M.D., Marc Levenston, Rebecca Fahrig, Stanford Univ. (USA) . . . . . [9783-19]

5:10 pm: **Offset detector super short scan reconstruction for the rotate-plus-shift trajectories and its application to C-arm CT systems**, Jan Kuntz, Michael Knaup, Deutsches Krebsforschungszentrum (Germany); Christof Fleischmann, Ziehm Imaging GmbH (Germany); Marc Kachelriess, Deutsches Krebsforschungszentrum (Germany) . . . . . [9783-20]

9783 continues on page 32 ➡

**CONFERENCE 9785**

Computer-Aided Diagnosis

Room: Golden West

**SESSION 4**

Room: Golden West . . . . Sun 3:30 to 5:30 pm

**Breast**

Session Chairs: **Hiroshi Fujita**, Gifu Univ. School of Medicine (Japan); **Karen Drukker**, The Univ. of Chicago (USA)

3:30 pm: **Quantification of mammographic masking risk with volumetric breast density maps: how to select women for supplemental screening**, Katharina Holland, Radboud Univ. Medical Ctr. (Netherlands); Carla H. van Gils, Johanna O. P. Wanders, Univ. Medical Ctr. Utrecht (Netherlands); Ritse M. Mann, Nico Karssemeijer, Radboud Univ. Medical Ctr. (Netherlands) . [9785-17]

3:50 pm: **Seamless lesion insertion in digital mammography: methodology and reader study**, Aria X. Pezeshk, Berkman Sahiner, Nicholas A. Petrick, U.S. Food and Drug Administration (USA) . . . . . [9785-18]

4:10 pm: **Workflow improvements for digital breast tomosynthesis: computerized generation of enhanced synthetic images**, Sergei Fotin, Yin Yin, Hrishikesh Haldankar, Jeffrey Hoffmeister, Senthil Periaswamy, iCAD, Inc. (USA) . . . . . [9785-19]

4:30 pm: **A fully automated system for quantification of background parenchymal enhancement in breast DCE-MRI**, Mehmet U. Dalmis, Albert Gubern-Mérida, Cristina Borelli, Suzan Vreemann, Ritse M. Mann, Nico Karssemeijer, Radboud Univ. Medical Ctr. (Netherlands) . . . . . [9785-20]

4:50 pm: **Parenchymal texture measures weighted by breast anatomy: preliminary optimization in a case-control study**, Airmilia Gastounioti, Brad M. Keller, Meng-Kang Hsieh, Emily F. Conant M.D., Despina Kontos, Univ. of Pennsylvania (USA) . . . . . [9785-21]

5:10 pm: **Automated linking of suspicious findings between automated 3D breast ultrasound volumes**, Albert Gubern-Mérida, Tao Tan, Jan van Zelst, Ritse M. Mann, Nico Karssemeijer, Radboud Univ. Medical Ctr. (Netherlands) . . . . . [9785-22]

9785 continues on page 32 ➡

**CONFERENCE 9786**

Image-Guided Procedures, Robotic Interventions, and Modeling

Room: California

**SESSION 4**

Room: California . . . . . Sun 3:30 to 5:30 pm

**Ultrasound Image Guidance**

Joint Session with Conferences 9786 and 9790

Session Chairs: **Parvin Mousavi**, Queen's Univ. (Canada); **Brecht Heyde**, Univ. of Leuven (Belgium), Duke Univ. (USA)

3:30 pm: **Automatic detection of a hand-held needle in ultrasound via phased-based analysis of the tremor motion**, Parmida Beigi, Septimiu E. Salcudean, Robert Rohling, The Univ. of British Columbia (Canada); Gary C. Ng, Philips Ultrasound, Inc. (USA) . . . . . [9786-17]

3:50 pm: **Development of 3D ultrasound needle guidance for high-dose-rate interstitial brachytherapy of gynaecological cancers**, Jessica R. Rodgers, David Tessier, Robarts Research Institute (Canada) and Western Univ. (Canada); David D'Souza, London Regional Cancer Program (Canada); Eric Leung, Odette Cancer Ctr. (Canada) and Sunnybrook Health Sciences Ctr. (Canada); George Hajdok, London Regional Cancer Program (Canada); Aaron Fenster, Robarts Research Institute (Canada) and Western Univ. (Canada) . . . . . [9790-17]

4:10 pm: **Ultrasound to video registration using a bi-plane transrectal probe with photoacoustic markers**, Alexis Cheng, Hyun Jae Kang, Russell H. Taylor, Emad M. Boctor, Johns Hopkins Univ. (USA) . . . . . [9786-18]

4:30 pm: **Classification of prostate cancer grade using temporal ultrasound: in vivo feasibility study**, Sahar Ghavidel, Queen's Univ. (Canada); Farhad Imani, Purang Abolmaesumi, Siavash Khallaghi, The Univ. of British Columbia (Canada); Eli Gibson, Western Univ. (Canada); Amir Khojaste, Queen's Univ. (Canada); Mena Gaed M.D., Western Univ. (Canada); Madeleine Moussa, José A. Gomez, London Health Sciences Ctr. (Canada); D. Robert Siemens, Michael Leveridge, Kingston General Hospital (Canada); Silvia Chang, Vancouver General Hospital (Canada); Aaron Fenster, Aaron D. Ward, Western Univ. (Canada); Parvin Mousavi, Queen's Univ. (Canada) [9786-19]

9786 continues on page 32 ➡

**CONFERENCE 9789**

PACS and Imaging Informatics: Next Generation and Innovations

Room: San Diego

**SESSION 3**

Room: San Diego . . . . . Sun 3:30 to 5:30 pm

**Imaging Informatics for Diagnostics and Therapeutic Applications**

Session Chair: **Maria Y. Law**, Hong Kong Sanatorium and Hospital (Hong Kong, China)

3:30 pm: **Streamlining an interactive Bayesian-based diagnostic support tool alongside traditional PACS system**, Po-Hao Chen M.D., Emmanuel Botzolakis M.D., Suyash Mohan M.D., Robert N. Bryan M.D., Tessa S. Cook M.D., The Univ. of Pennsylvania Health System (USA) . [9789-10]

3:50 pm: **Improved superficial brain hemorrhage visualization in susceptibility weighted images by constrained minimum intensity projection**, Marcelo A. Castro, Ctr. for Neuroscience and Regenerative Medicine, Henry M. Jackson Foundation (USA); Dzung L. Pham, Ctr. for Neuroscience and Regenerative Medicine, Henry M. Jackson Foundation (USA); John A. Butman, National Institutes of Health (USA) [9789-11]

4:10 pm: **Multi-site evaluation of a clinical decision support system for radiation therapy**, Ruchi R. Deshpande, Brent J. Liu, The Univ. of Southern California (USA); Kerstin A. Kessel, Technische Univ. München (Germany) . . . . . [9789-12]

4:30 pm: **Lesion registration for longitudinal disease tracking using thin-plate splines deformation for multiple sclerosis eFolder**, Kevin C. Ma, Xuejun Zhang, Lilyana Amezcua, Mark Shiroishi, Alex Lerner, Brent J. Liu, The Univ. of Southern California (USA) . . . . . [9789-13]

4:50 pm: **Altered effective connectivity within default mode network in major depression disorder**, Liang Li, Baojun Li, Yuanhan Bai, Huaning Wang, Linchuan Zhang, Longbiao Cui, Hong Yin, Hongbing Lu, Fourth Military Medical Univ. (China) . . . . . [9789-14]

5:10 pm: **Segmentation of bone pixels from EROI Image using Clustering Method for Bone Age Assessment**, rajitha bakhthula, Motilal Nehru National Institute of Technology (India) . . . [9789-15]

9789 continues on page 32 ➡

**CONFERENCE 9790**

Ultrasonic Imaging and Tomography

Room: California

**SESSION 4**

Room: California . . . . . Sun 3:30 to 5:30 pm

**NOTE ROOM CHANGE  
Ultrasound Image Guidance**

Joint Session with Conferences 9786 and 9790

Session Chairs: **Parvin Mousavi**, Queen's Univ. (Canada); **Brecht Heyde**, Univ. of Leuven (Belgium), Duke Univ. (USA)

3:30 pm: **Automatic detection of a hand-held needle in ultrasound via phased-based analysis of the tremor motion**, Parmida Beigi, Septimiu E. Salcudean, Robert Rohling, The Univ. of British Columbia (Canada); Gary C. Ng, Philips Ultrasound, Inc. (USA) . . . . . [9786-17]

3:50 pm: **Development of 3D ultrasound needle guidance for high-dose-rate interstitial brachytherapy of gynaecological cancers**, Jessica R. Rodgers, David Tessier, Robarts Research Institute (Canada) and Western Univ. (Canada); David D'Souza, London Regional Cancer Program (Canada); Eric Leung, Odette Cancer Ctr. (Canada) and Sunnybrook Health Sciences Ctr. (Canada); George Hajdok, London Regional Cancer Program (Canada); Aaron Fenster, Robarts Research Institute (Canada) and Western Univ. (Canada) . . . . . [9790-17]

4:10 pm: **Ultrasound to video registration using a bi-plane transrectal probe with photoacoustic markers**, Alexis Cheng, Hyun Jae Kang, Russell H. Taylor, Emad M. Boctor, Johns Hopkins Univ. (USA) . . . . . [9786-18]

4:30 pm: **Classification of prostate cancer grade using temporal ultrasound: in vivo feasibility study**, Sahar Ghavidel, Queen's Univ. (Canada); Farhad Imani, Purang Abolmaesumi, Siavash Khallaghi, The Univ. of British Columbia (Canada); Eli Gibson, Western Univ. (Canada); Amir Khojaste, Queen's Univ. (Canada); Mena Gaed M.D., Western Univ. (Canada); Madeleine Moussa, José A. Gomez, London Health Sciences Ctr. (Canada); D. Robert Siemens, Michael Leveridge, Kingston General Hospital (Canada); Silvia Chang, Vancouver General Hospital (Canada); Aaron Fenster, Aaron D. Ward, Western Univ. (Canada); Parvin Mousavi, Queen's Univ. (Canada) [9786-19]

9790 continues on page 32 ➡

# SUNDAY 28 FEBRUARY

## CONFERENCE 9783

Physics of Medical Imaging

Room: Town & Country

## CONFERENCE 9785

Computer-Aided Diagnosis

Room: Golden West

## CONFERENCE 9786

Image-Guided Procedures,  
Robotic Interventions, and Modeling

Room: California

## CONFERENCE 9789

PACS and Imaging Informatics:  
Next Generation and Innovations

Room: Golden West

## CONFERENCE 9790

Ultrasonic Imaging and  
Tomography

Room: California

### SESSION 4 (continued)

Room: California . . . . . Sun 3:30 to 5:30 pm

4:50 pm: **Non-invasive ultrasound method for measuring large range pressure changes in deep-positioned vessels**, Jacob B. Olesen, Carlos A. Villagomez-Hoyos, Technical Univ. of Denmark (Denmark); Marie S. Traberg, Technical Univ. of Denmark (Denmark); Jørgen A. Jensen, Technical Univ. of Denmark (Denmark) . . . . . [9790-18]

5:10 pm: **Automatic real-time detection of pleura and B-lines (comet-tail artifacts) on in-vivo ultrasound lung scans**, Ramin Moshavegh, Technical Univ. of Denmark (Denmark); Kristoffer Lindskov Hansen M.D., Hasse Møller Sørensen M.D., Rigshospitalet (Denmark); Martin C. Hemmsen Sr., Technical Univ. of Denmark (Denmark); Michael B. Nielsen M.D., Rigshospitalet (Denmark); Jørgen A. Jensen Sr., Technical Univ. of Denmark (Denmark) . . . . . [9790-19]

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### WORKSHOPS

#### Interventional Procedures: Emerging Technologies and Clinical Applications

Room: Town & Country  
Sun 5:45 to 7:45 pm

Workshop Chairs:  
**Despina Kontos**,  
Univ. of Pennsylvania, (USA)  
**Ziv Yaniv**, National Library of  
Medicine, (USA)

### WORKSHOP

#### 17th SPIE/IFCARS Joint Workshop on Information Management, Systems Integration, Standards, and Approval Issues for the Digital Operating Room

Room: Golden West  
Sun 5:45 pm to 7:45 pm

Workshop Chairs: **Leonard Berliner**,  
New York Methodist Hospital, (USA) and  
**Heinz U. Lemke**, Computer Assisted  
Radiology and Surgery, (German)  
See *Special Events* for more information.

### WORKSHOP

#### Sensing Challenges and Prospects in Miniaturizing Surgical Robots and Tools

Room: California · Sun 5:45 pm to 7:45 pm

Workshop Chair: **Jessica Burgner-Kahrs**,  
Leibniz Univ. Hannover, (Germany)  
See *Special Events* for more information.

### WORKSHOP

#### 17th SPIE/IFCARS Joint Workshop on Information Management, Systems Integration, Standards, and Approval Issues for the Digital Operating Room

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See *Special Events* for more information.

9783 continues on page 42 ➡

9785 continues on page 42 ➡

9786 continues on page 42 ➡

9789 continues on page 42 ➡

9790 continues on page 42 ➡

## POSTERS – SUNDAY/MONDAY

### SUNDAY/MONDAY POSTERS

Location: Grand Exhibit Hall

Posters for this conference will be on display Sunday and Monday. The interactive poster session with authors in attendance will be Monday evening from 5:30 to 7:00 pm. Poster awards will be announced in the conference meeting room on Tuesday morning.

#### POSTER AUTHORS:

- Display your poster early on Sunday for extended viewing and consideration for a poster award.
- Poster boards will be available lunch on Sunday.
- Posters not displayed at the beginning of the interactive poster session and reception will be considered a no show.
- Stand with your poster during the interactive poster session and reception from 5:30 to 7:00 pm on Monday.
- Authors should remove their poster after the interactive poster session on Monday.
- Posters remaining on the boards after the reception will be discarded.

### CONFERENCE 9783

#### Physics of Medical Imaging

#### Breast Imaging

**Conceptual detector development and Monte Carlo simulation of a novel 3D breast computed tomography system**, Jens Ziegler, Christoph Hoeschel, Bernhard H. Müller, Bernd Neumann, Otto-von-Guericke Univ. Magdeburg (Germany) . . . . . [9783-81]

**Eigenbreasts for statistical breast phantoms**, Gregory M. Sturgeon, Duke Univ. (USA); Daniel J. Tward, Johns Hopkins Univ. (USA); Subok Park, U.S. Food and Drug Administration (USA); W. Paul Segars, Joseph Y. Lo, Duke Univ. (USA) . . . . . [9783-82]

**Optimal exposure techniques for iodinated contrast-enhanced breast CT**, Stephen J. Glick, Andrey V. Makeev, Ctr. for Devices and Radiological Health, U.S. Food and Drug Administration (USA) . . . . [9783-83]

**Simulation of spiculated breast lesions**, Premkumar Elangovan, Faisal Alrehily, Rafael F. Pinto, Univ. of Surrey (UK); Alaleh Rashid Nasab, Univ. College London (UK); David R. Dance, Kenneth C. Young, The Royal Surrey County Hospital NHS Trust (UK); Kevin Wells, Univ. of Surrey (UK) . . . . . [9783-84]

**Estimation of mammary gland composition using CdTe series detector developed for photon-counting mammography**, Akiko Ihori, Chizuru Okamoto, Nagoya Univ. (Japan); Tsutomu Yamakawa, Shuichiro Yamamoto, Masahiro Okada, JOB Corp. (Japan); Ai Nakajima, Misa Kato, Yoshie Kodera, Nagoya Univ. (Japan) . . . . . [9783-85]

**Modeling and dimensioning a novel tissue-specific breast imaging system using spectral x-ray coherent scattering**, Damien Barbes, CEA-LETI (France) . . . . . [9783-86]

**Reduction of artifacts in computer simulation of breast Cooper's ligaments**, David D. Pokrajac, Delaware State Univ. (USA); Andrew D. A. Maidment, Predrag R. Bakic, The Univ. of Pennsylvania Health System (USA) . . . . . [9783-87]

**Analysis of the scatter effect on detective quantum efficiency of digital mammography**, Jiwoong Park, Pusan National Univ. (Korea, Republic of); Seungman Yun, SAMSUNG Electronics Co., Ltd. (Korea, Republic of); Dong Woon Kim, Pusan National Univ. (Korea, Republic of); Cheol-Ha Baek, Dongseo Univ. (Korea, Republic of); Hanbean Yun, Hosang Jeon, Pusan National Univ. Yangsan Hospital (Korea, Republic of) and Ctr. for Advanced Medical Engineering, Pusan National Univ. (Korea, Republic of); Ho Kyung Kim, Pusan National Univ. (Korea, Republic of) and Ctr. for Advanced Medical Engineering, Pusan National Univ. (Korea, Republic of) . [9783-88]

**Comparison of contrast enhancement methods using photon counting detector in spectral mammography**, Hyemi Kim, Su-Jin Park, Byungdu Jo, Do-Hyeon Kim, Hee-Joung Kim, Yonsei Univ. (Korea, Republic of) . . . . . [9783-89]

**Preliminary results for MAMMOCARE prototype: breast biopsy system guided by positron emission tomography in realtime**, Laura Moliner, Univ. Politècnica de València (Spain) and I3M (Spain); Jorge Alamo, ONCOVISION (GEM Imaging S.A.) (Spain); Jose L. Peris, Juan Gomez, Instituto de Biomecánica de Valencia (Spain); Paul Tattersall, HERRI (UK); Vicente Carrilero López, Abel Orero, Carlos Correcher, ONCOVISION (GEM Imaging S.A.) (Spain); José María Benlloch, I3M (Spain) and Univ. Politècnica de València (Spain) . . . . . [9783-90]

**Discrimination between normal breast tissue and tumor tissue using CdTe series detector developed for photon-counting mammography**, Chizuru Okamoto, Akiko Ihori, Nagoya Univ. (Japan); Tsutomu Yamakawa, Shuichiro Yamamoto, Masahiro Okada, JOB Corp. (Japan); Misa Kato, Ai Nakajima, Yoshie Kodera, Nagoya Univ. (Japan) . . . [9783-91]

**Grid-less imaging with anti-scatter correction software in 2D mammography: the effects on image quality and MGD under a virtual clinical validation study**, Nelis Van Peteghem, Frédéric Bemelmans, Xenia Bramaje Adversalo, Elena Salvagnini, KU Leuven (Belgium); Nicholas W. Marshall, Hilde Bosmans, UZ Leuven (Belgium) . . [9783-92]

**Estimation of adipose compartment volumes in CT images of a mastectomy specimen**, David D. Pokrajac, Abdullah-Al-Zubaer Imran, Delaware State Univ. (USA); Andrew D. A. Maidment, Predrag R. Bakic, The Univ. of Pennsylvania Health System (USA) . . . . . [9783-93]

**A feasibility study for three materials decomposition in digital mammography**, Dong-Hoon Lee, Ye-seul Kim, Sunghoon Choi, Haenghwa Lee, Hee-Joung Kim, Yonsei Univ. (Korea, Republic of) . [9783-94]

**A new paradigm of dielectric relaxation spectroscopy for non-invasive detection of breast abnormalities: a preliminary feasibility analysis**, Sreeram Dhurjaty, Dhurjaty Electronics Consulting LLC (USA); Yuchen Qiu, Maxine Tan, Bin Zheng, The Univ. of Oklahoma (USA) . . . . . [9783-95]

**DICOM organ dose does not accurately represent calculated dose in mammography**, Moayyad E. Suleiman, Patrick C. Brennan, Lucy Cartwright, The Univ. of Sydney (Australia); Jennifer Diffey, The Univ. of Sydney (Australia); Mark F. McEntee, The Univ. of Sydney (Australia) . . . . . [9783-96]

**Radiation dose differences between digital mammography and digital breast tomosynthesis are dependent on breast thickness**, Maram Mustafa Alakhras, The Univ. of Sydney (Australia); Claudia R. Mello-Thoms, The Univ. of Sydney (Australia) and Univ. of Pittsburgh School of Medicine (USA); Roger Bourne, The Univ. of Sydney (Australia); Mary Rickard, The Univ. of Sydney (Australia) and Sydney Breast Clinic (Australia); Jennifer Diffey, John Hunter Hospital (Australia); Patrick C. Brennan, The Univ. of Sydney (Australia) . . . . . [9783-97]

#### Cone Beam CT

**Ring artifacts removal via spatial sparse representation in cone beam CT**, Zhongyuan Li, Guang Li, Yi Sun, Shouhua Luo, Southeast Univ. (China) . . . [9783-98]

**Library based x-ray scatter correction for dedicated cone beam breast CT**, Lei Zhu, Linxi Shi, Georgia Institute of Technology (USA) . . . . . [9783-99]

**Properties of the ellipse-line-ellipse trajectory with asymmetrical variations**, Zijia Guo, Frédéric Noo, The Univ. of Utah (USA); Guenter Lauritsch, Siemens Healthcare GmbH (Germany) . . [9783-100]

**Lens of the eye dose calculation for neuro-interventional procedures and CBCT scans of the head**, Zhenyu Xiong, Sarath Vijayan, Vijay K. Rana, Amit Jain, Stephen Rudin, Daniel R. Bednarek, Toshiba Stroke and Vascular Research Ctr., Univ. at Buffalo (USA) . . . . . [9783-101]

**A system to track skin dose for neuro-interventional cone-beam computed tomography (CBCT)**, Sarath Vijayan, Zhenyu Xiong, Stephen Rudin, Daniel R. Bednarek, Toshiba Stroke Research Ctr. (USA) . . . . . [9783-102]

**Regularization design for high-quality cone-beam CT of intracranial hemorrhage using statistical reconstruction**, Hao Dang, Joseph W. Stayman, Jennifer Xu, Alejandro Sisniega, Wojciech Zbijewski, Johns Hopkins Univ. (USA); Xiaohui Wang, David H. Fooks, Carestream Health, Inc. (USA); Nafi Aygun, Vassili E. Koliatos, Jeffrey H. Siewerdsen, Johns Hopkins Univ. (USA) . . . [9783-103]

**A fast GPU-based approach to branchless distance-driven projection and back-projection in cone beam CT**, Daniel E. Schlifske, Marquette Univ. (USA) . . . . . [9783-104]

**Scatter correction in CBCT with an offset detector through a deconvolution method using data consistency**, Changhwan Kim, Miran Park, Hoyeon Lee, Seungryong Cho, KAIST (Korea, Republic of) . . . . . [9783-105]

**Imaging characteristics of distance-driven method in a prototype cone-beam computed tomography (CBCT)**, Sunghoon Choi, Ye-Seul Kim, Haeng-Hwa Lee, Dong-Hoon Lee, Chang-Woo Seo, Hee-Joung Kim, Yonsei Univ. (Korea, Republic of) . . . . . [9783-106]

**Deblurring in iterative reconstruction of half CBCT for image guided brain radiosurgery**, SayedMasoud Hashemi, Sunnybrook Health Sciences Ctr. (Canada); Young Lee, Odette Cancer Ctr., Sunnybrook Research Institute (Canada) and Univ. of Toronto (Canada); Markus K. Eriksson, Håkan C. A. Nordström, Elekta AB (Sweden); Bongyong Song, Wooseok Nam, Qualcomm Inc. (USA) and Univ. of California, San Diego (USA); Arjun Sahgal, William Song, Mark Ruschin, Odette Cancer Ctr., Sunnybrook Research Institute (Canada) and Univ. of Toronto (Canada) . . . . . [9783-107]

**Reduction in x-ray scatter and beam hardening for low-dose cone-beam CT**, Wen Lei Liu, Fourth Military Medical Univ. (China); Junyan Rong, Fourth Military Medical Univ. (China); Peng Gao, Qimei Liao, Hongbing Lu, Fourth Military Medical Univ. (China) . . . . . [9783-108]

#### Artifact Corrections

**Beam hardening and motion artifacts in cardiac CT: Evaluation and iterative correction method**, Zeyang Shen, Johns Hopkins Univ. (USA) and Southeast Univ. (China); Okkyun Lee, Katsuyuki Taguchi, Johns Hopkins Univ. School of Medicine (USA) . . . . . [9783-109]

**MADR: metal artifact detection and reduction**, Sunil Jaiswal, Hong Kong Univ. of Science and Technology (Hong Kong, China); Sungsoo Ha, Klaus D. Mueller, Stony Brook Univ. (USA) and SUNY Korea (Korea, Republic of) . . . . . [9783-110]

**Metal artifact reduction in CT via ray profile correction**, Sungsoo Ha, Klaus D. Mueller, Stony Brook Univ. (USA) and SUNY Korea (Korea, Republic of) [9783-111]

**Line-ratio based ring artifact correction method using transfer function**, Daejoong Oh, Dosik Hwang, Yonsei Univ. (Korea, Republic of) . . . . . [9783-112]

#### CT: Technology, System Characterization, Dose, Applications

**A geometric calibration method for inverse geometry computed tomography using P-matrices**, Jordan M. Slagowski, David A. P. Dunkerley, Charles R. Hatt, Michael A. Speidel, Univ. of Wisconsin-Madison (USA) . . . [9783-113]

**CT dose minimization using personalized protocol optimization and aggressive bowtie**, Hui Wang, GE Global Research (China); Zhye Yin, GE Global Research (USA); Yangyang Yao, Mingye Wu, GE Global Research (China); Yannan Jin, GE Global Research (USA); Kun Tao, GE Global Research (China); Mannudeep K. Kalra, Massachusetts General Hospital (USA); Bruno De Man, GE Global Research (USA) . . . . . [9783-114]

**Segmentation-free x-ray energy spectrum estimation for computed tomography**, Wei Zhao, Quide Zhang, Huazhong Univ. of Science and Technology (China); Tianye Niu, Zhejiang Univ. (China) . . . . . [9783-115]

**Noise power spectrum studies of CT systems with off-centered image object and bowtie filter**, Daniel Gomez-Cardona, Juan Pablo Cruz-Bastida, Ke Li, Univ. of Wisconsin-Madison (USA); Adam Budde, Univ. of Wisconsin-Madison (USA); Jiang Hsieh, GE Healthcare (USA); Guang-Hong Chen, Univ. of Wisconsin-Madison (USA) . . . . . [9783-116]



**Prototype adaptive bow-tie filter based on spatial exposure time modulation,** Andreu Badal, U.S. Food and Drug Administration (USA) . . . . . [9783-117]

Evaluation of the dose reduction potential using a breast positioning technique for organ-based tube current modulated CT examinations, Wanyi Fu, Xiaoyu Tian, W. Paul Segars, Duke Univ. (USA); Mitchell M. Goodsitt, Ella A. Kazerooni, Univ. of Michigan (USA); Ehsan Samei, Duke Univ. (USA) . . . . . [9783-118]

**Robust dynamic myocardial perfusion CT deconvolution using adaptive-weighted tensor total variation regularization,** Changfei Gong, Dong Zeng, Zhaoying Bian, Jing Huang, Xinyu Zhang, Hua Zhang, Lijun Lu, Southern Medical Univ. (China); Qianjin Feng, Southern Medical Univ (China); Jianhua Ma, Southern Medical Univ (China); Zhengrong Liang, State Univ. of New York (USA) . . . . . [9783-119]

**Estimation of organ dose under tube current modulated CT for 58 patients across diverse protocols,** Wanyi Fu, Xiaoyu Tian, Pooyan Sahbaee, Yakun Zhang, W. Paul Segars, Ehsan Samei, Duke Univ. (USA) . . . . . [9783-120]

**A technique for multi-dimensional optimization of radiation dose, contrast dose, and image quality in CT imaging,** Pooyan Sahbaee, Duke Univ. Medical Ctr. (USA); Ehsan Abadi, Duke Univ. School of Medicine (USA); Greeshma Agasthya, Yakun Zhang, Marc Becchetti, W. Paul Segars, Ehsan Samei, Duke Univ. Medical Ctr. (USA) . . . . . [9783-121]

**Experimental demonstration of a dynamic bowtie for region-based CT fluence optimization,** Vance S. Robinson, Walter J. Smith, Zhye Yin, Mingye Wu, Paul F. Fitzgerald, Bruno De Man, GE Global Research (USA) . . . . . [9783-122]

**Hybrid deterministic and stochastic x-ray transport simulation for transmission computed tomography with advanced detector noise model,** Lucretiu M. Popescu, U.S. Food and Drug Administration (USA) . . . . . [9783-123]

**An automated technique for estimating patient-specific regional imparted energy in TCM CT exams,** Jeremiah Sanders, Xiaoyu Tian, W. Paul Segars, Duke Univ. (USA); John M. Boone, Univ. of California, Davis (USA); Ehsan Samei, Duke Univ. (USA) . . . . . [9783-124]

**A framework for analytical estimation of patient-specific CT dose,** Hanbean Youn, Hosang Jeon, Jiho Nam, Jin Woo Kim, Pusan National Univ. (Korea, Republic of); Seungnam Yun, Min Kook Cho, SAMSUNG Electronics Co., Ltd. (Korea, Republic of); Ho Kyung Kim, Pusan National Univ. (Korea, Republic of) . . . . . [9783-125]

**Modulation transfer function determination using the edge technique for cone-beam micro-CT,** Junyan Rong, Wen Lei Liu, Peng Gao, Qimei Liao, Hongbing Lu, Fourth Military Medical Univ. (China) . . . . . [9783-126]

**An approach for quantitative image quality analysis for CT,** Amir Rahimi, Battelle Memorial Institute (USA) [9783-127]

**Detectors**

**Quantitative comparison using generalized relative object detectability (G-ROD) metrics of an amorphous selenium detector with high-resolution microangiographic fluoroscopes (MAF) and standard flat panel detectors (FPD),** Megan K. Russ, Amit Jain, Swetadri Vasan Setlur Nagesh, Ciprian N. Ionita, Toshiba Stroke and Vascular Research Ctr., Univ. at Buffalo (USA); Christopher C. Scott, Karim S. Karim, Univ. of Waterloo (Canada); Daniel R. Bednarek, Stephen Rudin, Toshiba Stroke and Vascular Research Ctr., Univ. at Buffalo (USA) . . . . . [9783-128]

**Exploration of maximum count rate capabilities for large-area photon counting arrays based on polycrystalline silicon thin-film transistors,** Albert K. Liang, Martin Konieczek, Larry E. Antonuk, Youcef El-Mohri, Qihua Zhao, Univ. of Michigan (USA) . . . . . [9783-129]

**Indirect-detection single photon-counting x-ray detector for breast tomosynthesis,** Hao Jiang, Joerg Kaercher, Roger Durst, Bruker AXS, Inc. (USA) . . . . . [9783-130]

**SWAD: inherent photon counting performance of amorphous selenium multi-well avalanche detector,** Jann Stavro, Wei Zhao, Amir H. Goldan, Stony Brook Univ. (USA) . . . . . [9783-131]

**Both QLD and DQE proposed for flat panel detector characterization,** Sarah J. Boyce, Michael J. Petrillo, Isaias D. Job, Kungang Zhou, Varian Medical Systems, Inc. (USA) . . . . . [9783-132]

**Focal spot deblurring for high-resolution direct conversion x-ray detectors,** Swetadri Vasan Setlur Nagesh, Raman Rana, Megan K. Russ, Ciprian N. Ionita, Daniel R. Bednarek, Stephen Rudin, Toshiba Stroke and Vascular Research Ctr. (USA) . . . . . [9783-133]

**Noise power spectrum measurements under nonuniform gains and their compensations,** Dong Sik Kim, Hankuk Univ. of Foreign Studies (Korea, Republic of); Eun Kim, Choul Woo Shin, DRTECH Corp. (Korea, Republic of) . . . . . [9783-134]

**A comparison of quantum limited dose and noise equivalent dose,** Sarah J. Boyce, Isaias D. Job, Michael J. Petrillo, Kungang Zhou, Varian Medical Systems, Inc. (USA) . . . . . [9783-135]

**Optimizing the CsI thickness for chest dual-shot dual-energy detectors,** Dong Woon Kim, Junwoo Kim, Eunpyeong Park, Pusan National Univ. (Korea, Republic of); Hanbean Youn, Hosang Jeon, Pusan National Univ. Yangsan Hospital (Korea, Republic of); Ho Kyung Kim, Pusan National Univ. (Korea, Republic of) and Ctr. for Advanced Medical Engineering, Pusan National Univ. (Korea, Republic of) . . . . . [9783-136]

**Physical properties of a new flat panel detector with cesium-iodide technology,** Andreas Hahn, Petar Penchev, Martin Fiebich, Technische Hochschule Mittelhessen (Germany) . . . . . [9783-137]

**Detective quantum efficiency: a standard test to ensure optimal detector performance and low patient exposures,** Terenz R. Escartin, Tomi Nano, Ian A. Cunningham, Roberts Research Institute (Canada) . . . . . [9783-138]

**MTF and NPS of single-shot dual-energy sandwich detectors,** Junwoo Kim, Dong Woon Kim, Pusan National Univ. (Korea, Republic of); Hanbean Yun, Pusan National Univ. Yangsan Hospital (Korea, Republic of) and Ctr. for Advanced Medical Engineering, Pusan National Univ. (Korea, Republic of); Ho Kyung Kim, Pusan National Univ. (Korea, Republic of) and Ctr. for Advanced Medical Engineering, Pusan National Univ. (Korea, Republic of) . . . . . [9783-139]

**Dual and Multi Energy CT**

**Computed tomography with single-shot dual-energy sandwich detectors,** Seung Ho Kim, Pusan National Univ. (Korea, Republic of); Hanbean Youn, Yangsan Hospital (Korea, Republic of) and Ctr. for Advanced Medical Engineering, Pusan National Univ. (Korea, Republic of); Daechoon Kim, Junwoo Kim, Dong Woon Kim, Pusan National Univ. (Korea, Republic of); Hosang Jeon, Yangsan Hospital (Korea, Republic of) and Ctr. for Advanced Medical Engineering, Pusan National Univ. (Korea, Republic of); Ho Kyung Kim, Pusan National Univ. (Korea, Republic of) and Ctr. for Advanced Medical Engineering, Pusan National Univ. (Korea, Republic of) . . . . . [9783-140]

**Theoretical and Monte Carlo optimization of a stacked three-layer flat-panel x-ray imager for applications in multi-spectral diagnostic medical imaging,** Sebastian Lopez Maurino, Univ. of Waterloo (Canada); Ian A. Cunningham, Roberts Research Institute (Canada) and The Univ. of Western Ontario (Canada); Karim S. Karim, Univ. of Waterloo (Canada) . . . . . [9783-141]

**A novel scatter correction method for multi-energy x-ray imaging,** Artur Sossin, CEA Grenoble (France) . . . . . [9783-142]

**Noise suppression for energy-resolved CT using similarity-based non-local filtration,** Joe Harms, Tonghe Wang, Michael Petrongolo, Lei Zhu, Georgia Institute of Technology (USA) . . . [9783-143]

**Dual energy x-ray imaging and scoring of coronary calcium: physics-based digital phantom and clinical studies,** Bo Zhou, Di Wen, Case Western Reserve Univ. (USA); Katelyn Nye, GE Healthcare (USA); Robert C. Gilkeson M.D., Univ. Hospitals Case Medical Ctr. (USA); David L. Wilson, Case Western Reserve Univ. (USA) . . . . . [9783-144]

**Enhanced diagnostic value for CT angiography of calcified coronary arteries using dual energy and a novel high-Z contrast material: a phantom study,** Jack W. Lambert, Karen G. Ordovas, Yuxin Sun, Benjamin M. Yeh, Univ. of California, San Francisco (USA) . . . . . [9783-145]

**Reconstruction of limited angle dual-energy CT using mutual learning and cross-estimation,** Huayu Zhang, Univ. of Wisconsin-Madison (USA); Yuxiang Xing, Tsinghua Univ. (China) . . . . . [9783-146]

**A constrained method for stabilized quantitative projection-based dual-energy material decomposition,** Huifeng Guan, Alfred B. Garson III, Mark A. Anastasio, Washington Univ. in St. Louis (USA) . . . . . [9783-147]

**Calcium scoring with dual-energy CT in men and women: an anthropomorphic phantom study,** Qin Li, Songtao Liu M.D., Kyle J. Myers, Marios A. Gavriellides, Rongping Zeng, Berkman Sahiner, Nicholas A. Petrick, U.S. Food and Drug Administration (USA) . . . . . [9783-148]

**Dual-energy computed tomography of the head: a phantom study assessing axial dose distribution, eye lens dose, and image noise level,** Kosuke Matsubara, Kanazawa Univ. (Japan); Hiroki Kawashima, Takashi Hamaguchi, Tadanori Takata, Kanazawa Univ. Hospital (Japan); Masanao Kobayashi, Fujita Health Univ. (Japan); Kichiro Koshida, Kanazawa Univ. (Japan) . . . . . [9783-149]

**Multi-energy method of digital radiography for imaging of biological objects,** Volodymyr Ryzhikov, Volodymyr G. Volkov, Olexandr D. Opolonin, Institute for Scintillation Materials (Ukraine); Sergei Naydenov, Institute for Single Crystals (Ukraine); Craig Smith, Naval Postgraduate School (USA) . . . . . [9783-150]

**Image Reconstruction**

**Iterative image reconstruction for multienergy computed tomography via structure tensor total variation regularization,** Dong Zeng, Zhaoying Bian, Changfei Gong, Jing Huang, Jianhua Ma, Ji He, Hua Zhang, Lijun Lu, Qianjin Feng, Southern Medical Univ. (China); Zhengrong Liang, State Univ. of New York (USA) . . . . . [9783-151]

**Iterative CT reconstruction using coordinate descent with ordered subsets of data,** Frédéric Noo, The Univ. of Utah (USA); Katharina Hahn, Harald Schönhuber, Karl Stierstorfer, Siemens AG (Germany) . . . . . [9783-152]

**Optimization-based reconstruction for reduction of CBCT artifact reduction in IGRT,** Dan Xia, Zheng Zhang, The Univ. of Chicago (USA); Pascal Paysan, Dieter Seghers, Marcus Brehm, Peter Munro, Varian Medical Systems, Inc. (Switzerland); Emil Y. Sidky, Charles A. Pelizzari, Xiaochuan Pan, The Univ. of Chicago (USA) . . . . . [9783-153]

**Resolution-enhancing hybrid, spectral CT reconstruction,** Darin P. Clark, Cristian T. Badea, Duke Univ. (USA) . . . . [9783-154]

**Axial 3D region of interest reconstruction using 3D weighted cone beam BPF/DBPF algorithm cascaded with adequately oriented orthogonal butterfly filtering,** Shaojie Tang, Xi'an Univ. of Posts and Telecommunications (China); Xiangyang Tang, Emory Univ. (USA) . . . . . [9783-155]

**Joint regularization for spectro-temporal CT reconstruction,** Darin P. Clark, Cristian T. Badea, Duke Univ. Medical Ctr. (USA) . . . . . [9783-156]

**Texture-preserved penalized weighted least-squares reconstruction of low-dose CT image via image segmentation and high-order MRF modeling,** Hao Han, Hao Zhang, Zhengrong Liang, Stony Brook Medicine (USA) . . . . . [9783-157]

**Regularized CT reconstruction on unstructured grid,** Yun Chen, Yao Lu, Xiangyuan Ma, Yuesheng Xu, Sun Yat-Sen Univ. (China) . . . . . [9783-158]

**A new look at signal sparsity paradigm for low-dose computed tomography image reconstruction,** Yan Liu, Hao Zhang, William Moore M.D., Zhengrong Liang, Stony Brook Univ. (USA) . [9783-159]

**Texture-preserving Bayesian image reconstruction of low-dose x-ray CT,** Hao Zhang, Hao Han, Yan Liu, William Moore, Zhengrong Liang, Stony Brook Univ. (USA) . . . . . [9783-160]

**Fast conjugate gradient algorithm extension for analyzer-based imaging reconstruction,** Oriol Caudevilla, Jovan G. Brankov, Illinois Institute of Technology (USA) . . . . . [9783-161]

## POSTERS – SUNDAY/MONDAY

**Efficient iterative image reconstruction algorithm for dedicated breast CT**, Natalia Antropova, Adrian Sanchez, Ingrid Reiser, Emil Y. Sidky, The Univ. of Chicago (USA); John M. Boone, Univ. of California, Davis (USA); Xiaochuan Pan, The Univ. of Chicago (USA) . . . . . [9783-162]

**Direct reconstruction of enhanced signal in computed tomography perfusion**, Bin Li, The Univ. of Texas Southwestern Medical Ctr. at Dallas (USA) and Southern Medical Univ. (China); Qingwen Lyu, Zhujiang Hospital (China) and Southern Medical Univ. (China); Jianhua Ma, Southern Medical Univ. (China); Jing Wang, The Univ. of Texas Southwestern Medical Ctr. at Dallas (USA) . . . . . [9783-163]

**A method for investigating system matrix properties in optimization-based CT reconstruction**, Sean D. Rose, Emil Y. Sidky, Xiaochuan Pan, The Univ. of Chicago Medical Ctr. (USA) . . . . [9783-164]

**A comparative study of the effects of using normalized patches for penalized likelihood tomographic reconstruction**, Xue Ren, Soo-Jin Lee, Paichai Univ. (Korea, Republic of) . . . . . [9783-165]

**High-resolution and large-volume tomography reconstruction for x-ray microscopy**, Chang-Chieh Cheng, National Chiao Tung Univ. (Taiwan); Yeukuang Hwu, Institute of Physics, Academia Sinica (Taiwan); Yu-Tai Ching, National Chiao Tung Univ. (Taiwan) . . . . . [9783-166]

**An adaptive method for weighted median priors in transmission tomography reconstruction**, Ji Eun Jung, Paichai Univ. (Korea, Republic of) and Kumamoto Univ. (Japan); Soo-Jin Lee, Paichai Univ. (Korea, Republic of) . . . . . [9783-167]

**Continuous analog of multiplicative algebraic reconstruction technique for computed tomography**, Kiyoko Tateishi, St. Marianna Univ. School of Medicine Hospital (Japan) and Tokushima Univ. (Japan); Yusaku Yamaguchi, Shikoku Medical Ctr. for Children and Adults (Japan); Omar M. A. Al-Ola, Tanta Univ. (Egypt); Takeshi Kojima, Tetsuya Yoshinaga, The Univ. of Tokushima (Japan) . . . . . [9783-168]

**Texture enhanced optimization-based image reconstruction (TxE-OBIR) from sparse projection views**, Huiqiao Xie, Emory Univ. School of Medicine (USA); Tianye Niu, Sir Run Run Shaw Hospital, Institute of Translational Medicine, Zhejiang Univ. School of Medicine (China); Yi Yang, Emory Univ. School of Medicine (USA); Yi Ren, Sino-Vision Technology Co., Ltd. (China); Xiangyang Tang, Emory Univ. School of Medicine (USA) . . . . [9783-169]

**Acceleration of iterative tomographic image reconstruction by reference-based back projection**, Chang-Chieh Cheng, Ping-Hui Li, Yu-Tai Ching, National Chiao Tung Univ. (Taiwan) . . . . [9783-170]

**Noise reduction in computed tomography using a multiplicative continuous-time image reconstruction method**, Yusaku Yamaguchi, Shikoku Medical Ctr. for Children and Adults (Japan); Takeshi Kojima, Tetsuya Yoshinaga, The Univ. of Tokushima (Japan) . . . . . [9783-171]

**Assessment of tomographic reconstruction performance using the Mojette transform**, Henri Der Sarkissian, Keosys (France) and Univ. de Nantes (France); Guédon Jeanpierre, University of Nantes (France); Benoit Recur, Noctylio (France); Nicolas Normand, Univ. de Nantes (France) . . . . . [9783-172]

### Measurements

**A wide-acceptance Compton spectrometer for spectral characterization of a medical x-ray source**, Michelle Espy, Amanda E. Gehring, David C. Moir, Petr L. Volegov, Robert Sedillo, Roger P. Shurter, John Stearns, Jacob A. Mendez, Anthony Belian, Todd Haines, Los Alamos National Lab. (USA) . . . . . [9783-173]

**X-ray spectrum estimation from transmission measurements by an exponential of a polynomial model**, Boris Perkhounkov, Stanford Univ. (USA); Jessica Stec, DePaul Univ. (USA); Emil Y. Sidky, Xiaochuan Pan, The Univ. of Chicago Medical Ctr. (USA) . . . . . [9783-174]

**A dual-energy medical instrument for measurement of x-ray source voltage and dose rate**, Volodymyr Ryzhikov, Volodymyr G. Volkov, Olexandr D. Opolonin, Institute for Scintillation Materials (Ukraine); Sergei Naydenov, Institute for Single Crystals (Ukraine); Thierry Pochet, DETEC Europe (France); Craig Smith, Naval Postgraduate School (USA) . . . . . [9783-175]

### New Systems and Technologies

**Neutron spectroscopic imaging for precision medical diagnostics**, Anuj J. Kapadia, Grant Fong, Duke Univ. (USA) . . . . . [9783-176]

**In vivo small animal lung speckle imaging with a benchtop in-line XPC system**, Alfred B. Garson III, Sean Gunsten, Huifeng Guan, Runze Han, Washington Univ. in St. Louis (USA); Sunil Vasireddi, MetroHealth Medical Ctr., Case Western Reserve Univ. (USA); Steven L. Brody, Washington Univ. School of Medicine in St. Louis (USA); Mark A. Anastasio, Washington Univ. in St. Louis (USA) . . . . . [9783-177]

**New CT system architectures for high-temporal resolution with applications to improved geometric dose efficiency and cardiac imaging, part II: x-ray source sub-system**, Guy M. Besson, ForeVision Technologies Corp. (USA) . . . . . [9783-179]

**A glass-sealed field emission x-ray tube based on cone shaped carbon nanotube emitter for medical imaging**, Jehwang Ryu, Seung Jun Yeo, Kyung Hee Univ. (Korea, Republic of) and Saint KHAL Co. (Korea, Republic of); Jaek Jeong, Saint KHAL Co. (Korea, Republic of); Hunkuk Park, Kyung Hee Univ. (Korea, Republic of); Sanghyun Paik, Soon Chun Hyang Univ. Hospital Bucheon (Korea, Republic of); Seung Hoon Kim, Asan Medical Ctr. (Korea, Republic of); Jeong Hwan Kwak, LUCEM Co., Ltd. (Korea, Republic of); Kyuchang Park, Kyung Hee Univ. (Korea, Republic of) . . . . . [9783-180]

**Organ radiation exposure with EOS: GATE simulations versus TLD measurements**, Francis R. Verdun, Institut Univ. de Radiophysique Appliquée (Switzerland); Jean-Michel Létang, Univ. Claude Bernard Lyon 1 (France); Anabela Darbon, EOS Imaging S.A. (France) . . . . . [9783-181]

**Hartmann-Shack wavefront sensor for adaptive optics confocal scanning laser ophthalmoscopy**, JinSheng Yang, Ling Wei, Yi He, Institute of Optics and Electronics (China) . . . . . [9783-183]

**Scattering-compensated cone beam x-ray luminescence computed tomography**, Peng Gao, Fourth Military Medical Univ. (China) . . . . . [9783-184]

**Microstructure analysis of the pulmonary acinus by a synchrotron radiation CT**, Kohichi Minami, The Univ. of Tokushima (Japan) . . . . . [9783-185]

**Ultrasound waveform tomography with a total-generalized-variation regularization scheme**, Youzuo Lin, Lianjie Huang, Los Alamos National Lab. (USA) . . . . . [9783-186]

### PET, SPECT, MR, Ultrasound

**Event-by-event PET image reconstruction using list-mode origin ensembles algorithm**, Andriy Andreyev, Philips Healthcare (USA) . . . . . [9783-187]

**Quantitative analysis of L-SPECT system for small animal brain imaging**, Tasneem Rahman, Murat Tahtali, Mark R. Pickering, UNSW Canberra (Australia) . . . . . [9783-188]

**A depth-encoding PET detector inserting horizontal stripes glass between crystal layers**, Jihoon Kang, Chonnam National Univ. (Korea, Republic of); Yong Choi, Sogang Univ. (Korea, Republic of) . . . . . [9783-189]

**In vitro flow assessment: from PC-MRI to computational fluid dynamics including fluid-structure interaction**, Jonas Kratzke, Ruprecht-Karls-Univ. Heidelberg (Germany); Fabian Rengier, Deutsches Krebsforschungszentrum (Germany); Christian Weis, UniversitätsKlinikum Heidelberg (Germany); Carsten J. Beller, Vincent Heuveline, Ruprecht-Karls-Univ. Heidelberg (Germany) . . . . . [9783-190]

**Characterization of various tissue mimicking materials for medical ultrasound imaging**, Audrey Thouvenot, Institut Supérieur d'Ingenieurs de Franche Comte (France); Tamie L. Poepping, Western Univ. (Canada); Terry M. Peters, Elvis C. S. Chen, Roberts Research Institute (Canada) . . . . . [9783-191]

**Quantitative evaluation of susceptibility effects caused by dental materials in head magnetic resonance imaging**, Sabina Strocchi, Ospedale di Circolo e Fondazione Macchi Varese (Italy); Elisabetta Binaghi, Aldo Macchi, Raffaele Novario, Matteo Ghielmi, Francesco Basilio, Univ. degli Studi dell'Insubria (Italy); Roberta Ferretti, Silvana G. Dellepiane, Univ. degli Studi di Genova (Italy) . . . . . [9783-192]

**Effects of tissue heterogeneity on single-coil, scanning MIT imaging**, Joseph R. Feldkamp, Stephen Quirk, Kimberly-Clark Corp. (USA) . . . . [9783-193]

**Quantitative evaluation of PET image using event information bootstrap**, Han Kyeol Kyeol, Shin Hye Kwak, Kyeong Min Kim, Joo Hyun Kang, Korea Institute of Radiological & Medical Sciences (Korea, Republic of); Yong Hyun Chung, Yonsei Univ. (Korea, Republic of); Sang-Keun Woo, Korea Institute of Radiological & Medical Sciences (Korea, Republic of) . . . . . [9783-195]

### Phase Contrast Imaging

**Construction and evaluation of a high-energy grating-based x-ray phase-contrast imaging setup**, Christian Hauke, Florian Horn, Georg Pelzer, Jens Rieger, Sebastian Lachner, Veronika Ludwig, Maria Seifert, Max Schuster, Friedrich-Alexander-Univ. Erlangen-Nürnberg (Germany); Johannes Wandner, Friedrich-Alexander-Univ. Erlangen-Nürnberg (Germany); Andreas Wolf, Thomas Weber, Thilo Michel, Gisela Anton, Friedrich-Alexander-Univ. Erlangen-Nürnberg (Germany) . . [9783-196]

**Feasibility of using energy-resolving detectors in differential phase-contrast imaging**, Pavlo Baturin, Carestream Health, Inc. (USA) . . . . . [9783-197]

**Joint reconstruction of refractive and absorption properties in propagation-based x-ray phase contrast tomography via nonlinear image reconstruction**, Yujia Chen, Kun Wang, Washington Univ. in St. Louis (USA); Doga Gursoy, Carmen S. Hoyuelos, Francesco De Carlo, Argonne National Lab. (USA); Mark A. Anastasio, Washington Univ. in St. Louis (USA) . . . . . [9783-198]

**Improvement of the visibility for x-ray phase contrast imaging using photon counting detector**, Satoshi Sano, Shimadzu Corp. (Japan) . . . . . [9783-199]

**Quantification of signal detection performance degradation induced by phase-retrieval in propagation-based x-ray phase-contrast imaging**, Cheng-Ying Chou, National Taiwan Univ. (Taiwan); Mark A. Anastasio, Washington Univ. in St. Louis (USA) . . . . . [9783-200]

**Low dose phase contrast computed tomography for brain tumor follow-up**, Marie Ruat, Christian Nemoz, ESRF - The European Synchrotron (France); Jean François Adam, Raphael Serduc, Inserm U836 (France); Cyril Ponchut, Helene Elleaume, ESRF - The European Synchrotron (France); Emmanuel Brun, Inserm U836 (France) . . . . . [9783-201]

**Quantitative characterization of the microbubbles concentration by using a high-energy in-line phase contrast tomosynthesis prototype: a preliminary phantom study**, Di Wu, Muhammad U. Ghani, Molly D. Wong, Yuhua Li, The Univ. of Oklahoma (USA); Kai Yang, Massachusetts General Hospital (USA); Wei R. Chen, Univ. of Central Oklahoma (USA); Bin Zheng, Hong Liu, The Univ. of Oklahoma (USA) . . . . . [9783-202]

**Evaluation of a new reconstruction algorithm for x-ray phase-contrast imaging**, Maria Seifert, Christian Hauke, Florian Horn, Sebastian Lachner, Veronika Ludwig, Georg Pelzer, Jens Rieger, Max Schuster, Johannes Wandner, Andreas Wolf, Thilo Michel, Gisela Anton, Friedrich-Alexander-Univ. Erlangen-Nürnberg (Germany) . . . . . [9783-203]

### Photon Counting CT

**Photon counting CT of the liver with dual-contrast enhancement**, Daniela Muenzel M.D., Technische Univ. München (Germany); Roland M. Proksa, Heiner Daerr, Philips Research (Germany); Alexander A. Fingerle, Franz Pfeiffer, Ernst J. Rummeny, Peter B. Noel, Technische Univ. München (Germany) . . . . [9783-204]

**Low-dose performance of a whole-body research photon-counting CT scanner,** Zhicong Yu, Shuai Leng, Mayo Clinic (USA); Steffen G. Kappler, Katharina Hahn, Siemens Healthcare (Germany); Zhoubo Li, Mayo Clinic (USA); Ahmed Halaweish, Siemens Healthcare (USA); Andre Henning, Siemens Healthcare (Germany); Erik L. Ritman, Cynthia H. McCollough, Mayo Clinic (USA) . . . . . [9783-205]

**A neural network-based method for spectral distortion correction in photon counting x-ray CT,** Mengheng Touch, Ctr. for In Vivo Microscopy, Duke Univ. Medical Ctr. (USA) and Duke Univ. (USA); Darin P. Clark, Ctr. for In Vivo Microscopy, Duke Univ. Medical Ctr. (USA); William Barber, DxRay, Inc. (USA); Cristian T. Badea, Ctr. for In Vivo Microscopy, Duke Univ. Medical Ctr. (USA) . . . . . [9783-206]

**Feasibility study of sparse-angular sampling and sinogram interpolation in material decomposition with a photon-counting detector,** Dohyeon Kim, Byungdu Jo, Su-Jin Park, Hyemi Kim, Hee-Joung Kim, Yonsei Univ. (Korea, Republic of) . . . . . [9783-207]

**Radiation Therapy**

**Spot scanning proton therapy plan assessment: design and development of a dose verification application for use in routine clinical practice,** Kurt E. Augustine, Timothy Walsh, Chris Beltran, Joshua Stoker, Daniel Mundy, Mark Parry, Martin Bues, Mirek Fatyga, Mayo Clinic (USA) . . . . . [9783-208]

**Estimation of the influence of radial effect in the proton beams using a combined approach with physical data and gel data,** Kiyofumi Haneda, Hiroshima International Univ. (Japan) . . . . . [9783-209]

**Scatter and Diffraction Imaging**

**A generational approach to snapshot coded aperture x-ray diffraction imaging for medical applications,** Joel A. Greenberg, Manu N. Lakshmanan, Duke Univ. (USA); Scott Wolter, Elon Univ. (USA); David J. Brady, Anuj J. Kapadia, Duke Univ. (USA) . . . . . [9783-210]

**Validation of coded aperture coherent scatter spectral imaging for normal and neoplastic breast tissues via surgical pathology,** Robert E. Morris, Katie Albanese, Manu N. Lakshmanan, Shannon McCall, Joel A. Greenberg, Anuj J. Kapadia, Duke Univ. Medical Ctr. (USA) . . . . . [9783-211]

**Task Driven Imaging, Observers, Detectability, Phantom Studies**

**Development of a Hausdorff distance based 3D quantification technique to evaluate the CT imaging system impact on depiction of lesion morphology,** Pooyan Sahbaee, Marthony Robins, Justin B. Solomon, Ehsan Samei, Duke Univ. Medical Ctr. (USA) . . . . . [9783-212]

**Synthesis of realistic lung nodule texture using a clustered lumpy background,** Yuese Zheng, Duke Univ. (USA) and Carl E. Ravin Advanced Imaging Institute (USA); Justin B. Solomon, Duke Univ. (USA) and Carl E. Ravin Advanced Imaging Labs. (USA); Daniele Marin M.D., Duke Univ. School of Medicine (USA); Ehsan Samei, Carl E. Ravin Advanced Imaging Labs. (USA) and Duke Univ. (USA) . . . . . [9783-213]

**Second-generation anthropomorphic physical phantom for mammography and DBT: incorporating voxelized 3D printing and inkjet printing of iodinated lesion inserts,** Dhiraj Sikaria, Stephanie Musinsky, Duke Univ. (USA); Gregory M. Sturgeon, Justin B. Solomon, Duke Univ. School of Medicine (USA); Andrew Diaio, Duke Univ. School of Medicine (USA) and Duke Univ. (USA); Michael E. Gehm, Duke Univ. (USA); Ehsan Samei, Duke Univ. School of Medicine (USA); Stephen J. Glick, U.S. Food and Drug Administration (USA); Joseph Y. Lo, Duke Univ. School of Medicine (USA) . . . . . [9783-214]

**Evaluation of a projection-domain lung nodule insertion technique in thoracic CT,** Chi Ma, Baiyu Chen, Chi Wan Koo, Edwin A. Takahashi, Joel G. Fletcher, Cynthia H. McCollough, David L. Levin, Ronald S. Kuzo, Lyndsay D. Viers, Stephanie A. Vincent Sheldon, Shuai Leng, Lifeng Yu, Mayo Clinic (USA) . . . [9783-215]

**Synthesized interstitial lung texture for use in anthropomorphic computational phantoms,** Marc Becchetti, Justin B. Solomon, W. Paul Segars, Ehsan Samei, Duke Univ. (USA) . . . . . [9783-216]

**Development and comparison of projection and image space 3D nodule insertion techniques,** Marthony Robins, Justin B. Solomon, Duke Univ. Medical Ctr. (USA); Jayashree Kalpathy-Cramer, Harvard Medical School (USA); Pooyan Sahbaee, Ehsan Samei, Duke Univ. Medical Ctr. (USA) . . . . . [9783-217]

**Tomosynthesis and Digital Radiography**

**kV x-ray dual digital tomosynthesis for image guided lung SBRT,** Larry Partain, Douglas Boyd, Namho Kim, Roy Rand, TeleSecurity Sciences, Inc. (USA); Andrew M. Hernandez, Univ. of California, Davis (USA); John M. Boone, Univ. of California, Davis (USA) . . . . . [9783-218]

**Design, optimization and evaluation of a smart pixel sensor array for low-dose digital radiography,** Kai Wang, SYSU-CMU Joint Institute of Engineering (China) . . . . . [9783-219]

**Modeling acquisition geometries with improved superresolution in digital breast tomosynthesis,** Raymond J. Acciavatti, Andrew D. A. Maidment, The Univ. of Pennsylvania Health System (USA) . . . . . [9783-220]

**Scatter estimation and removal of anti-scatter grid-line artifacts from anthropomorphic head phantom images taken with high-resolution image detectors,** Raman Rana, Amit Jain, Alok Shankar, Daniel R. Bednarek, Stephen Rudin, Toshiba Stroke and Vascular Research Ctr. (USA) . . . . . [9783-221]

**Optical geometry calibration method for free form digital tomosynthesis systems,** Pavel A. Chtcheprov, Allison Hartman, Jing Shan, Otto Zhou, Jianping Lu, The Univ. of North Carolina at Chapel Hill (USA) . . . . . [9783-222]

**Initial clinical evaluation of stationary digital chest tomosynthesis,** Allison Hartman, Jing Shan, Gongting Wu, Yueh Z. Lee, The Univ. of North Carolina at Chapel Hill (USA); Michael D. Heath, Xiaohui Wang, David H. Fooks, Carestream Health, Inc. (USA); Jianping Lu, Otto Zhou, The Univ. of North Carolina at Chapel Hill (USA) . . . . . [9783-223]

**Anatomical decomposition in dual energy chest digital tomosynthesis,** Dong-Hoon Lee, Ye-seul Kim, Sunghoon Choi, Haengwha Lee, Hee-Joung Kim, Yonsei Univ. (Korea, Republic of) [9783-224]

**Optimization of exposure parameters in digital tomosynthesis considering effective dose and image quality,** Seungyeon Choi, Sunghoon Choi, Pii-Hyun Jeon, Yonsei Univ. (Korea, Republic of); Dong-Hyuk Jang, Ehwa Womans Univ. Mokdong Hospital (Korea, Republic of); Hee-Joung Kim, Yonsei Univ. (Korea, Republic of) . . . . . [9783-225]

**Digital breast tomosynthesis reconstruction using spatially weighted non-convex regularization,** Jiabei Zheng, Jeffrey A. Fessler, Heang-Ping Chan, Univ. of Michigan (USA) . . . . . [9783-226]

**Optimal kVp in chest computed radiography using visual grading scores: a comparison between visual grading characteristics and ordinal regression analysis,** Xiaoming Zheng, Ted Myeongsoo Kim, Charles Sturt Univ. (Australia) . . . . . [9783-227]

**On the properties of artificial neural network filters for bone-suppressed digital radiography,** Eunpyeong Park, Pusan National Univ. (Korea, Republic of); Hanbean Youn, Pusan National Univ. Yangsan Hospital (Korea, Republic of) and Ctr. for Advanced Medical Engineering, Pusan National Univ. (Korea, Republic of); Junwoo Kim, Dong Woon Kim, Pusan National Univ. (Korea, Republic of); Hosang Jeon, Pusan National Univ. Yangsan Hospital (Korea, Republic of) and Ctr. for Advanced Medical Engineering, Pusan National Univ. (Korea, Republic of); Jin Sung, SAMSUNG Medical Ctr. (Korea, Republic of); Ho Kyung Kim, Pusan National Univ. (Korea, Republic of) and Ctr. for Advanced Medical Engineering, Pusan National Univ. (Korea, Republic of) [9783-228]

**Effects of angular range on image quality of chest digital tomosynthesis,** Haeng-Hwa Lee, Hee-Joung Kim, Ye-seul Kim, Sunghoon Choi, Dong-Hoon Lee, Yonsei Univ. (Korea, Republic of) [9783-229]

**Quantitative comparison of spatial resolution in step-and shoot and continuous motion digital breast tomosynthesis,** Muhammad U. Ghani, Di Wu, Molly D. Wong, Liqiang Ren, Bin Zheng, The Univ. of Oklahoma (USA); Xizeng Wu, The Univ. of Alabama at Birmingham (USA); Hong Liu, The Univ. of Oklahoma (USA) . . . . . [9783-230]

**Tomosynthesis reconstruction algorithms using distance driven methods,** Nuhad A. Malalla, Ying Chen, Southern Illinois Univ. Carbondale (USA) . . . . . [9783-231]

**Image quality of ray tracing reconstruction algorithms for C-arm tomosynthesis,** Nuhad A. Malalla, Ying Chen, Southern Illinois Univ. Carbondale (USA) . . . . . [9783-232]

**Integration of kerma-area product and cumulative air kerma determination into a skin dose tracking system for fluoroscopic imaging procedures,** Sarath Vijayan, Alok Shankar, Stephen Rudin, Daniel R. Bednarek, Toshiba Stroke Research Ctr. (USA) . . . . . [9783-233]

**CONFERENCE 9785  
Computer-Aided Diagnosis**

**Breast**

**Reference state estimation of breast computed tomography for registration with digital mammography,** Ravi K. Samala, Heang-Ping Chan, Lubomir M. Hadjiiski, Univ. of Michigan (USA); Ruola Ning, Univ. of Rochester Medical Ctr. (USA); Kenny H. Cha, Mark A. Helvie, Univ. of Michigan (USA) . . . . . [9785-65]

**Improving the performance of lesion-based computer-aided detection schemes of breast masses using a case-based adaptive cueing method,** Maxine Tan, Yuchen Qiu, Faranak Aghaei, Bin Zheng, The Univ. of Oklahoma (USA) . . . . . [9785-66]

**Quantitative breast MRI radiomics for cancer risk assessment and the monitoring of high-risk populations,** Kayla R. Mendel, Hui Li, Maryellen L. Giger, The Univ. of Chicago (USA) . . . . [9785-67]

**Benign-malignant mass classification in mammogram using edge weighted local texture features,** Rinku Rabidas, Abhishek Midya, National Institute of Technology, Silchar (India); Anup Sadhu, Medical College and Hospital Kolkata (India); Jayasree Chakraborty, Memorial Sloan-Kettering Cancer Ctr. (USA) [9785-68]

**Parameter optimization of parenchymal texture analysis for prediction of false-positive recalls from screening mammography,** Shonket Ray, Brad M. Keller, Jinbo Chen, Emily F. Conant M.D., Despina Kontos, Univ. of Pennsylvania School of Medicine (USA) . . . . . [9785-69]

**Automatic quantification of mammary glands on non-contrast X-ray CT by using a novel segmentation approach,** Xiangrong Zhou, Takuya Kano, Gifu Univ. School of Medicine (Japan); Shuo Li, Western Univ. (Canada); Xinxin Zhou, Nagoya Bunri Univ. (Japan); Takeshi Hara, Hiroshi Fujita, Gifu Univ. School of Medicine (Japan) . . . . . [9785-70]

**Computer-aided classification of mammographic masses using the deep learning technology: a preliminary study,** Yuchen Qiu, The Univ. of Oklahoma (USA); Shiju Yan, Univ. of Shanghai for Science and Technology (China); Maxine Tan, The Univ. of Oklahoma (USA); Samuel Cheng, The Univ. of Oklahoma - Tulsa (USA); Hong Liu, Bin Zheng, The Univ. of Oklahoma (USA) . . . . . [9785-71]



**An initial investigation on developing a new method to predict short-term breast cancer risk based on deep learning technology.** Yuchen Qiu, The Univ. of Oklahoma (USA); Shiju Yan, Univ. of Shanghai for Science and Technology (China); Maxine Tan, Samuel Cheng, Hong Liu, Bin Zheng, The Univ. of Oklahoma (USA) . . . . . [9785-72]

**Computer-aided global breast MR image feature analysis for prediction of tumor response to chemotherapy: performance assessment.** Faranak Aghaei, Maxine Tan, Samuel Cheng, Bin Zheng, The Univ. of Oklahoma (USA) . . . . . [9785-73]

**First and second-order features for detection of masses in digital breast tomosynthesis.** Ravi K. Samala, Jun Wei, Heang-Ping Chan, Lubomir M. Hadjiiski, Kenny H. Cha, Mark A. Helvie, Univ. of Michigan Health System (USA) . . . [9785-74]

**An adaptive online learning framework for practical breast cancer diagnosis.** Tianshu Chu, Stanford Univ. (USA); Jiayu Chen, GE Healthcare (USA); Jie Wang, Stanford Univ. (USA) . . . . . [9785-75]

**Colon and Prostate**

**Computer-aided detection of polyps in optical colonoscopy images from Stony Brook University.** Saad Nadeem, Arie Kaufman, Stony Brook Univ. (USA) . . . . . [9785-76]

**Performance evaluation of multi-material electronic cleansing for ultra-low-dose dual-energy CT colonography.** Rie Tachibana, Institute of National Colleges of Technology (Japan); Najia Kohlhasse, Massachusetts General Hospital (USA) and Harvard Medical School (USA); Janne J. Näppi, Toru Hironaka, Massachusetts General Hospital (USA) and Harvard Medical School (USA); Junko Ota, Takayuki Ishida, Osaka Univ. (Japan); Daniele Regge, Institute for Cancer Research and Treatment (Italy); Hiroyuki Yoshida, Massachusetts General Hospital (USA) and Harvard Medical School (USA) . . . . . [9785-77]

**Detection of benign prostatic hyperplasia nodules in T2W MR Images using fuzzy decision forest.** Nathan Lay, National Institutes of Health (USA); Sabrina Freeman, Arizona State Univ. (USA); Baris Turkbey, Ronald M. Summers, National Institutes of Health (USA) . . . . . [9785-78]

**Colonoscopic polyp detection on multimodality images using convolutional neural networks.** Sun Young Park, Dustin Sargent, Merge Healthcare (USA) . . . . . [9785-79]

**Normalization of T2W-MRI prostate images using Rician a priori.** Guillaume Lemaître, Univ. de Girona (Spain) and Univ. Bourgogne Franche Comté (France); Mojdeh Rastgo Dastjerd, Univ. Bourgogne Franche-Comté (France) and Univ. de Girona (Spain); Joan Massich, Univ. Bourgogne Franche-Comté (France); Joan C. Vilanova, Clínica Girona (Spain); Paul M. Walker, Univ. Bourgogne Franche-Comté (France); Jordi Freixenet, Univ. de Girona (Spain); Anke Meyer Bäse, Florida State Univ. (USA); Fabrice Meriaudeau, Univ. Bourgogne Franche-Comté (France); Robert Marti, Univ. de Girona (Spain) . . . . . [9785-80]

**Differentiation of neoplastic lesions and healthy tissue in HD colonoscopy images based on color texture features.** Thomas Wittenberg, Sebastian Nowack, Martin Prinzen, Sebastian Krappe, Fraunhofer-Institut für Integrierte Schaltungen (IIS) (Germany); Martin Raithe, Friedrich-Alexander-Univ. Erlangen-Nürnberg (Germany); Steffen Mühdorfer, Klinikum Bayreuth GmbH (Germany); Michaela Benz, Christian Münzenmayer, Fraunhofer-Institut für Integrierte Schaltungen (IIS) (Germany) . . . . . [9785-81]

**Deep transfer learning of virtual endoluminal views for the detection of polyps in CT colonography.** Janne J. Näppi, Toru Hironaka, Massachusetts General Hospital (USA); Daniele Regge, Institute for Cancer Research and Treatment (Italy); Hiroyuki Yoshida, Massachusetts General Hospital (USA) . . . . . [9785-82]

**Head and Neck**

**Detection and measurement of retinal blood vessel pulsatile motion.** Di Xiao, Australian e-Health Research Ctr. (Australia) and Commonwealth Scientific and Industrial Research Organisation (Australia) . . . . . [9785-83]

**Automatic determination of white matter hyperintensity properties in relation to the development of Alzheimer's disease.** Sandra van der Velden, Rita Simões, Univ. Twente (Netherlands); Christoph Mönninghoff, Martha Dlugaj, Christian Weimar, Isabel Wanke, Univ. Duisburg-Essen (Germany); Anne-Marie van Cappellen van Walsum, Radboud Univ. Medical Ctr. (Netherlands); Cornelis H. Slump, Univ. Twente (Netherlands) . . . . . [9785-84]

**Improvement of retinal blood vessel detection by spur removal and Gaussian matched filtering compensation.** Di Xiao, Janardhan Vignarajan, Australian e-Health Research Ctr. (Australia); Dong An, Mei-Ling Tay-Kearney, Royal Perth Hospital (Australia); Yogi Kanagasalingam, Australian e-Health Research Ctr. (Australia) [9785-85]

**Automated blood vessel extraction using local features on retinal images.** Yuji Hatanaka, Kazuki Samo, Mikiya Tajima, Kazunori Oghara, Univ. of Shiga Prefecture (Japan); Chisako Muramatsu, Gifu Univ. School of Medicine (Japan); Susumu Okumura, Univ. of Shiga Prefecture (Japan); Hiroshi Fujita, Gifu Univ. School of Medicine (Japan) . . . . . [9785-86]

**Automated detection of retinal whitening in malarial retinopathy.** Vinayak Joshi, Carla P. Agurto Rios, Simon Barriga, Sheila C. Nemeth, Peter Soliz, VisionQuest Biomedical LLC (USA); Ian MacCormick, Univ. of Liverpool (UK); Terrie Taylor, Michigan State Univ. (USA); Susan Lewallen, Killimanjaro Ctr. for Community of Ophthalmology (South Africa); Simon P. Harding, Univ. of Liverpool (UK) . . [9785-87]

**Finding regional models of the Alzheimer's disease by fusing neuropsychological and structural MRI information.** Diana L. Giraldo, Juan D. Garcia-Arteaga, Eduardo Romero Castro M.D., Univ. Nacional de Colombia (Colombia) . . . . . [9785-88]

**Deep learning in the small sample size setting: cascaded feed forward neural networks for medical image segmentation.** Bilwaj K. Gaonkar, David Hovda, Neil Martin, Luke Macyszyn, Univ. of California, Los Angeles (USA) . [9785-89]

**A fully automatic framework for cell segmentation on non-confocal adaptive optics images.** Jianfei Liu, National Institutes of Health (USA); Alfredo Dubra, Medical College of Wisconsin (USA); Johnny Tam, National Institutes of Health (USA) . . . . . [9785-90]

**Automated metastatic brain lesion detection: a computer aided diagnostic and clinical research tool.** Jeremy Devine, Univ. of Toronto (Canada); Arjun Sahgal, Irene Karam, Sunnybrook Health Sciences Ctr. (Canada); Anne L. Martel, Sunnybrook Research Institute (Canada) . . . . . [9785-91]

**Automated detection of retinal nerve fiber layer defects on fundus images: false positive reduction based on vessel likelihood.** Chisako Muramatsu, Kyoko Ishida, Akira Sawada, Gifu Univ. School of Medicine (Japan); Yuji Hatanaka, Univ. of Shiga Prefecture (Japan); Tetsuya Yamamoto, Hiroshi Fujita, Gifu Univ. School of Medicine (Japan) . . . . . [9785-93]

**Phenotypic characterization of glioblastoma identified through shape descriptors.** Ahmad Chaddad, Christian Desrosiers, Matthew Toews, École de Technologie Supérieure (Canada) [9785-94]

**3D texture-based classification applied on brain white matter lesions on MR Images.** Mariana P. Bento Leite, Univ. Estadual de Campinas (Brazil); David Gobbi, Marina Salluzi, Richard Frayne, Univ. of Calgary (Canada); Roberto A. Lotufo, Letícia Rittner, Univ. Estadual de Campinas (Brazil) . . . . . [9785-95]

**Classification of SD-OCT volumes for DME detection: an anomaly detection approach.** Shrinivasan Sankar, Désiré Sidibé, Univ. de Bourgogne (France); Carol Y. Cheung, Tien Y. Wong, Ecosse Lamoureux, Dan Milea, Singapore Eye Research Institute (Singapore); Fabrice Meriaudeau, Univ. de Bourgogne (France) . . . . . [9785-96]

**A toolbox to visually explore cerebellar shape changes in cerebellar disease and dysfunction.** Sayed M. Abulnaga, The Univ. of British Columbia (Canada); Zhen Yang, Aaron Carass, Johns Hopkins Univ. (USA); Kalyani Kansal, Johns Hopkins Univ. School of Medicine (USA); Bruno M. Jedynak, Johns Hopkins Univ. (USA); Chiadi U. Onyike, Sarah H. Ying, Johns Hopkins Univ. School of Medicine (USA); Jerry L. Prince, Johns Hopkins Univ. (USA) . . . . . [9785-97]

**Using support vector machines with tract-based spatial statistics for automated classification of Tourette syndrome children.** Hongwei Wen, Institute of Automation (China); Yue Liu, Capital Medical Univ. (China); Jieqiong Wang, Huiguang He, Institute of Automation (China); Yun Peng, Capital Medical Univ. (China) . . . . . [9785-98]

**A diagnosis model for early Tourette syndrome children based on brain structural network characteristics.** Hongwei Wen, Institute of Automation (China); Yue Liu, Capital Medical Univ. (China); Jieqiong Wang, Beijing key Lab of Magnetic Imaging Device and Technique, Beijing Children's Hospital, Capital Med (China); Jishui Zhang, Department of Radiology, Beijing Children's Hospital, Capital Medical University (China), Beijing key Lab of Magnetic Imaging Device and Technique, Beijing Children's Hospital, Capital Med (China); Yun Peng, Capital Medical Univ. (China); Huiguang He, Institute of Automation (China) . . [9785-99]

**A primitive study of voxel feature generation by multiple stacked denoising autoencoders for detecting cerebral aneurysms on MRA.** Mitsutaka Nemoto, Naoto Hayashi, Shouhei Hanaoka, Yukihiko Nomura, Soichiro Miki, Takeharu Yoshikawa, Kuni Ohtomo M.D., The Univ. of Tokyo (Japan) . . . . . [9785-100]

**Predicting outcomes in glioblastoma patients using computerized analysis of tumor shape: preliminary data.** Maciej A. Mazurowski, Nicholas M. Czarnek, Duke Univ. (USA); Katherine B. Peters, Duke Univ. (USA); Kal L. Clark, Duke Univ. (USA) . . . . . [9785-101]

**Glioma grading using cell nuclei morphologic features in digital pathology images.** Syed M. S. Reza, Khan M. Iftekharuddin, Old Dominion Univ. (USA) . . . . . [9785-102]

**Quantitative characterization of brain β-amyloid in 300 normal subjects using a joint PiB/FDG PET image histogram.** Jon J. Camp, Dennis P. Hanson, Val J. Lowe M.D., Bradley J. Kemp, Matthew L. Senjem, Melissa E. Murray, Dennis W. Dickson M.D., Joseph E. Parisi M.D., Ronald C. Petersen M.D., Richard A. Robb, David R. Holmes III, Mayo Clinic (USA) . . . . . [9785-103]

**Lung and Chest**

**A novel approach for tuberculosis screening based on deep convolutional neural networks.** Sangheum Hwang, Hyo-Eun Kim, Lunit (Korea, Republic of); Hee-Jin Kim, Korean Institute of Tuberculosis (Korea, Republic of) . . . . . [9785-104]

**Ensemble lymph node detection from CT volumes combining local intensity structure analysis approach and appearance learning approach.** Yoshihiko Nakamura, Tomakomai National College of Technology (Japan); Yukitaka Nimura, Nagoya Univ. (Japan); Takayuki Kitasaka, Aichi Institute of Technology (Japan); Kazuhiro Furukawa, Hidemi Goto, Michitaka Fujiwara, Nagoya Univ. (Japan); Kazunari Misawa, Aichi Cancer Ctr. Hospital (Japan); Kensaku Mori, Nagoya Univ. (Japan) . . . . . [9785-105]

**Classification of pulmonary nodules in lung CT images using shape and texture features.** Sudipta Mukhopadhyay, Ashis K. Dhara, Indian Institute of Technology Kharagpur (India); Anirvan Dutta, Birla Institute of Technology Mesra (India); Mandeep Kumar Garg, Niranjani Khandelwal, Postgraduate Institute of Medical Education & Research (India) . . . . . [9785-106]

**Differentiation of several interstitial lung disease patterns in HRCT images using support vector machine: role of databases on performance.** Mandar Kale, Sudipta Mukhopadhyay, Jatindra Kumar Dash, Indian Institute of Technology Kharagpur (India); Mandeep Kumar Garg, Niranjani Khandelwal, Postgraduate Institute of Medical Education & Research (India) . . . . . [9785-107]

# POSTERS – SUNDAY/MONDAY

**Automated anatomical description of pleural thickening towards improvement of its computer-assisted diagnosis**, Kraisoron Chaisaowong, King Mongkut's Univ. of Technology North Bangkok (Thailand) and RWTH Aachen Univ. (Germany); Mingze Jiang, Peter Faltn, Dorit Merhof, Christian Eisenhawer, Monika Gube, Thomas Kraus, RWTH Aachen Univ. (Germany). . . . . [9785-108]

**Computer aided diagnosis for severity assessment of pneumoconiosis using CT images**, Hidenobu Suzuki, Mikio Matsuhiro, Yoshiaki Kawata, Noboru Niki, The Univ. of Tokushima (Japan); Katsuya Kato, Kawasaki Medical School (Japan); Takumi Kishimoto, Okayama Rosai Hospital (Japan); Kazuto Ashizawa, Nagasaki Univ. (Japan). . . . . [9785-109]

**Lung nodule detection using 3D convolutional neural networks trained on weakly labeled data**, Rushil Anirudh, Arizona State Univ. (USA); Jayaraman J. Thiagarajan, Timo Bremer, Hyojin Kim, Lawrence Livermore National Lab. (USA). . . . . [9785-110]

**Investigating the effects of majority voting on CAD systems: an LIDC case study**, Miguel Carrazza, Brendan Kennedy, Alex Rasin, Jacob D. Furst, Daniela S. Raicu, DePaul Univ. (USA). . . . . [9785-111]

**Automated lymph node segmentation in CT images using deep reconstruction**, Ajay Gupta, Florida State Univ. (USA) and National Institutes of Health (USA); Ari Seff, Le Lu, National Institutes of Health (USA); Adrian Barbu, Florida State Univ. (USA); Ronald M. Summers, National Institutes of Health (USA). . . . . [9785-112]

**Change descriptors determining nodule malignancy in national lung screening trial CT images**, Benjamin E. Geiger, Samuel H. Hawkins, Lawrence O. Hall, Dmitry B. Goldgof, Univ. of South Florida (USA); Yoganand Balagurunathan, Robert A. Gatenby, Robert J. Gillies, H. Lee Moffitt Cancer Ctr. & Research Institute (USA). . . . . [9785-113]

**Adaptive thresholding of chest temporal subtraction images in computer-aided diagnosis of pathologic change**, Melanie J. Harrison, Jared Looper, Samuel G. Armato III, The Univ. of Chicago (USA). . . . . [9785-114]

**Correlation analysis between pulmonary function test parameters and CT image parameters of emphysema**, Cheng-Pei Liu, Chia-Chen Li, National Taiwan Univ. (Taiwan); Chong-Jen Yu, Yeun-Chung Chang, National Taiwan Univ. Hospital (Taiwan); Cheng-Yi Wang, Cardinal Tien Hospital (Taiwan), Fu Jen Catholic Univ. (Taiwan); Wen-Kuang Yu, National Yang-Ming Univ. (Taiwan); Taipei Veterans General Hospital (Taiwan); Chung-Ming Chen, National Taiwan Univ. (Taiwan). . . . . [9785-115]

**Computerized lung cancer malignancy level analysis using 3D texture features**, Wenqing Sun, Xia Huang, Tzu-Liang B. Tseng, Wei Qian, The Univ. of Texas at El Paso (USA). . . . . [9785-116]

**A CAD system to detect pathologies in temporal subtraction images of chest radiographs**, Jared Looper, Melanie J. Harrison, Samuel G. Armato III, The Univ. of Chicago (USA). . . . . [9785-117]

## Musculoskeletal and Miscellaneous

**Computer-aided diagnosis for osteoporosis using chest 3D CT images**, Kazuya Yoneda, Mikio Matsuhiro, Hidenobu Suzuki, Yoshiaki Kawata, Noboru Niki, The Univ. of Tokushima (Japan); Yasutaka Nakano, Shiga Univ. of Medical Science (Japan); Hironobu Ohmatsu, Masahiko Kusumoto, Takaaki Tsuchida, National Cancer Ctr. Hospital East (Japan); Kenji Eguchi, Teikyo Univ. School of Medicine (Japan); Masahiro Kaneko, Tokyo Health Service Association (Japan). . . . . [9785-118]

**Segmentation of knee MRI using structure enhanced local phase filtering**, Mikhiel Lim, Ilker Hacıhaliloglu, Rutgers, The State Univ. of New Jersey (USA). . . . . [9785-120]

**Automated morphological analysis of bone marrow cells in microscopic images for diagnosis of leukemia:**

**nucleus-plasma separation and cell classification using a hierarchical tree model of hematopoiesis**, Sebastian Krappe, Thomas Wittenberg, Fraunhofer-Institut für Integrierte Schaltungen (IIS) (Germany); Torsten Haferlach, MLL Münchner LeukämieLabor GmbH (Germany); Christian Mützenmayer, Fraunhofer-Institut für Integrierte Schaltungen (IIS) (Germany). . . . . [9785-121]

**A B-spline image registration based CAD scheme to evaluate drug treatment response of ovarian cancer patients**, Maxine Tan, Zheng Li, Yuchen Qiu, Scott McMeekin, Theresa Thai, Kai Ding, Hong Liu, Bin Zheng, The Univ. of Oklahoma (USA). . . . . [9785-122]

**Phantom-less bone mineral density (BMD) measurement using dual energy computed tomography-based 3-material decomposition**, Philipp Hofmann, Siemens Healthcare GmbH (Germany) and Philipps-Univ. Marburg (Germany); Martin Sedlmair, Bernhard Krauss, Siemens Healthcare GmbH (Germany); Julian L. Wichmann, Universitätsklinikum Frankfurt (Germany) and The Medical Univ. of South Carolina (USA); Ralf W. Bauer, Universitätsklinikum Frankfurt (Germany); Thomas G. Flohr, Siemens Healthcare GmbH (Germany); Andreas H. Mahnken M.D., Philipps-Univ. Marburg (Germany). . . . . [9785-123]

**Reliable measurement of 3D foot bone angles based on the frame-of-reference derived from the sole of the foot**, Taeho Kim, KAIST (Korea, Republic of); Dong Yeon Lee, Seoul National Univ. Hospital (Korea, Republic of); Jinah Park, KAIST (Korea, Republic of). . . . . [9785-124]

**Segmentation and JSW measurements of feet radiographs**, Olga Schenk, Daan M. De Muinck Keizer, Univ. Twente (Netherlands); Hein B. J. Bernelot Moens M.D., Hospital Group Twente (Netherlands); Cornelis H. Slump, Univ. Twente (Netherlands). . . . . [9785-125]

**Multi-atlas segmentation of the cartilage in knee MR images with sequential volume- and bone-mask-based registrations**, Han Sang Lee, KAIST (Korea, Republic of); Hyeon A. Kim, Hyeonjin Kim, Helen Hong, Seoul Women's Univ. (Korea, Republic of); Young Cheol Yoon, Samsung Medical Ctr. (Korea, Republic of); Junmo Kim, KAIST (Korea, Republic of). . . . . [9785-126]

**A new paradigm of oral cancer detection using digital infrared thermal imaging**, Manashi Chakraborty, Sudipta Mukhopadhyay, Avijit Dasgupta, Swapna Banerjee, Sourav Mukhopadhyay, Indian Institute of Technology Kharagpur (India); Santanu Patsa, Jay G. Ray, Dr. R. Ahmed Dental College & Hospital (India) [9785-127]

**Image segmentation evaluation for very-large data sets**, Anthony P. Reeves, Shuang Liu, Yiting Xie, Cornell Univ. (USA). . . . . [9785-128]

**Automated recognition of the iliac muscle and modeling of muscle fiber direction in torso CT images**, Naoki Kamiya, Aichi Prefectural Univ. (Japan); Xiangrong Zhou, Gifu Univ. (Japan); Kagaku Azuma, Univ. of Occupational and Environmental Health, Japan (Japan); Chisako Muramatsu, Takeshi Hara, Hiroshi Fujita, Gifu Univ. School of Medicine (Japan). . . . . [9785-129]

**Multispectral imaging burn wound tissue classification system: a comparison of test accuracies of several common machine learning algorithms**, John J. Squiers, Baylor Research Institute (USA); Weizhi Li, Weirong Mo, Xu Zhang, Yan Lu, Eric W. Sellke, Wensheng Fan, Spectral MD, Inc. (USA); J. Michael DiMaio, Baylor Research Institute (USA); Jeffrey E. Thatcher, Spectral MD, Inc. (USA). . . . . [9785-130]

**Automated torso organ segmentation from 3D CT images using conditional random field**, Yukitaka Nimura, Yuichiro Hayashi, Nagoya Univ. (Japan); Takayuki Kitasaka, Aichi Institute of Technology (Japan); Kazunari Misawa, Aichi Cancer Ctr. Research Institute (Japan); Kensaku Mori, Nagoya Univ. (Japan). . . . . [9785-131]

**Interactive computer-assisted approach for evaluation of ultrastructural cilia abnormalities**, Christoph Palm, Ostbayerische Technische Hochschule Regensburg (Germany); Heiko Siegmund, Universitätsklinikum Regensburg (Germany); Matthias Semmelmann, Ostbayerische Technische Hochschule Regensburg (Germany); Claudia Grafe, Matthias Evert, Josef A. Schroeder, Universitätsklinikum Regensburg (Germany). . . . . [9785-132]

**Improving vertebra segmentation through joint vertebra-rib atlases**, Yinong Wang, Jianhua Yao, Holger R. Roth, National Institutes of Health (USA); Joseph E. Burns, Univ. of California, Irvine (USA); Ronald M. Summers, National Institutes of Health (USA). . . . . [9785-133]

**A machine learning approach for classification of anatomical coverage in CT**, Xiaoyong Wang, Pechin Lo, Johnathan G. Goldin, Bharath Ramakrishna, Matthew S. Brown, Univ. of California, Los Angeles (USA). . . . . [9785-134]

**Computerized scheme for vertebra detection in CT scout image**, Wei Guo, Guodong Zhang, Shenyang Aerospace Univ. (China); Lin Cong, Shanghai United Imaging Healthcare Co., Ltd. (China); Qiang Li, Shanghai Advanced Research Institute (China). . . . . [9785-135]

## Vessels and Heart

**Learning evaluation of ultrasound image segmentation using combined measures**, Mengjie Fang, Huazhong Univ. of Science and Technology (China) and Institute of Automation (China); Yongkang Luo, Huazhong Univ. of Science and Technology (China); Ming Yue Ding, Huazhong Univ. of Science and Technology (China) and Image Processing and Intelligence Control Key Lab. of Education Ministry of China (China). . . . . [9785-136]

**Atorvastatin effect evaluation based on feature combination of three-dimension ultrasound images**, Yongkang Luo, Ming Yue Ding, Huazhong Univ. of Science and Technology (China). . . . . [9785-137]

**Fully automated segmentation of left ventricle using dual dynamic programming in cardiac cine MR images**, Luan Jiang, Shanghai Advanced Research Institute (China); Shan Ling, Shanghai United Imaging Healthcare Co., Ltd. (China); Qiang Li, Shanghai Advanced Research Institute (China) and Shanghai United Imaging Healthcare Co., Ltd. (China). . . . . [9785-138]

**Computerized flow and vessel wall analyses of coronary arteries for detection of non-calcified plaques in coronary CT angiography**, Jun Wei, Chuan Zhou, Heang-Ping Chan, Aamer R. Chughtai, Prachi Agarwal, Lubomir M. Hadjiiski, Ella A. Kazerooni M.D., Univ. of Michigan Health System (USA). . . . . [9785-139]

## Abdominal

**Maximal area and conformal welding heuristics for optimal slice selection in splenic volume estimation**, Ievgeniia Gutenko, Hao Peng, Xianfeng Gu, Stony Brook Univ. (USA); Mathew Barish, Stony Brook Medicine (USA); Arie Kaufman, Saad Nadeem, Stony Brook Univ. (USA). . . . . [9785-140]

**Computer-aided detection of bladder mass within non-contrast-enhanced region of CT Urography (CTU)**, Kenny H. Cha, Lubomir M. Hadjiiski, Heang-Ping Chan, Elaine M. Caoili, Richard H. Cohan M.D., Chuan Zhou, Univ. of Michigan Health System (USA). . . . . [9785-141]

## CONFERENCE 9786 Image-Guided Procedures, Robotic Interventions, and Modeling

**Structure sensor for mobile markerless augmented reality**, Thomas Kilgus, Deutsches Krebsforschungszentrum (Germany); Roland Bux, Ruprecht-Karls-Universität Heidelberg (Germany); Alfred M. Franz, Wibke Johnen, Eric Heim, Markus Fangerau, Michael Müller, Deutsches Krebsforschungszentrum (Germany); Kathrin Yen, Ruprecht-Karls-Universität Heidelberg (Germany); Lena Maier-Hein, Deutsches Krebsforschungszentrum (Germany). . . . . [9786-56]

**Visual design and verification tool for collision-free dexterous patient specific neurosurgical instruments**, Margaret A. Hess, Lab. for Percutaneous Surgery (Canada); Kyle W. Eastwood, Univ. of Toronto (Canada); Bence Linder, Queen's Univ. (Canada); Vivek Bodani, Univ. of Toronto (Canada); Andras Lasso, Queens Univ. (Canada); Thomas Lool, The Hospital for Sick Children (SickKids) (Canada); Gabor Fichtinger, Queen's Univ. (Canada); James Drake, The Hospital for Sick Children (SickKids) (Canada). . . . . [9786-57]

**A web-based computer aided system for liver surgery planning: initial implementation on RayPlus**, Ming Luo, Rong Yuan, Zhi Sun, Tianhong Li, Qingguo Xie, Huazhong Univ. of Science and Technology (China). . . . . [9786-58]

## POSTERS – SUNDAY/MONDAY

**Kinect based real-time position calibration for nasal endoscopic surgical navigation system**, Jingfan Fan, Jian Yang, Yakui Chu, Shaodong Ma, Yongtian Wang, Beijing Institute of Technology (China) . . . . . [9786-59]

**An improved robust hand-eye calibration for endoscopy navigation system**, Wei He, Kumsok Kang, Yanfang Li, Weili Shi, Yu Miao, Fei He, Fei Yan, Huamin Yang, Changchun Univ. of Science and Technology (China); Kensaku Mori, Nagoya Univ. (Japan); Zhengang Jiang, Changchun Univ. of Science and Technology (China) . . . . . [9786-60]

**Toward robust specularly detection and inpainting in cardiac images**, Samar Alsaleh, The George Washington Univ. (USA); Angelica Aviles, Pilar Sobrevilla, Alicia Casals, Univ. Politècnica de Catalunya (Spain) . . . . . [9786-61]

**Real-time mosaicing of fetoscopic images**, Pankaj Daga, Francois Chadebecq, Marcel Tella, George Dwyer, Univ. College London (UK); Anna L. David, Univ. College Hospital (UK); Jan Deprest, KU Leuven (Belgium); Danail Stoyanov, Imperial College London (UK); Tom Vercauteren, Sebastian Ourselin, Univ. College London (UK) . . . . . [9786-62]

**Multiple video sequences synchronization during minimally invasive surgery**, David Provoost, Johan Bellezza, Altran Technologies (France); Karim Moukoko, Altran Research Medic@ (France); Abdelkrim Belhaoua, Jean-Pierre Radoux, Altran Technologies (France) . . . . . [9786-63]

**Visualization framework for colonoscopy videos from Stony Brook University**, Saad Nadeem, Arie Kaufman, Stony Brook Univ. (USA) . . . . . [9786-64]

**High-performance computing (HPC) enabled real-time remote processing of laparoscopic surgery**, Zahra Ronaghi, Karan Sapra, Ryan Izard, Edward Duffy, Melissa C. Smith, Kuang-Ching Wang, David M. Kwartowitz, Clemson Univ. (USA) . . . . . [9786-65]

**Content-based retrieval in videos from laparoscopic surgery**, Klaus Schoeffmann, Alpen-Adria-Universität Klagenfurt (Austria); Christian Beecks, RWTH Aachen Univ. (Germany); Mathias Lux, Alpen-Adria-Universität Klagenfurt (Austria); Merih Seran Uysal, Thomas Seidl, RWTH Aachen Univ. (Germany) . . . . . [9786-66]

**Cost-effective surgical registration using consumer depth cameras**, Michael Potter, Rochester Institute of Technology (USA); Ziv Yaniv, National Institutes of Health (USA) . . . . . [9786-67]

**Exploring the effects of dimensionality reduction in deep networks for force estimation in robotic-assisted surgery**, Angelica I. Aviles, Univ. Politècnica de Catalunya (Spain); Samar M. Alsaleh, The George Washington Univ. (USA); Pilar Sobrevilla, Alicia Casals, Univ. Politècnica de Catalunya (Spain) . . . . . [9786-68]

**Current sensing for navigated electrosurgery: proof of concept**, Kaci Carter, Evelyn Morin, Gabor Fichtinger, Tamas Ungi M.D., Andras Lasso, Queen's Univ. (Canada) . . . . . [9786-69]

**Characterization of a phantom setup for breast conserving cancer surgery**, Jacob T. Chadwell, Rebekah H Conley, Vanderbilt Univ. (USA); Ingrid M. Meszoeoly M.D., Vanderbilt Univ. Medical Ctr. (USA); Michael I. Miga, Vanderbilt Univ. (USA) . . . . . [9786-70]

**Image-guided intracranial cannula placement for awake in vivo microdialysis in nonhuman primates**, Antong Chen, Ashleigh Bone, Catherine Hines, Belma Dogdas, Tamara O. Montgomery, Maria Michener, Merck & Co., Inc. (USA); Christopher T. Winkelmann, Pfizer Inc. (USA); Soheil Ghafurian, Rutgers, The State Univ. of New Jersey (USA) and Merck & Co., Inc. (USA); Laura S. Lubbers, John Renger, Ansuman Bagchi, Jason M. Uslander, Colena Johnson, Hatim A. Zariwala, Merck & Co., Inc. (USA) . . . . . [9786-71]

**Patch-based label fusion for automatic multi-atlas-based prostate segmentation in MR images**, Xiaofeng Yang, Peter J. Rossi, Ashesh B. Jani, Hui Mao, Walter J. Curran, Tian Liu, Emory Univ. (USA) . . . . . [9786-72]

**Phantom-based ground-truth generation for vessel segmentation and pulsatile deformation analysis**, Daniel Schetelig, Dennis Säring, Till Illies, Jan Sedlacik, Fabian Kording, René Werner, Univ. Medical Ctr. Hamburg-Eppendorf (Germany) . . . . . [9786-73]

**A general approach to liver lesion segmentation in CT images**, Li Cao, Huazhong Univ. of Science and Technology (China) and Univ. of Pennsylvania (USA); Jayaram K. Udupa, Dewey Odhner, Univ. of Pennsylvania (USA); Lidong Huang, BeiHang Univ. (China) and Univ. of Pennsylvania (USA); Yubing Tong, Drew A. Torigian, Univ. of Pennsylvania (USA) . . . . . [9786-74]

**A comparison study of atlas-based 3D cardiac MRI segmentation: global versus global and local transformations**, Aditya Daryanani, Shusil Dangi, Kfir Y. Ben Zikri, Cristian A. Linte, Rochester Institute of Technology (USA) . . . . . [9786-75]

**Surface mesh to voxel data registration for patient-specific anatomical modelling**, Julia Oliveira, Paul Giessler, András Keszei, Uniklinik RWTH Aachen (Germany); Andreas Herrler, Maastricht Univ. (Netherlands); Thomas Deserno, Uniklinik RWTH Aachen (Germany) [9786-76]

**Estimation of line-based target registration error**, Burton Ma, York Univ. (Canada); Elvis C. S. Chen, Roberts Research Institute (Canada); Terry M. Peters, Roberts Research Institute (Canada) . . . . . [9786-77]

**MRI-CT prostate registration based on patch-deformation dictionary**, Xiaofeng Yang, Peter J. Rossi, Ashesh B. Jani, Hui Mao, Walter J. Curran, Tian Liu, Emory Univ. (USA) . . . . . [9786-78]

**Model-based deformable registration of compressed and uncompressed MRI breast images**, Shadi Emami Abarghouei, McMaster Univ. (Canada); Bahram Marami, Harvard Medical School (USA); Shahin Sirouspour, McMaster Univ. (Canada) . . . . . [9786-79]

**Fusion of cone-beam CT and 3D photographic images for soft tissue simulation in maxillofacial surgery**, Soyoung Chung, Joojin Kim, Helen Hong, Seoul Women's Univ. (Korea, Republic of) . . . . . [9786-80]

**Image updating for brain deformation compensation in tumor resection**, Xiaoyao Fan, Songbai Ji, Thayer School of Engineering at Dartmouth (USA); David W Roberts, Dartmouth Hitchcock Medical Ctr. (USA) and Norris Cotton Cancer Ctr. (USA); Alex Hartov, Keith D. Paulsen, Thayer School of Engineering at Dartmouth (USA) . . . . . [9786-81]

**A fully automatic image-to-world registration method for image-guided procedure with intraoperative imaging updates**, Senhu Li, David Sarment, Xoran Technologies, LLC (USA) . . . . . [9786-82]

**Optimal atlas construction through hierarchical image registration**, George J. Grevera, Saint Joseph's Univ. (USA); Jayaram K. Udupa, Dewey Odhner, Drew A. Torigian, Univ. of Pennsylvania (USA) . . . . . [9786-83]

**Fast single slice US-MRI registration for neurosurgical MRI-guided US**, Utsav Pardasani, Roberts Research Institute (Canada) . . . . . [9786-84]

**Rapidly-steered single-element ultrasound for real-time volumetric imaging and guidance**, Mark Stauber, Craig Western, Stanford Univ. (USA); Roman Solek, Interson, Inc. (USA); Kenneth Salisbury, Stanford Health Care (USA); Dmitre Hristov, Stanford Univ. (USA); Jeffrey Schlosser, SoniTrack Systems (USA) . . . . . [9786-85]

**Investigation of permanent magnets in low-cost position tracking**, Ryan Anderson, Andras Lasso, Keyvan Hashtrudi-Zaad, Gabor Fichtinger, Queen's Univ. (Canada) . . . . . [9786-86]

**Image-guided endobronchial ultrasound**, William E. Higgins, Xiaonan Zang, Ronnarit Cheirsilp, Patrick Byrnes, Trevor Kuhlengel, Rebecca Bascom, Jennifer W. Toth, The Pennsylvania State Univ. (USA) . . . . . [9786-87]

**A motorized ultrasound system for MRI-ultrasound fusion guided prostatectomy**, Reza Seifabadi, Sheng Xu, Peter Pinto, Bradford J. Wood, National Institutes of Health (USA) . . . . . [9786-88]

**Visualization of hepatic arteries with 3D ultrasound during intra-arterial therapies**, Maxime Gerard, Ecole Polytechnique de Montréal (Canada); An Tang, Ctr. Hospitalier de l'Univ. de Montréal (Canada); Anais Badoual, Ecole Polytechnique Fédérale de Lausanne (Switzerland); Alexandre Bigot, Gilles Soulez, Ctr. Hospitalier de l'Univ. de Montréal (Canada); Samuel Kadoury, Ecole Polytechnique de Montréal (Canada) . . . . . [9786-89]

**3D shape tracking of minimally invasive medical instruments using optical frequency domain reflectometry**, François Parent, Koushik Kanti Mandal, Sébastien Loranger, Ecole Polytechnique de Montréal (Canada); Eric Hideki Watanabe Fernandes, Univ. Federal de São Paulo (Brazil); Raman Kashyap, Samuel Kadoury, Ecole Polytechnique de Montréal (Canada) . . . . . [9786-91]

**Measurement of electromagnetics tracking error in a navigated breast surgery setup**, Vinyas Harish, Aidan Baksh, Tamas Ungi, Andras Lasso, Lab. for Percutaneous Surgery (Canada); Zachary Baum, The Laboratory for Percutaneous Surgery (Canada); Gabrielle Gauvin, Jay Engel, John Rudan, Queen's Univ. (Canada); Gabor Fichtinger, Lab. for Percutaneous Surgery (Canada) . . . . . [9786-92]

**Image-guided navigation surgery for pelvic malignancies using electromagnetics tracking**, Jasper Nijkamp, Koert Kuhlmann M.D., Jan-Jakob Sonke, Theo Ruers M.D., The Netherlands Cancer Institute (Netherlands) . . . . . [9786-93]

**Feasibility of tracked electrodes for use in epilepsy surgery**, David R. Holmes III, Benjamin Brinkmann, Dennis P. Hanson, Gregory Worrell, Richard A. Robb, Mayo Clinic (USA); Leslie Holton, Medtronic Navigation (USA) . . . . . [9786-94]

**4D cone-beam CT imaging for guidance in radiation therapy: setup verification by use of implanted fiducial markers**, Peng Jin, Niek van Wieringen, Maarten C. C. M. Hulshof M.D., Arjan Bel, Tanja Alderliesten, Academisch Medisch Centrum (Netherlands) . . . . . [9786-95]

**Effects of voxelization on dose volume histogram accuracy**, Kyle Sunderland, Queen's Univ. (Canada); Csaba Pinter, Queen's Univ. (Canada); Andras Lasso, Gabor Fichtinger, Queen's Univ. (Canada) . . . . . [9786-96]

**Partition-based acquisition model for speed-up navigated Beta-probe surface imaging**, Frederic Monge, Univ. de Rennes 1 (France); Dzshoskun I. Shakir, Nassir Navab, Technische Univ. München (Germany); Pierre Jannin, Univ. de Rennes 1 (France) and Lab. Traitement du Signal et de l'Image (France) . . . . . [9786-97]

**Stent enhancement in digital x-ray fluoroscopy using an adaptive feature enhancement filter**, Yuhao Jiang, Josey Zachary, Univ. of Central Oklahoma (USA) . . . . . [9786-98]

**Evaluation of left ventricular scar identification from contrast enhanced magnetic resonance imaging for guidance of ventricular catheter ablation therapy**, Maryam E. Rettmann, Helge Lehmann, Susan Johnson, Douglas Packer, Mayo Clinic (USA) . . . . . [9786-99]

**Interactive patient specific visualization for scar transmural in cardiac resynchronization therapy**, Sabrina Reiml, Siemens Healthcare (Germany); Daniel Toth, Siemens Healthcare (UK); Maria Panayiotou, King's College London (UK); Bernhard Fahn, Siemens AG Österreich (Austria); Rashed Karim, Jonathan Behar, King's College London (UK); Aldo Rinaldi, Guy's and St Thomas' NHS Foundation Trust (UK); Reza Razavi, Kawal S. Rhode, King's College London (UK); Alexander Brost, Siemens AG (Germany); Peter Mountney, Siemens Healthcare (UK) . . . . . [9786-100]

**A robust, automated left ventricle region of interest localization technique using a cardiac cine MRI atlas**, Kfir Y. Ben Zikri, Shusil Dangi, Cristian A. Linte, Rochester Institute of Technology (USA) . . . . . [9786-101]

**Classification of coronary artery tissues using optical coherence tomography imaging in Kawasaki disease**, Atefeh Abdolmanafi, Ecole de Technologie Supérieure (Canada); Nagib Dahdah M.D., Univ. de Montréal (Canada) and Ctr. Hospitalier Univ. Sainte-Justine (Canada); Arpan S. Prasad, Luc Duong, Ecole de Technologie Supérieure (Canada) . . . . . [9786-102]



CONFERENCE 9789

PACS and Imaging Informatics:  
Next Generation and Innovations

**A cloud platform for remote diagnosis of breast cancer in mammography by fusion of machine and human intelligence**, Guodong Jiang, Ming Fan, Lihua Li, Hangzhou Dianzi Univ. (China) . . . . . [9789-25]

**Semantic information extracting system for classification of radiological reports in radiology information system (RIS)**, Liehang Shi, Tonghui Ling, Jianguo Zhang, Shanghai Institute of Technical Physics (China) . . . . . [9789-26]

**Multi-disciplinary data organization and visualization models for clinical and pre-clinical studies: A case study in the application of proton beam radiosurgery for treating spinal cord injury related pain**, Sneha K. Verma, Brent J. Liu, The Univ. of Southern California (USA) [9789-27]

**Building hybrid high-dimensional imaging database for content-based image search**, Qinpei Sun, Jianyong Sun, Tonghui Ling, Mingqing Wang, Yuanyuan Yang, Jianguo Zhang, Shanghai Institute of Technical Physics (China) . . . . . [9789-28]

**Comparing the role of shape and texture on staging hepatic fibrosis from medical imaging**, Xuejun Zhang, Guangxi Univ. (China) and The Univ. of Southern California (USA); Ryan Louie, Brent J. Liu, The Univ. of Southern California (USA); Xin Gao, Suzhou Institute of Biomedical Engineering and Technology (China); Xiaomin Tan, Xianghe Qu, Guangxi Univ. (China); Liling Long, Guangxi Medical Univ. (China) . . . [9789-29]

**Clinical experiences of collaborative imaging diagnosis in Shanghai District Healthcare Services**, Kai Zhang, Tonghui Ling, Yuanyuan Yang, Jianyong Sun, Mingqing Wang, Jianguo Zhang, Shanghai Institute of Technical Physics (China) . . . . . [9789-30]

**Development of a web-based informatics system utilizing quantitative imaging features for predicting outcomes in stroke rehabilitation clinical trials**, Ximing Wang, Jeffrey Tse, Brent J. Liu, The Univ. of Southern California (USA) . . . . . [9789-31]

**Association between dynamic features of breast DCE-MR imaging and clinical response of neoadjuvant chemotherapy: a preliminary analysis**, Lijuan Huang, Ming Fan, Hangzhou Dianzi University (China); Lihua Li, Hangzhou Dianzi Univ. (China); Juan Zhang, Guoliang Shao, Zhejiang Cancer Hospital (China); Bin Zheng, Hangzhou Dianzi University (China) and University of Oklahoma (USA) . . . . . [9789-33]

CONFERENCE 9790

Ultrasonic Imaging and Tomography

Motion and Deformation Imaging

**Automated 3D ultrasound image segmentation for assistant diagnosis of breast cancer**, Peng Gu, Nanjing Univ. (China); Wonmean Lee, Marilyn A. Roubidoux, Univ. of Michigan (USA); Jie Yuan, Nanjing Univ. (China); Paul L. Carson, Univ. of Michigan (USA) . [9790-36]

**Development of estimation system of knee extension strength using image features in ultrasound images of rectus femoris**, Hiroki Murakami, Gifu Univ. School of Medicine (Japan); Tsuneo Watanabe, Gifu Univ. Hospital (Japan); Daisuke Fukuoaka, Gifu Univ. (Japan); Nobuo Terabayashi, Takeshi Hara, Chisako Muramatsu, Hiroshi Fujita, Gifu Univ. School of Medicine (Japan) . . . . [9790-37]

**Precise reconstruction of fast moving cardiac valve in high frame rate synthetic transmit aperture ultrasound imaging**, Mayumi Suzuki, Teichiro Ikeda, Chizue Ishihara, Shinta Takano, Hiroshi Masuzawa, Hitachi, Ltd. (Japan) . [9790-38]

**Effect of echo artifacts on characterization of pulsatile tissues in neonatal cranial ultrasonic movies**, Kazuki Takahashi, Yuki Tabata, Masayuki Fukuzawa, Kyoto Institute of Technology (Japan); Yoshiki Kitsunozuka, Saiseikai Hyogo-ken Hospital (Japan) . . . . [9790-39]

**Determining cardiac fiber orientation using FSL and registered ultrasound/DTI volumes**, Baowei Fei, James Dormer, Emory Univ. (USA); Xulei Qin, Emory Univ. (USA); Ming Shen, Silun Wang, Xiaodong Zhang, Rong Jiang, Mary B. Wagner, Emory Univ. (USA) . . . . . [9790-40]

Ultrasound Tomography and Reconstruction

**Ultrasound transmission attenuation tomography with two parallel transducer arrays**, Ting Chen, Junseob Shin, Lianjie Huang, Los Alamos National Lab. (USA) . . . . . [9790-41]

**Image reconstruction for robot assisted ultrasound tomography**, Fereshteh Aalamifar, Haichong K. Zhang, Arman Rahmim, Emad M. Boctor, Johns Hopkins Univ. (USA) . . . . . [9790-42]

**Phase aberration correction by multi-stencils fast marching method using sound speed image in ultrasound computed tomography**, Xiaolei Qu, Takashi Azuma, Hongxiang Lin, Haruka Imoto, The Univ. of Tokyo (Japan); Satoshi Tamano, Tohoku Univ. (Japan); Shu Takagi, The Univ. of Tokyo (Japan); Shin-Ichiro Umemura, Tohoku Univ. (Japan); Ichiro Sakuma, Yoichiro Matsumoto, The Univ. of Tokyo (Japan) . . . . . [9790-43]

**Using ultrasound tomography to identify the distributions of density throughout the breast**, Mark A. Sak, Neb Duric, Delphinus Medical Technologies, Inc. (USA); Peter J. Littrup M.D., Delphinus Medical Technologies, Inc. (USA) and Brown Univ. (USA); Norman F. Boyd, Princess Margaret Cancer Ctr. (Canada); Mark E. Sherman, Gretchen Gierach, National Cancer Institute (USA) . . [9790-44]

Ultrasound Image Analysis and Tissue Characterization

**Automated kidney morphology measurements from ultrasound images using texture and edge analysis**, Hariharan Ravishanker, Pavan Annangi, GE Global Research (India); Justin Lanning, Michael Washburn, GE Healthcare (USA) . . . . . [9790-45]

**Automated kidney detection for 3D ultrasound using scan line searching**, Matthias Noll, Julian Puhl, Stefan Wesarg, Fraunhofer-Institut für Graphische Datenverarbeitung (Germany) . . [9790-46]

**US-Cut: interactive algorithm for rapid detection and segmentation of liver tumors in ultrasound acquisitions**, Jan Egger, Philip Voglreiter, Mark Dokter, Michael Hofmann, Technische Univ. Graz (Austria); Xiaojun Chen, Shanghai Jiao Tong Univ. (China); Andreas Hartl, Technische Univ. Graz (Austria); Bernhard Kaizn, Imperial College London (UK); Wolfram G. Zoller, Katharinenhospital (Germany) and Klinikum Stuttgart (Germany); Dieter Schmalstieg, Technische Univ. Graz (Austria); Alexander Hann, Katharinenhospital (Germany) . . . [9790-47]

**Delimitation of the lung region with distributed ultrasound transducers**, Diego A. Cardona Cardenas, Sérgio S. Furuie, Univ. de São Paulo (Brazil) . . . . . [9790-48]

**Rotation elastogram: a novel method to visualize local rigid-body rotation under quasi-static compression**, Sowmiya C. Abishekar, Ali Arshad A. Kothawala, Arun K. Thittai, Indian Institute of Technology Madras (India) . . . . . [9790-49]

**Dynamic programming on a tree for ultrasound elastography**, Roozbeh Shams, Concordia Univ. (Canada); Mathieu Boily, Paul Martineau, McGill Univ. Health Ctr. (Canada); Hassan Rivaz, Concordia Univ. (Canada) . . . . . [9790-50]

**Image based temporal alignment of echocardiographic sequences**, Adriyana Danudibroto, KU Leuven (Belgium) and GE Vingmed Ultrasound (Norway); Jørn Bersvendsen, GE Vingmed Ultrasound (Norway) and Univ. I Oslo (Norway); Oana Mirea, KU Leuven (Belgium); Olivier Gerard, GE Vingmed Ultrasound (Norway); Jan D'hooge, KU Leuven (Belgium); Eigil Samset, GE Vingmed Ultrasound (Norway) and Univ. I Oslo (Norway) . . . . . [9790-51]

**Comparison of ultrasound B-mode, strain imaging, acoustic radiation force impulse displacement and shear wave velocity imaging using real time clinical breast images**, Kavitha Manickam, Ramasubba Reddy Machireddy, Indian Institute of Technology Madras (India); Bagyam Raghavan, Apollo Specialty Hospital (India) . . . . . [9790-53]

**Differential diagnosis of thyroid nodules with virtual touch tissue imaging of ARFI elastography**, Tao Li, Huazhong Univ. of Science and Technology (China); Pei Zhou, Wuhan General Hospital of Guangzhou Military Command (China) and People's Liberation Army (China); Ming Yue Ding, Huazhong Univ. of Science and Technology (China); Yongwei Mi, Yiyong Li, Ji Zhang, Wuhan General Hospital of Guangzhou Military Command (China) and People's Liberation Army (China) . [9790-54]

Ultrasound Image Guidance

**New platform for evaluating medical image guided technology**, Younsu Kim, Xiaoyu Guo, Emad M. Boctor, Johns Hopkins Univ. (USA) . . . . . [9790-55]

**Speed of sound estimation with active PZT element for thermal monitoring during ablation therapy: feasibility study**, Younsu Kim, Xiaoyu Guo, Alexis Cheng, Emad M. Boctor, Johns Hopkins Univ. (USA) . . . . . [9790-56]

Novel Imaging Strategies and Signal Processing

**Selective differencing for nonlinear ultrasound imaging**, Jen-Tang Lu, Jason W. Fleischer, Princeton Univ. (USA) . . . . . [9790-57]

**Compressed sensing for high performance ultrasound imaging**, Jing Liu, Jianwen Luo, Qiong He, Tsinghua Univ. (China) . . . . . [9790-58]

**Endocavity ultrasound, fiber-guided photoacoustic, and quasi-static elasticity imaging**, Yan Yan, Sirisha Kondle, Vishal N. Srivastava, Bhargava Saripalli, Jinjun Xia, Edgar A. Hernandez, Mohammad Mehrmohammadi, Wayne State Univ. (USA) . . . . . [9790-59]

**Suppression of acoustic clutter and random noise using F-X prediction filtering in medical ultrasound imaging**, Junseob Shin, Lianjie Huang, Los Alamos National Lab. (USA) . . . . . [9790-60]

New Applications of Ultrasound in Medicine and Biology

**Towards predictive diagnosis and management of rotator cuff disease: using curvelet transform for edge detection and segmentation of tissue**, Vipul Pai Raikar, David M. Kwartowitz, Clemson Univ. (USA) . . . . . [9790-61]

**Classification of motor intent in transradial amputees using sonomyography and spatio-temporal image analysis**, Harishwaran Hariharan, Nima Aklaghi, Alex Baker, Jana Kosecka, Huzefa Rangwala, Siddhartha Sikdar, George Mason Univ. (USA) . . . . [9790-62]

**Single element ultrasonic imaging of limb geometry: an in-vivo study with comparison to MRI**, Xiang Zhang, Brian W. Anthony, Massachusetts Institute of Technology (USA) . . . . . [9790-63]

**Towards ultrasound travel time tomography for quantifying human limb geometry and material properties**, Jonathan R. Fincke, Micha Feigin, Germán A. Prieto, Xiang Zhang, Brian W. Anthony, Massachusetts Institute of Technology (USA) . . . . . [9790-64]

Transducers and Beamforming

**Observations of liver cancer cells in scanning probe acoustic microscope: a preliminary study**, Xiaohui Chen, Ming Yue Ding, Xiaoyue Fang, Huazhong Univ. of Science and Technology (China); Qing Xi, Tianjin Medical Univ. (China); Hua Guo, Tianjin Medical Univ. Cancer Institute and Hospital (China); Ning Zhang, Tianjin Medical Univ. (China) . . . . . [9790-65]

**A preliminary evaluation work on a 3D ultrasound imaging system for 2D array transducer**, Xiaoli Zhong, Xu Li, Jiali Yang, Chunyu Li, Junjie Song, Ming Yue Ding, Ming Yuchi, Huazhong Univ. of Science and Technology (China) . . . . . [9790-66]

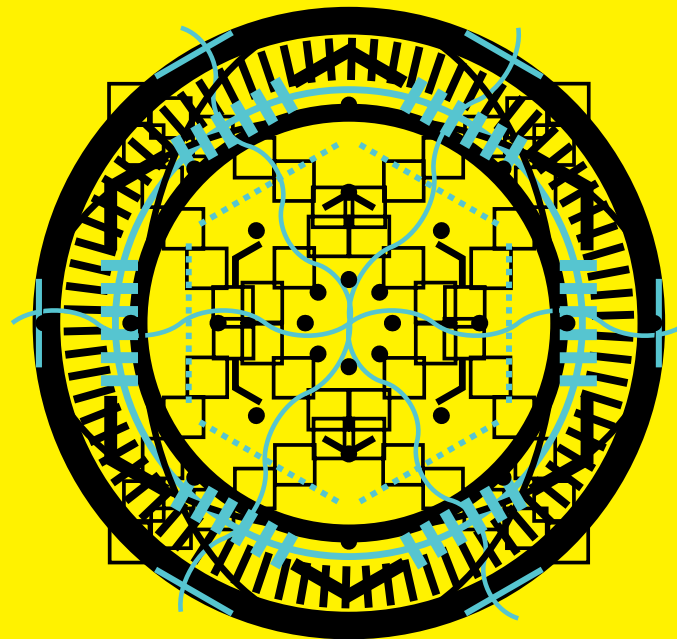
**A new post-phase rotation based dynamic receive beamforming architecture for smartphone-based wireless ultrasound imaging**, Minsuk Park, Jeeun Kang, Gunho Lee, Min Kim, Tai Kyong Song, Sogang Univ. (Korea, Republic of) . . . . . [9790-67]

**High-resolution synthetic-aperture ultrasound imaging with minimum variance beamforming and spiking deconvolution**, Junseob Shin, Lianjie Huang, Los Alamos National Lab. (USA).....[9790-68]

**In vivo visualization of robotically implemented Synthetic-Tracked Aperture UltraSound (STrAtUS) imaging system using curvilinear array**, Haichong K. Zhang, Fereshteh Aalamifar, Johns Hopkins Univ. (USA); Gregg E. Trahey, Duke Univ. (USA); Emad M. Boctor, Johns Hopkins Univ. (USA).....[9790-69]

**Hadamard-encoded synthetic transmit aperture imaging with a reduced number of receiving channels**, Ying Li, Ping Gong, Michael C. Kolios, Yuan Xu, Ryerson Univ. (Canada).....[9790-70]

**Higher-frame-rate ultrasound imaging with reduced cross-talk by combining a synthetic aperture and spatial coded excitation**, Chizue Ishihara, Teiichiro Ikeda, Hiroshi Masuzawa, Hitachi, Ltd. (Japan).....[9790-71]



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## CONFERENCE 9783

Physics of Medical Imaging

Room: Town & Country

## CONFERENCE 9785

Computer-Aided Diagnosis

Room: Golden West

## CONFERENCE 9786

Image-Guided Procedures,  
Robotic Interventions, and Modeling

Room: California

## CONFERENCE 9789

PACS and Imaging Informatics:  
Next Generation and Innovations

Room: San Diego

## CONFERENCE 9790

Ultrasonic Imaging and  
Tomography

Room: Royal Palm One

### SESSION 5

Room: Town & Country . Mon 8:00 to 9:40 am

#### Phase Contrast Imaging

Session Chairs: **Mini Das**, Univ. of Houston (USA); **Guang-Hong Chen**, Univ. of Wisconsin-Madison (USA)

8:00 am: **Single-shot x-ray phase contrast imaging with an algorithmic approach using spectral detection**, Mini Das, Chan Soo Park, Univ. of Houston (USA) . . . . . [9783-21]

8:20 am: **X-ray differential phase contrast imaging using a Talbot-Lau interferometer and a photon-counting detector**, Yongshuai Ge, Ran Zhang, Ke Li, Guang-Hong Chen, Univ. of Wisconsin-Madison (USA) . . . . . [9783-22]

8:40 am: **Potential use of microrubbles (MBs) as contrast material in x-ray dark field (DF) imaging: How does the DF signal change with the characteristic parameters of the MBs?**, Ran Zhang, Univ. of Wisconsin-Madison (USA); Bin Qin, Univ. of Pittsburgh (USA); Yongshuai Ge, Univ. of Wisconsin-Madison (USA); Bruce R. Whiting, Univ. of Pittsburgh (USA); Ke Li, Univ. of Wisconsin-Madison (USA); Flordeliza S. Villanueva, Univ. of Pittsburgh (USA); Guang-Hong Chen, Univ. of Wisconsin-Madison (USA) . . . . . [9783-23]

9:00 am: **Phase contrast imaging with a dual-phase grating interferometer**, Matias E. Kogias, Zhentian Wang, Marco F. M. Stampanoni, Paul Scherrer Institut (Switzerland) and ETH Zürich (Switzerland) . . . . . [9783-24]

9:20 am: **High-energy x-ray grating-based phase-contrast radiography of human anatomy**, Florian Horn, Christian Hauke, Sebastian Lachner, Veronika Ludwig, Georg Pelzer, Jens Rieger, Max Schuster, Maria Seifert, Johannes Wandner, Andreas Wolf, Thilo Michel, Gisela Anton, Friedrich-Alexander-Univ. Erlangen-Nürnberg (Germany) . . . [9783-25]

Coffee Break . . . Mon 9:40 am to 10:10 am

### SESSION 5

Room: Golden West . . . . Mon 8:00 to 9:40 am

#### Keynote and Deep Learning I

Session Chairs: **Lubomir M. Hadjiiski**, Univ. of Michigan Health System (USA); **Horst K. Hahn**, Fraunhofer MEVIS (Germany)

8:00 am: **Radiomics: There is more than meets the eye in medical imaging (Keynote Presentation)**, Hugo Aerts, Dana-Farber Cancer Institute (USA) and Brigham and Women's Hospital (USA) and Harvard Medical School (USA) . . . . . [9785-23]

9:00 am: **Deep convolutional networks for automated detection of posterior-element fractures on spine CT**, Holger R. Roth, Yinong Wang, Jianhua Yao, Le Lu, National Institutes of Health (USA); Joseph E. Burns, Univ. of California, Irvine (USA); Ronald M. Summers, National Institutes of Health (USA) . . . . . [9785-24]

9:20 am: **Increasing CAD system efficacy for lung texture analysis using a convolutional network**, Sebastian R. Tarando, Catalin Fetita, Télécom SudParis (France); Pierre Yves, Univ. Paris 13 (France) . . . . . [9785-25]

Coffee Break . . . Mon 9:40 am to 10:10 am

### SESSION 5

Room: California . . . . . Mon 8:00 to 9:40 am

Session Chairs: **Lena Maier-Hein**, Deutsches Krebsforschungszentrum (Germany); **Stefanie Speidel**, Karlsruher Institut für Technologie (Germany)

8:00 am: **Deformable registration of x-ray to MRI for post-implant dosimetry in prostate brachytherapy**, Seyoun Park, The Johns Hopkins Hospital (USA); Danny Y. Song, Sidney Kimmel Comprehensive Cancer Ctr. (USA); Junghoon Lee, Johns Hopkins Univ. (USA) . . . . . [9786-20]

8:20 am: **Evaluation of a  $\mu$ CT-based electro-anatomical cochlear implant model**, Ahmet Cakir, Benoit M. Dawant, Jack H. Noble, Vanderbilt Univ. (USA) . . . . . [9786-21]

8:40 am: **Fast simulated annealing and adaptive Monte Carlo sampling based parameter optimization for dense optical-flow deformable image registration of 4DCT lung anatomy**, Tai Dou, Yugang Min, John Neylon, David Thomas, Patrick Kupelian, Anand Santhanam, Univ. of California, Los Angeles (USA) . . . . . [9786-22]

9:00 am: **Automatic pose correction for image-guided nonhuman primate brain surgery planning**, Soheil Ghafurian, Merck & Co., Inc. (USA) and Rutgers Univ. (USA); Antong Chen, Catherine Hines, Belma Dogdas, Ashleigh Bone, Kenneth Lodge, Stacey O'Malley, Merck & Co., Inc. (USA); Christopher T. Winkelmann, Pfizer Inc. (USA); Ansuman Bagchi, Laura S. Lubbers, Jason M. Uslander, Colena Johnson, John Renger, Hatim A. Zariwala, Merck & Co., Inc. (USA) . . . . . [9786-23]

9:20 am: **Accurate tracking of tumor volume change during radiotherapy by CT-CBCT registration with intensity correction**, Seyoun Park, The Johns Hopkins Hospital (USA); Adam Robinson, Johns Hopkins Univ. (USA); Harry Quon, The Johns Hopkins Hospital (USA); Ana P. Kiess, Colette Shen, John Wong, Johns Hopkins Univ. (USA); William Plishker, Raj Shekhar, IGI Technologies (USA); Junghoon Lee, Johns Hopkins Univ. (USA) . . . . . [9786-24]

Coffee Break . . . Mon 9:40 am to 10:10 am

### SESSION 4

Room: San Diego . . . . . Mon 8:00 to 9:40 am

#### Big Data Technologies and Image Sharing in Medical Imaging and Informatics

Session Chair: **Brent J. Liu**, The Univ. of Southern California (USA)

8:00 am: **A case-based reasoning tool for breast cancer with data mining concepts and techniques**, Souad Demigha, Univ. Paris 1 Panthéon Sorbonne (France) . . . . . [9789-16]

8:20 am: **Improving face image extraction by using deep learning technique**, Zhiyun Xue, Sameer K. Antani, Rodney Long, Dina Demner-Fushman, George R. Thoma, National Library of Medicine (USA) . . . . . [9789-17]

8:40 am: **Collection of sequential imaging events for research in breast cancer screening**, Mishal N. Patel, Kenneth C. Young, Mark D. Halling-Brown, The Royal Surrey County Hospital NHS Trust (UK) . . . . . [9789-18]

9:00 am: **Mutual Information-based feature selection for radiomics**, Estanislao Oubel, Hubert Beaumont, Median Technologies (France); Antoine Iannessi, Ctr. de Lutte Contre le Cancer Antoine Lacassagne (France) . . . . [9789-19]

9:20 am: **PACS-integrated electronic data capture of DICOM data in multi-centered clinical trials**, Daniel Haak, Charles-E. Page, Thomas Deserno, Uniklinik RWTH Aachen (Germany) . . . . . [9789-20]

Coffee Break . . . Mon 9:40 am to 10:10 am

### SESSION 5

Room: Royal Palm One . Mon 8:00 to 9:40 am

#### Novel Imaging Strategies and Signal Processing

Session Chair: **Mohammad Mehrmohammadi**, Wayne State Univ. (USA)

8:00 am: **Sub-mSV breast XACT scanner: concept and design**, Shanshan Tang, Liqiang Ren, Pratik Samant, Jian Chen, Hong Liu, Liangzhong Xiang, The Univ. of Oklahoma (USA) . . . . . [9790-20]

8:20 am: **An evolutionary Bayesian search scheme for ultrasound modulated optical tomography**, Mamatha Venugopal, Debasish Roy, Ram Mohan Vasu, Indian Institute of Science (India) . . . . . [9790-21]

8:40 am: **Monte Carlo investigation of the dosimetric effect of the Autoscans ultrasound probe for guidance of radiotherapy**, Michael Martyn, National Univ. of Ireland, Galway (Ireland); Tuathan O' Shea, The Institute of Cancer Research (UK) and The Royal Marsden NHS Foundation Trust (UK); Emma J. Harris, The Institute of Cancer Research (UK) and The Royal Marsden NHS Foundation Trust (UK); Jeffrey C. Bamber, The Institute of Cancer Research (UK) and The Royal Marsden NHS Foundation Trust (UK); Mark J. Foley, National Univ. of Ireland, Galway (Ireland) . . . . . [9790-22]

9:00 am: **Signal processing for enhanced tumor perfusion detection**, MinWoo Kim, Univ. of Illinois at Urbana-Champaign (USA); Craig K. Abbey, Univ. of California, Santa Barbara (USA); Michael F. Insana, Univ. of Illinois at Urbana-Champaign (USA) . . . . . [9790-23]

9:20 am: **Frequency-shift low-pass filtering and least mean square adaptive filtering for ultrasound imaging**, Shanshan Wang, Chunyu Li, Ming Yue Ding, Ming Yuchi, Huazhong Univ. of Science and Technology (China) . . . . . [9790-24]

Coffee Break . . . Mon 9:40 am to 10:10 am

9783 continues on page 43

9785 continues on page 43

9786 continues on page 43

9789 continues on page 43

9790 continues on page 43



CONFERENCE 9783

Physics of Medical Imaging

Room: Town & Country

SESSION 6

Room: Town & Country . . . . . Mon 10:10 am to 12:10 pm

Cone Beam CT II: System Optimization, Image Reconstruction

Session Chairs: **Marc Kachelriess**, Deutsches Krebsforschungszentrum (Germany); **Maria Drangova**, Robarts Research Institute (Canada)

10:10 am: **Design and characterization of a dedicated cone-beam CT scanner for detection of acute intracranial hemorrhage**, Jennifer Xu, Alejandro Sisniega, Wojciech Zbijewski, Hao Dang, Joseph W. Stayman, Johns Hopkins Univ. (USA); Xiaohui Wang, David H. Foos, Carestream Health, Inc. (USA); Nafi Aygun, Vassili E. Koliatsos, Jeffrey H. Siewerdsen, Johns Hopkins Univ. (USA) . . . . . [9783-26]

10:30 am: **Intravenous 3D digital subtracted angiography (IV 3D-DSA) from a single sweep C-arm cone beam CT (CBCT) acquisition**, Yinsheng Li, Kai Niu, Pengfei Yang, Beverly D. Aagaard-Kienitz, David B. Niemann, Azam S. Ahmed, Charles M. Strother, Guang-Hong Chen, Univ. of Wisconsin-Madison (USA) . . . . . [9783-27]

10:50 am: **C-arm cone-beam CT perfusion imaging using SMART-RECON method to improve temporal sampling density and temporal resolution**, Kai Niu, Yinsheng Li, Univ. of Wisconsin-Madison (USA); Sebastian Schafer, Kevin L. Royalty, Siemens Medical Solutions USA, Inc. (USA); Charles M. Strother, Guang-Hong Chen, Univ. of Wisconsin-Madison (USA) . . . . . [9783-28]

11:10 am: **Nonlinear statistical reconstruction for flat-panel cone-beam CT with blur and correlated noise models**, Steven W. Tilley II, Jeffrey H. Siewerdsen, Wojciech Zbijewski, Joseph W. Stayman, Johns Hopkins Univ. (USA) . . . . . [9783-29]

11:30 am: **Automatic intrinsic cardiac and respiratory gating from cone-beam CT scans of the thorax region**, Andreas Hahn, Sebastian Sauppe, Deutsches Krebsforschungszentrum (Germany); Michael Lell, Friedrich-Alexander-Univ. Erlangen-Nürnberg (Germany); Marc Kachelriess, Deutsches Krebsforschungszentrum (Germany) . . . . . [9783-30]

11:50 am: **Reduction of beam hardening artifacts in cone-beam CT imaging via SMART-RECON algorithm**, Yinsheng Li, John Garrett, Guang-Hong Chen, Univ. of Wisconsin-Madison (USA) . . . . . [9783-31]  
Lunch Break . . . . Mon 12:10 pm to 1:20 pm

9783 continues on page 44 ➡

CONFERENCE 9785

Computer-Aided Diagnosis

Room: Golden West

SESSION 6

Room: Golden West . . . . . Mon 10:10 am to 12:10 pm

Radiomics I

Session Chairs: **Maryellen L. Giger**, The Univ. of Chicago (USA); **Nicholas A. Petrick**, U.S. Food and Drug Administration (USA)

10:10 am: **Increasing cancer detection yield of breast MRI using a new CAD scheme of mammograms**, Maxine Tan, Faranak Aghaei, The Univ. of Oklahoma (USA); Alan B. Hollingsworth, Rebecca G. Stough, Mercy Women's Ctr. (USA); Hong Liu, Bin Zheng, The Univ. of Oklahoma (USA) . . . . . [9785-26]

10:30 am: **Identification, segmentation, and characterization of microcalcifications on mammography**, Karen Drukker, The Univ. of Chicago (USA); Serghei Malkov, Jesus Avila, Karla Kerlikowske, Bonnie Joe, Gregor Krings, Jennifer Creasman, Univ. of California, San Francisco (USA); Jennifer S. Drukteinis, Malesa M. Pereira, H. Lee Moffitt Cancer Ctr. & Research Institute (USA); Leila Kazemi, John A. Shepherd, Univ. of California, San Francisco (USA); Maryellen L. Giger, The Univ. of Chicago (USA) . . . . . [9785-27]

10:50 am: **Predicting Ki67% expression from DCE-MR images of breast tumors using textural kinetic features in tumor habitats**, Baishali Chaudhury, Mu Zhou, Dmitry B. Goldgof, Lawrence O. Hall, Univ. of South Florida (USA); Robert A. Gatenby, Robert J. Gillies, Jennifer S. Drukteinis, H. Lee Moffitt Cancer Ctr. & Research Institute (USA) . . . . . [9785-28]

11:10 am: **Applying quantitative adiposity feature analysis models to predict benefit of bevacizumab-based chemotherapy in ovarian cancer patients**, Yunzhi Wang, Yuchen Qiu, The Univ. of Oklahoma (USA); Theresa Thai, Kathleen More, Kai Ding, The Univ. of Oklahoma Health Sciences Ctr. (USA); Hong Liu, Bin Zheng, The Univ. of Oklahoma (USA) . . . . . [9785-29]

11:30 am: **Radiogenomics of glioblastoma: a pilot multi-institutional study to investigate a relationship between tumor shape features and tumor molecular subtype**, Nicholas M. Czarnek, Kal L. Clark, Katherine B Peters, Maciej A. Mazurowski, Duke Univ. (USA) . . . . . [9785-30]

11:50 am: **Prognosis classification in glioblastoma multiforme using multimodal MRI derived heterogeneity textural features: impact of pre-processing choices**, Taman Upadhya, Yannick Morvan, Institut de recherche technologique B-Com (France); Eric Stindel, Lab. de Traitement de l'Information Médicale (France); Pierre-Jean Le Reste, CHU Rennes (France); Mathieu Hatt, Lab. de Traitement de l'Information Médicale (France) . . . . . [9785-31]  
Lunch Break . . . . Mon 12:10 pm to 1:20 pm

9785 continues on page 44 ➡

CONFERENCE 9786

Image-Guided Procedures, Robotic Interventions, and Modeling

Room: California

SESSION 6

Room: California . Mon 10:10 am to 12:10 pm

Robotic Systems and Treatment Planning

Session Chairs: **David M. Kwartowitz**, Clemson Univ. (USA); **Cristian A. Linte**, Rochester Institute of Technology (USA)

10:10 am: **Toward disparity joint upsampling for robust stereoscopic endoscopic scene reconstruction in robotic prostatectomy**, Xiongbiao Luo, A. Jonathan McLeod, Terry M. Peters, Western Univ. (Canada) . . . . . [9786-25]

10:30 am: **Endoscopes and robots for tight surgical spaces: use of pre-curved elastic elements to enhance curvature**, Andria A. Ramirez, Robert J. Webster III, Vanderbilt Univ. (USA) . . . . . [9786-26]

10:50 am: **Disposable patient-mounted geared robot for image-guided needle insertion**, Charles Watkins, Takahisa Kato, Nobuhiko Hata, Brigham and Women's Hospital (USA) . . . . . [9786-27]

11:10 am: **Comparison of portable and conventional ultrasound imaging in spinal curvature measurement**, Christina Yan, Reza Tabanfar, Michael Kempston, Daniel Borschneck, Tamas Ungi M.D., Gabor Fichtinger, Queen's Univ. (Canada) . . . . . [9786-90]

11:30 am: **Image-guided preoperative prediction of pyramidal tract side effect in deep brain stimulation**, Clément Baumgarten, Yulong Zhao, INSERM (France) and Lab. Traitement du Signal et de l'Image (France); Cecile Malrain M.D., Paul Sauleau M.D., Ctr. Hospitalier Univ. de Rennes (France); Pierre Jannin, Univ. de Rennes 1 (France) and Lab. Traitement du Signal et de l'Image (France); Claire Haegelen M.D., Ctr. Hospitalier Univ. de Rennes (France) and INSERM (France) and LTSI (France) . . . . . [9786-29]

11:50 am: **Rapid virtual stenting for intracranial aneurysms**, Liang Zhao, Danyang Chen, Zihe Chen, Xiangyu Wang, Nikhil Paliwal, Univ. at Buffalo (USA); Jianping Xiang, Hui Meng, Toshiba Stroke and Vascular Research Ctr. (USA); Jason J. Corso, Jinhui Xu, Univ. at Buffalo (USA) . . . . . [9786-30]  
Lunch Break . . . . Mon 12:10 pm to 1:20 pm

9786 continues on page 44 ➡

CONFERENCE 9789

PACS and Imaging Informatics: Next Generation and Innovations

Room: San Diego

SESSION 5

Room: San Diego . Mon 10:10 am to 11:50 am

Cloud Computing and Collaborating for Medical Imaging Services and Applications

Session Chair: **Peter R. Bak**, McMaster Univ. (Canada)

10:10 am: **Decentralizing radiology: preparing for the end of fee for service**, Steven C. Horii M.D., Tessa S. Cook M.D., Woojin Kim M.D., The Univ. of Pennsylvania Health System (USA) . . . . . [9789-21]

10:30 am: **Toward an open-source semantic data infrastructure for integrating clinical and scientific data in cognition-guided surgery**, Andreas Fetzter, Jasmin Metzger, Deutsches Krebsforschungszentrum (Germany); Darko Katic, Karlsruher Institut für Technologie (Germany); Keno März, Deutsches Krebsforschungszentrum (Germany); Martin Wagner, UniversitätsKlinikum Heidelberg (Germany); Patrick Philipp, Karlsruher Institut für Technologie (Germany); Sandy Engelhardt, Deutsches Krebsforschungszentrum (Germany); Tobias Weller, Karlsruher Institut für Technologie (Germany); Sascha Zelzer, Alfred M. Franz, Deutsches Krebsforschungszentrum (Germany); Maria Maleshkova, Achim Rettinger, Stefanie Speidel, Karlsruher Institut für Technologie (Germany); Ivo Wolf, Hochschule Mannheim (Germany); Hannes Kenngott, Beat Müller, UniversitätsKlinikum Heidelberg (Germany); Lena Maier-Hein, Hans-Peter Meinzer, Marco Nolden, Deutsches Krebsforschungszentrum (Germany) [9789-22]

10:50 am: **A handheld computer-aided diagnosis system and simulated analysis**, Ming Jian Su, Xuejun Zhang, Guangxi Univ. (China); Brent J. Liu, The Univ. of Southern California (USA); Kening Su, The First Affiliated Hospital of Guangxi Univ. of Chinese Medicine (China); Ryan Louie, The Univ. of Southern California (USA) . . . . . [9789-23]

11:10 am: **Performance management of high-performance computing for medical image processing in Amazon Web Services**, Shunxing Bao, Stephen M. Damon, Bennett A. Landman, Aniruddha Gokhale, Vanderbilt Univ. (USA) . [9789-24]

11:30 am: **Mass classification in mammography with multi-agent based fusion of human and machine intelligence**, Dongdong Xi, Ming Fan, Lihua Li, College of Life Information Science and Instrument Engineering, Hangzhou Dianzi University (China); Juan Zhuang, Zhejiang Cancer Hospital (China); Yanna Shan, Hangzhou First People's Hospital, Hangzhou (China); Gang Dai, Zhejiang Cancer Hospital (China); Bin Zheng, College of Life Information Science and Instrument Engineering, Hangzhou Dianzi University (China) and School of Electrical and Computer Engineering, University of Oklahoma (USA) . . . . . [9789-32]

CONFERENCE 9790

Ultrasonic Imaging and Tomography

Room: Royal Palm One

SESSION 6

Room: Royal Palm One . . . . Mon 10:10 am to 12:10 pm

Keynote and New Applications of Ultrasound in Medicine and Biology

Session Chairs: **Brian George Anthony**, The Univ. of Texas at Austin (USA); **Neb Duric**, Delphinus Medical Technologies, Inc. (USA)

10:10 am: **Enhanced ultrasound, ultrasound tomography for volume limb imaging and prosthetic fitting (Keynote Presentation)**, Brian W. Anthony, Massachusetts Institute of Technology (USA) . . . . . [9790-25]

11:10 am: **3D optical imagery for motion compensation in a limb ultrasound system**, Bryan J. Ranger, Micha Feigin, Xiang Zhang, Al Mireault, Ramesh Raskar, Hugh M. Herr, Brian W. Anthony, Massachusetts Institute of Technology (USA) . . . . . [9790-26]

11:30 am: **Quantitative head ultrasound measurements to determine thresholds for preterm neonates requiring interventional therapies following intraventricular hemorrhage**, Jessica Kishimoto, Aaron Fenster, Robarts Research Institute (Canada); Fateme Salehi, Western Univ. (Canada); Walter Romano, David S. C. Lee, St. Thomas Elgin General Hospital (Canada); Sandrine de Ribaupierre, Western Univ. (Canada) . . . . . [9790-27]

11:50 am: **Development and evaluation of a novel targeted, nanoscaled, ultrasound contrast agents**, Houqiang Yu, Huazhong Univ. of Science and Technology (China) . . . . . [9790-28]

Lunch Break . . . . Mon 12:10 pm to 1:20 pm

9790 continues on page 44 ➡

POSTER AWARDS SESSION

Room: San Diego . . . . 11:50 to 11:55 am

Poster Award Announcements

The PACS and Imaging Informatics: Next Generation and Innovations conference poster award recipients will be recognized and certificates distributed.

CONFERENCE 9789 ENDS

CONFERENCE 9783

Physics of Medical Imaging

Room: Town & Country

SESSION 7

Room: Town & Country ..... Mon 1:20 to 3:40 pm

CT I: Technology, System Characterization, Applications

Session Chairs: **Christoph Hoeschen**, Helmholtz Zentrum München GmbH (Germany); **Kirsten Boedeker**, Toshiba Medical Research Institute USA, Inc. (USA)

1:20 pm: **Development of a realistic dynamic digital brain phantom for CT perfusion validation**, Sarah E. Divel, Stanford Univ. (USA); W. Paul Segars, Duke Univ. Medical Ctr. (USA); Soren Christensen, Max Wintermark, Maarten G. Lansberg, Stanford Univ. Medical Ctr. (USA); Norbert J. Pelc, Stanford Univ. (USA) . [9783-32]

1:40 pm: **Fluence-field modulated x-ray CT using multiple aperture devices**, Joseph W. Stayman, Aswin J. Mathews, Wojciech Zbijewski, Grace J. Gang, Jeffrey H. Siewerdsen, Satomi Kawamoto, Johns Hopkins Univ. (USA); Ira Blevis, Reuven Levinson, Philips Medical Systems Technologies Ltd. (Israel) . [9783-33]

2:00 pm: **Accuracy of patient specific organ-dose estimates obtained using an automated image segmentation algorithm**, Taly G. Gilat-Schmidt, Marquette Univ. (USA); Adam S. Wang, Thomas Coradi, Benjamin Haas, Josh M. Star-Lack, Varian Medical Systems, Inc. (USA) . [9783-34]

2:20 pm: **Noise characteristics of CT perfusion imaging: How does noise propagate from source images to final perfusion maps?**, Ke Li, Guang-Hong Chen, Univ. of Wisconsin-Madison School of Medicine and Public Health (USA) . [9783-35]

2:40 pm: **Experimental characterization of extra-focal radiation in CT scanners**, Bruce R. Whiting, Univ. of Pittsburgh (USA); Joshua D. Evans, Mariela A. Porras-Chaverri, Jeffrey F. Williamson, Virginia Commonwealth Univ. (USA) . [9783-36]

3:00 pm: **Dual-source multi-energy CT with triple or quadruple x-ray beams**, Lifeng Yu, Shuai Leng, Cynthia H. McCollough, Mayo Clinic (USA) . [9783-37]

9783 continues on page 45 ➡

CONFERENCE 9785

Computer-Aided Diagnosis

Room: Golden West

SESSION 7

Room: Golden West ..... Mon 1:20 to 3:20 pm

Deep Learning II

Session Chairs: **Ronald M. Summers**, National Institutes of Health (USA); **Hayit Greenspan**, Tel Aviv Univ. (Israel)

1:20 pm: **Detection of soft tissue densities from digital breast tomosynthesis: comparison of conventional and deep learning approaches**, Sergei Fotin, Yin Yin, Hrishikesh Haldankar, Jeffrey Hoffmeister M.D., Senthil Periaswamy, iCAD, Inc. (USA) . [9785-32]

1:40 pm: **Deep learning convolution neural network for computer-aided detection of microcalcifications in digital breast tomosynthesis**, Ravi K. Samala, Heang-Ping Chan, Lubomir M. Hadjiiski, Kenny H. Cha, Mark A. Helvie, Univ. of Michigan (USA) . [9785-33]

2:00 pm: **Computer aided lung cancer diagnosis with deep learning algorithms**, Wenqing Sun, The Univ. of Texas at El Paso (USA); Bin Zheng, The Univ. of Oklahoma (USA); Wei Qian, The Univ. of Texas at El Paso (USA) . [9785-34]

2:20 pm: **Visualizing and enhancing a deep learning framework using patients age and gender for chest x-ray image retrieval**, Yaron Anavi, Ilya Kogan, Elad Gelbart, Ofer Geva, Hayit Greenspan, Tel Aviv Univ. (Israel) . [9785-35]

2:40 pm: **Deep convolutional neural networks for automatic coronary calcium scoring in a screening study with low-dose chest CT**, Nikolas Lessmann, Ivana Isgum, Univ. Medical Ctr. Utrecht (Netherlands); Arnaud A. A. Setio, Radboud Univ. Medical Ctr. (Netherlands); Bob D. de Vos, Univ. Medical Ctr. Utrecht (Netherlands); Francesco Ciompi, Radboud Univ. Medical Ctr. (Netherlands); Pim A. de Jong, Univ. Medical Ctr. Utrecht (Netherlands); Matthijs Oudkerk, Univ. Medical Ctr. Groningen (Netherlands); Willem P. Th. M. Mali, Max A. Viergever, Univ. Medical Ctr. Utrecht (Netherlands); Bram van Ginneken, Radboud Univ. Medical Ctr. (Netherlands) . [9785-36]

9784 continues on page 45 ➡

CONFERENCE 9786

Image-Guided Procedures, Robotic Interventions, and Modeling

Room: California

SESSION 7

Room: California ..... Mon 1:20 to 3:40 pm

Tissue Deformation and Motion

Session Chairs: **Michael I. Miga**, Vanderbilt Univ. (USA); **Pierre Jannin**, Univ. de Rennes 1 (France)

1:20 pm: **Surface-driven biomechanical breast image registration**, Bjoern Eiben, Vasileios Vavourakis, John H. Hipwell, Univ. College London (UK); Sven Kabus, Cristian Lorenz, Thomas Buelow, Philips Research (Germany); David J. Hawkes, Univ. College London (UK) . [9786-31]

1:40 pm: **Modeling and simulation of tumor-influenced high-resolution real-time physics-based breast models for model-guided robotic interventions**, John Neylon, Katelyn Hasse, Anand Santhanam, Univ. of California, Los Angeles (USA) . [9786-32]

2:00 pm: **Accuracy of lesion boundary tracking in navigated breast tumor excision**, Emily Heffernan, Tamas Ungi M.D., Thomas Vaughan, Padina Pezeshki, Andras Lasso, Evelyn Morin, Gabor Fichtinger, Gabrielle Gauvin, Jay Engel M.D., John Rudan M.D., Queen's Univ. (Canada) . [9786-33]

2:20 pm: **Diaphragm motion characterization using chest motion data for biomechanics-based lung tumor tracking during EBRT**, Elham Karami, Western Univ. (Canada) and Robarts Research Institute (Canada); Stewart Gaede, Western Univ. (Canada) and London Regional Cancer Program (Canada); Ting-Yim Lee, Western Univ. (Canada) and Robarts Research Institute (Canada) and Lawson Health Research Institute (Canada); Abbas Samani, Western Univ. (Canada) and Robarts Research Institute (Canada) . [9786-34]

2:40 pm: **Determination of surgical variables using an android application for a brain shift correction pipeline used in image guided neurosurgery**, Rohan C. Vijayan, Rebekah H. Conley, Logan W. Clements, Reid C. Thompson M.D., Michael I. Miga, Vanderbilt Univ. (USA) . [9786-35]

9785 continues on page 45 ➡

CONFERENCE 9790

Ultrasonic Imaging and Tomography

Room: Royal Palm One

SESSION 7

Room: Royal Palm One ..... Mon 1:20 to 3:40 pm

Transducers and Beamforming

Session Chairs: **Jørgen Arendt Jensen**, Technical Univ. of Denmark (Denmark); **Marko Jakovljevic**, Duke Univ. School of Medicine (USA), Stanford Univ. (USA)

1:20 pm: **A pseudo non-linear method for fast simulations of ultrasonic reverberation**, Brett C. Byram, Jasmine Shu, Vanderbilt Univ. (USA) . [9790-29]

1:40 pm: **A beamforming method for plane wave Doppler imaging of high flow velocities**, Omar Mansour, Tamie L. Poepping, James C. Lacefield, Robarts Research Institute (Canada) . [9790-30]

2:00 pm: **Detection of and compensation for blocked elements using large coherent apertures: ex vivo studies**, Marko Jakovljevic, Nick Bottenus, Lily Kuo, Shalki Kumar, Gregg E. Trahey, Duke Univ. (USA) . [9790-31]

2:20 pm: **Real-time 3D image reconstruction of a 24x24 row-column addressing array: from raw data to image**, Chunyu Li, Jiali Yang, Xu Li, Xiaoli Zhong, Junjie Song, Ming Yue Ding, Ming Yuchi, Huazhong Univ. of Science and Technology (China) . [9790-32]

2:40 pm: **Synthetic aperture volumetric ultrasound imaging using 2D row-column addressed transducer array**, Hamed Bouzari, Thomas L. Christiansen, Technical Univ. of Denmark (Denmark); Christopher Beers, Sound Technology, Inc. (USA); Matthias B. Stuart, Technical Univ. of Denmark (Denmark); Svetoslav I. Nikolov, BK Ultrasound (Denmark); Jørgen A. Jensen, Technical Univ. of Denmark (Denmark) . [9790-33]

3:00 pm: **Advanced optimization of the synthetic aperture imaging quality for fast ultrasound imaging**, Ramin Moshavegh, Jonas Jensen Sr., Carlos A. Villagomez Hoyos, Matthias B. Stuart, Martin C. Hemmsen Sr., Jørgen A. Jensen, Technical Univ. of Denmark (Denmark) . [9790-34]

3:20 pm: **Analog gradient beamformer for a portable ultrasound scanner**, Tommaso Di Ianni, Martin C. Hemmsen, Technical Univ. of Denmark (Denmark); Jan Bagge, Henrik Jensen, BK Ultrasound (Denmark); Nitsan Vardi, BK Ultrasound (Denmark); Jørgen A. Jensen, Technical Univ. of Denmark (Denmark) . [9790-35]

9786 continues on page 45 ➡

# MONDAY 29 FEBRUARY

## CONFERENCE 9783

Physics of Medical Imaging

Room: Town & Country

## CONFERENCE 9785

Computer-Aided Diagnosis

Room: Golden West

## CONFERENCE 9786

Image-Guided Procedures,  
Robotic Interventions, and Modeling

Room: California

## CONFERENCE 9790

Ultrasonic Imaging and  
Tomography

Room: Royal Palm One

### SESSION 7 (CONTINUED) Room: Town & Country . . . Mon 1:20 to 3:40 pm

3:20 pm: **Optimized projection binning for improved helical amplitude- and phase-based 4DCT reconstruction in the presence of breathing irregularity**, René Werner, Univ. Medical Ctr. Hamburg-Eppendorf (Germany); Christian Hofmann, Siemens Healthcare GmbH (Germany); Tobias Gauer, Univ. Medical Ctr. Hamburg-Eppendorf (Germany) . . . . . [9783-38]  
Coffee Break . . . . Mon 3:40 pm to 4:00 pm

### SESSION 7 (CONTINUED) Room: Golden West . . . . Mon 1:20 to 3:20 pm

3:00 pm: **Comparison of bladder segmentation using deep-learning convolutional neural network with and without level sets**, Kenny H. Cha, Lubomir M. Hadjiiski, Ravi K. Samala, Heang-Ping Chan, Richard H. Cohan M.D., Elaine M. Caoili, Univ. of Michigan Health System (USA) . . . . . [9785-37]  
Coffee Break . . . . Mon 3:20 pm to 3:50 pm

### SESSION 7 (CONTINUED) Room: California . . . . . Mon 1:20 to 3:40 pm

3:00 pm: **3D superficial vessel centerlines non-rigid registration**, Filipe M. Marreiros, Linköping Univ. (Sweden) and Ctr. for Medical Image Science and Visualization (Sweden); Chunliang Wang, KTH Royal Institute of Technology (Sweden); Sandro Rossitti, Region Östergötland (Sweden); Örjan Smedby, KTH Royal Institute of Technology (Sweden) . . . . . [9786-36]  
3:20 pm: **A novel craniotomy simulation system for evaluation of stereo-pair reconstruction fidelity and tracking**, Xiaochen Yang, Logan W. Clements, Rebekah H. Conley, Reid C. Thompson M.D., Benoit M. Dawant, Michael I. Miga, Vanderbilt Univ. (USA) . . . . . [9786-37]  
Coffee Break . . . . Mon 3:40 pm to 4:00 pm

### POSTER AWARDS SESSION Room: Royal Palm One . . . 3:40 to 3:45 pm

**Poster Award Announcements**  
The Ultrasonic Imaging and Tomography conference poster award recipients will be recognized and certificates distributed.  
Coffee Break . . . . Mon 3:45 pm to 4:00 pm

### BEST STUDENT PAPER AWARD AND PLENARY PRESENTATION

Monday 29 February · 4:00 to 5:15 pm · Location: Town & Country  
Conference Chairs: **Steven C. Horii**, The Univ. of Pennsylvania Health System (USA)  
**Berkman Sahiner**, U.S. Food and Drug Administration (USA)

#### Student Paper Award Announcement

Plenary Presentation:



**The Evolution of Medical Imaging from Qualitative to Quantitative: Opportunities, Challenges, and Approaches**  
**Edward F. Jackson**,  
Univ. of Wisconsin-Madison School of Medicine and Public Health (USA)

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9783 continues on page 46 ➡

9785 continues on page 46 ➡

9786 continues on page 46 ➡

**CONFERENCE 9790 ENDS**



**CONFERENCE 9783**

Physics of Medical Imaging

Room: Town & Country

**SESSION 8**

Room: Town & Country ..... Tue 8:00 am to 9:40 am

**Detectors**

Session Chairs: **John A. Rowlands**,  
Thunder Bay Regional Research Institute (Canada);  
**Karim S. Karim**, Univ. of Waterloo (Canada)

8:00 am: **Improving detector spatial resolution using pixelated scintillators with a barrier rib structure**,  
Langechuan Liu, Minghui Lu, Wanqing Cao, Luke Peng,  
Arthur Chen, PerkinElmer, Inc. (USA) ..... [9783-39]

8:20 am: **Solid state flat panel imager with avalanche amorphous selenium**, James R. Scheuermann, Amir H. Goldan, Stony Brook Univ. (USA); Olivier Tousignant, Sébastien Léveillé, Analogic Canada Corp. (Canada); Wei Zhao, Stony Brook Univ. (USA) ..... [9783-40]

8:40 am: **The new generation of x-ray detectors: higher DQE and less aliasing with lower exposures**,  
Tomi Nano, Terenz R. Escartin, Robarts Research Institute (Canada); Karim S. Karim, Univ. of Waterloo (Canada); Ian A. Cunningham, Robarts Research Institute (Canada) ..... [9783-41]

9:00 am: **DQE simulation of a-Se x-ray detectors using ARTEMIS**, Yuan Fang, Aldo Badano, U.S. Food and Drug Administration (USA) ..... [9783-42]

9:20 am: **High-dynamic range CMOS-based mammography detector for FFDM and DBT**, Inge M. Peters, Chiel Smit, Teledyne DALSA (Netherlands); James J. Miller, Andrew A. Lomako, Teledyne DALSA (Canada) ..... [9783-43]

**POSTER AWARDS SESSION**

Room: Town & Country ..... 9:40 to 9:45 am

**Poster Award Announcements**

The Physics of Medical Imaging conference poster award recipients will be recognized and certificates distributed.

Coffee Break ..... Tue 9:45 am to 10:10 am

9783 continues on page 47 ➡

**CONFERENCE 9784**

Image Processing

Room: San Diego

**SESSION 1**

Room: San Diego ..... Tue 8:00 am to 9:40 am

**Quantitative Image Analysis**

Session Chairs: **Marius G. Linguraru**,  
Children's National Medical Ctr. (USA)

8:00 am: **Multi-voxel algorithm for quantitative bi-exponential MRI T1 estimation**, Piet Bladt, Gwendolyn Van Steenkiste, Gabriel Ramos-Llordén, Arjan den Dekker, Jan Sijbers, Univ. Antwerpen (Belgium). [9784-1]

8:20 am: **Automatic coronary lumen segmentation with partial volume modeling improves hemodynamic significance assessment**, Moti Freiman, Yechiel Lamash, Philips Medical Systems Technologies Ltd. (Israel); Guy Gilboa, Technion-Israel Institute of Technology (Israel); Hannes Nickisch, Sven Prevhal, Holger Schmitt, Philips Research (Germany); Mani Vembar, Philips Healthcare (USA); Liran Goshen, Philips Medical Systems Technologies Ltd (Israel) ..... [9784-2]

8:40 am: **Contour tracking and probabilistic segmentation of tissue phase mapping MRI**, Teodora Chitiboi, Fraunhofer MEVIS (Germany) and Jacobs Univ. Bremen (Germany); Anja B. Hennemuth, Fraunhofer MEVIS (Germany); Susanne Schnell, Varun Chowdhary, Amir Honarmand, Michael Markl, Northwestern Univ. (USA); Lars Linsen, Jacobs Univ. Bremen gGmbH (Germany); Horst K. Hahn, Fraunhofer MEVIS (Germany) and Jacobs Univ. Bremen (Germany) ..... [9784-3]

9:00 am: **Automatic detection of cardiovascular risk in CT attenuation correction maps in Rb-82 PET/CTs**, Ivana Isgum, Bob D. de Vos, Jelmer M. Wolterink, Univ. Medical Ctr. Utrecht (Netherlands); Damini Dey, Daniel S. Berman, Mathieu Rubeaux, Cedars-Sinai Medical Ctr. (USA); Tim Leiner, Univ. Medical Ctr. Utrecht (Netherlands); Piotr J. Slomka, Cedars-Sinai Medical Ctr. (USA) ..... [9784-4]

9:20 am: **Combining the boundary shift integral and tensor-based morphometry for brain atrophy estimation**, Mateusz Michalkiewicz, Akshay Pai, Datalogisk Institut (Denmark); Kelvin Leung, Univ. College London (UK); Stefan Sommer, Sune Darkner, Lauge Sørensen, Jon Sporning, Datalogisk Institut (Denmark); Mads Nielsen, Datalogisk Institut (Denmark) and Biomediq (Denmark) ..... [9784-5]

Coffee Break ..... Tue 9:40 am to 10:10 am

9784 continues on page 47 ➡

**CONFERENCE 9785**

Computer-Aided Diagnosis

Room: Golden West

**SESSION 8**

Room: Golden West ..... Tue 8:00 am to 9:40 am

**Lung and Chest II**

Session Chairs: **Bram van Ginneken**,  
Radboud Univ. Medical Ctr. (Netherlands);  
**Rafael Wiemker**, Philips Research (Germany)

8:00 am: **Pulmonary nodule detection using a cascaded SVM classifier**, Martin Bergholdt, Philips Technologie GmbH (Germany); Rafael Wiemker, Tobias Klinder, Philips GmbH Innovative Technologies (Germany) ..... [9785-38]

8:20 am: **Spatial context learning approach to automatic segmentation of pleural effusion in chest computed tomography images**, Awais Mansoor, Children's National Medical Ctr. (USA); Rafael Casas Jr., National Institute of Health (USA); Marius G. Linguraru, Children's National Medical Ctr. (USA) ..... [9785-39]

8:40 am: **Lymph node detection in IASLC-defined zones on PET/CT images**, Yihua Song, Jayaram K. Udupa, Dewey Odhner, Drew A. Torigian, Univ. of Pennsylvania (USA) ..... [9785-40]

9:00 am: **Intrapulmonary vascular remodeling: MSCT-based evaluation in COPD and alpha-1 antitrypsin deficient subjects**, Adeline Crosnier, Catalin Fetita, Télécom SudParis (France); Pierre-Yves Brillet, Univ. Paris 13 (France) ..... [9785-41]

9:20 am: **Automatic heart localization and radiographic index computation in chest x-rays**, Sema Candemir, Stefan R. Jaeger, National Library of Medicine (USA); Wilson Lin, Univ. of Maryland, College Park (USA); Zhiyun Xue, Sameer K. Antani, George R. Thoma, National Library of Medicine (USA) . . . [9785-42]

**POSTER AWARDS SESSION**

Room: Golden West ..... Tue 9:40 am to 9:45 am

The Computer-Aided Diagnosis conference poster award recipients will be recognized and certificates distributed.

Coffee Break ..... Tue 9:45 am to 10:10 am

9785 continues on page 47 ➡

**CONFERENCE 9786**

Image-Guided Procedures,  
Robotic Interventions, and Modeling

Room: California

**SESSION 8**

Room: California ..... Tue 8:00 am to 9:40 am

**Intraoperative Imaging and Visualization**

Session Chairs: **George J. Grevera**, Saint Joseph's Univ. (USA); **Amber L. Simpson**, Memorial Sloan-Kettering Cancer Ctr. (USA)

8:00 am: **Biplane reconstruction and visualization of virtual endoscopic and fluoroscopic views for interventional device navigation**, Martin G. Wagner, Charles M. Strother, Univ. of Wisconsin-Madison (USA); Sebastian Schafer, Siemens Medical Solutions USA, Inc. (USA); Charles A. Mistretta, Univ. of Wisconsin-Madison (USA) ..... [9786-38]

8:20 am: **Visual feedback mounted on surgical tool: proof of concept**, Kaci Carter, Evelyn Morin, Gabor Fichtinger, Thomas Vaughan, Matthew Holden, Gabrielle Gauvin, Padina Pezeshki, Andras Lasso, Tamas Ungi M.D., John Rudan M.D., Jay Engel, Queen's Univ. (Canada) ..... [9786-39]

8:40 am: **CT thermometry for cone-beam CT guided ablation**, Zachary DeStefano, Univ. of California, Irvine (USA); Nadine Abi-Jaoudeh, Ming Li, Bradford J. Wood, Ronald M. Summers, Jianhua Yao, National Institutes of Health (USA) ..... [9786-40]

9:00 am: **A computational model for estimating tumor margins in complementary tactile and 3D ultrasound images**, Arefin M. Shamsil, Canadian Surgical Technologies and Advanced Robotics (Canada) and Western Univ. (Canada); Abelardo M. Escoto, Canadian Surgical Technologies and Advanced Robotics (Canada); Michael D. Naish, Canadian Surgical Technologies and Advanced Robotics (Canada) and Western Univ. (Canada); Rajni V. Patel, Canadian Surgical Technologies and Advanced Robotics (Canada) ..... [9786-41]

9:20 am: **Freehand 3D-US reconstruction with robust visual tracking with application to ultrasound-augmented laparoscopy**, Uditha L. Jayarathne, Terry M. Peters, Elvis C. S. Chen, John T. Moore, Robarts Research Institute (Canada) ..... [9786-42]

**POSTER AWARDS SESSION**

Room: California ..... Tue 9:40 am to 9:45 am

The Image-Guided Procedures, Robotic Interventions, and Modeling conference paper and poster award recipients will be recognized and certificates distributed.

Coffee Break ..... Tue 9:45 am to 10:10 am

9786 continues on page 47 ➡

**CONFERENCE 9783**

Physics of Medical Imaging

Room: Town & Country

**SESSION 9**

Room: Town & Country ..... Tue 10:10 am to 12:10 pm

**CT II: Image Reconstruction, Artifact Reduction**

Session Chairs: **Joseph W. Stayman**, Johns Hopkins Univ. (USA); **Michael Grass**, Philips Research (Germany)

10:10 am: **An open library of CT patient projection data**, Baiyu Chen, Shuai Leng, Lifeng Yu, David R. Holmes III, Joel G. Fletcher, Cynthia H. McCollough, Mayo Clinic (USA) ..... [9783-44]

10:30 am: **A generalized Fourier penalty in prior-image-based reconstruction for cross-platform imaging**, Amir Pourmorteza, National Institutes of Health Clinical Ctr. (USA) and Johns Hopkins Univ. School of Medicine (USA); Jeffrey H. Siewerdsen, Joseph W. Stayman, Johns Hopkins Univ. School of Medicine (USA) ..... [9783-45]

10:50 am: **Limits to dose reduction from iterative reconstruction and the effect of through-slice blurring**, Scott S. Hsieh, Norbert J. Pelc, Stanford Univ. (USA) ..... [9783-46]

11:10 am: **Compensation (MC) of skull motion and breathing motion in CT using data-based and image-based metrics, respectively**, Herbert K. Bruder, Christopher Rohkohl, Karl Stierstorfer, Thomas G. Flohr, Siemens AG (Germany) ..... [9783-47]

11:30 am: **Reduction of truncation artifacts in CT images via a discriminative dictionary representation method**, Yang Chen, Univ. of Wisconsin-Madison (USA) and Southeast Univ. (China); Ke Li, Yinsheng Li, Univ. of Wisconsin-Madison (USA); Jiang Hsieh, GE Healthcare (USA); Guang-Hong Chen, Univ. of Wisconsin-Madison (USA) ..... [9783-48]

11:50 am: **Reduction of motion artifacts in cardiac CT based on partial angle reconstructions from short scan data**, Juliane Hahn, Deutsches Krebsforschungszentrum (Germany); Herbert K. Bruder, Thomas Allmendinger, Karl Stierstorfer, Thomas Flohr, Siemens Healthcare GmbH (Germany); Marc Kachelrieß, Deutsches Krebsforschungszentrum (Germany) ..... [9783-49]

Lunch Break ..... Tue 12:10 pm to 1:20 pm

9783 continues on page 48

**CONFERENCE 9784**

Image Processing

Room: San Diego

**SESSION 2**

Room: San Diego ..... Tue 10:10 am to 12:10 pm

**Keynote and Diffusion MRI**

Session Chair: **Bennett A. Landman**, Vanderbilt Univ. (USA)

10:10 am: **Image processing pipelines: Applications in magnetic resonance histology (Keynote Presentation)**, G. Allan Johnson, Robert Anderson, Evan Calabrese, James Cook, Christopher Long, Alexandra Badea, Ctr. for In Vivo Microscopy (USA) ..... [9784-6]

11:10 am: **Auto tract: automatic cleaning and tracking of fibers**, Juan Prieto, Francois Budin, Jean Y. Yang, Martin A. Styner, The Univ. of North Carolina at Chapel Hill (USA) ..... [9784-7]

11:30 am: **Supervised hub-detection for brain connectivity**, Niklas Kasenburg, Univ. of Copenhagen (Denmark); Matthew G. Liptrot, Univ. of Copenhagen (Denmark) and Technical Univ. of Denmark (Denmark); Nina L. Reislev, Ellen Garde, Copenhagen Univ. Hospital Hvidovre (Denmark); Mads Nielsen, Aasa Feragen, Univ. of Copenhagen (Denmark) ..... [9784-8]

11:50 am: **Coresets versus clustering: comparison of methods for redundancy reduction in very large white matter fiber sets**, Guy Alexandroni, Galí Zimmerman Moreno, Nir Sochen, Hayit Greenspan, Tel Aviv Univ. (Israel) ..... [9784-9]

Lunch Break ..... Tue 12:10 pm to 1:20 pm

9784 continues on page 48

**CONFERENCE 9785**

Computer-Aided Diagnosis

Room: Golden West

**SESSION 9**

Room: Golden West ..... Tue 10:10 am to 12:10 pm

**Head and Neck**

Session Chairs: **Khan M. Iftekharuddin**, Old Dominion Univ. (USA); **Fabrice Meriaudeau**, Univ. de Bourgogne (France)

10:10 am: **Comprehensive eye evaluation algorithm**, Carla P. Agurto Rios, Sheila C. Nemeth, Gilberto Zamora, Maria Vahtel, Peter Soliz, Simon Barriga, VisionQuest Biomedical LLC (USA) ..... [9785-43]

10:30 am: **Vessel discoloration detection in malaria retinopathy**, Carla P. Agurto Rios, Sheila C. Nemeth, Simon Barriga, Peter Soliz, VisionQuest Biomedical LLC (USA); Ian MacCormick, Univ. of Liverpool (UK); Terrie Taylor, Michigan State Univ. (USA); Simon P. Harding, Univ. of Liverpool (UK); Susan Lewallen, Kilimanjaro Ctr. for Community of Ophthalmology (South Africa); Vinayak Joshi, VisionQuest Biomedical LLC (USA) ... [9785-44]

10:50 am: **Computer-aided detection of human cone photoreceptor inner segments using multi-scale circular voting**, Jianfei Liu, National Institutes of Health (USA); Alfredo Dubra, Medical College of Wisconsin (USA); Johnny Tam, National Institutes of Health (USA) ..... [9785-45]

11:10 am: **Sweet-spot training for early esophageal cancer detection**, Fons van der Sommen, Svitlana Zinger, Technische Univ. Eindhoven (Netherlands); Erik J. Schoon M.D., Catharina-ziekenhuis (Netherlands); Peter H. N. de With, Technische Univ. Eindhoven (Netherlands) ..... [9785-46]

11:30 am: **A single-layer network unsupervised feature learning method for white matter hyperintensity segmentation**, Koen P. T. Vijverberg, Radboud Univ. Nijmegen (Netherlands) and Radboud Univ. Medical Ctr (Netherlands); Mohsen Ghafoorian, Radboud Univ. Nijmegen (Netherlands) and Radboud Univ. Medical Ctr. (Netherlands); Tom Heskens, Radboud Univ. Nijmegen (Netherlands); Bram Platel, Inge van Uden, Frank-Erik de Leeuw, Radboud Univ. Medical Ctr. (Netherlands) ..... [9785-47]

11:50 am: **Early esophageal cancer detection using RF classifiers**, Mark H. A. Janse, Fons van der Sommen, Svitlana Zinger, Technische Univ. Eindhoven (Netherlands); Erik J. Schoon M.D., Catharina-ziekenhuis (Netherlands); Peter H. N. de With, Technische Univ. Eindhoven (Netherlands) ..... [9785-48]

Lunch Break ..... Tue 12:10 pm to 1:20 pm

9785 continues on page 48

**CONFERENCE 9786**

Image-Guided Procedures, Robotic Interventions, and Modeling

Room: California

**SESSION 9**

**Endoscopy/Laparoscopy**

Session Chairs: **Eric J. Seibel**, Univ. of Washington (USA); **William E. Higgins**, The Pennsylvania State Univ. (USA)

10:10 am: **Superpixel-based structure classification for laparoscopic surgery**, Sebastian Bodenstedt, Jochen Görtler, Karlsruher Institut für Technologie (Germany); Martin G. Wagner, Hannes Kenngott, UniversitätsKlinikum Heidelberg (Germany); Beat Müller-Stich, Heidelberg School of Medicine (Germany); Rüdiger Dillmann, Stefanie Speidel, Karlsruher Institut für Technologie (Germany) ..... [9786-43]

10:30 am: **Tissue classification for laparoscopic image understanding based on multispectral texture analysis**, Yan Zhang, Sebastian J. Wirkert, Justin Iszatt, Deutsches Krebsforschungszentrum (Germany); Hannes Kenngott, Martin G. Wagner, Benjamin Mayer, UniversitätsKlinikum Heidelberg (Germany); Christian Stock, Ruprecht-Karls-Univ. Heidelberg (Germany); Neil T. Clancy, Daniel S. Elson, Imperial College London (UK); Lena Maier-Hein, Deutsches Krebsforschungszentrum (Germany) ..... [9786-44]

10:50 am: **Endoscopic feature tracking for augmented-reality assisted prosthesis selection in mitral valve repair**, Sandy Engelhardt, Silvio Kolb, Deutsches Krebsforschungszentrum (Germany); Raffaele De Simone, UniversitätsKlinikum Heidelberg (Germany); Matthias Karck, Ruprecht-Karls-Univ. Heidelberg (Germany); Hans-Peter Meinzer, Deutsches Krebsforschungszentrum (Germany); Ivo Wolf, Deutsches Krebsforschungszentrum (Germany) and Hochschule Mannheim (Germany) ..... [9786-45]

11:10 am: **Method for endobronchial video parsing**, William E. Higgins, The Pennsylvania State Univ. (USA) ..... [9786-46]

11:30 am: **Uncalibrated stereo rectification and disparity range stabilization: A comparison of different feature detectors**, Xiongbiao Luo, A. Jonathan McLeod, Terry M. Peters, Robarts Research Institute (Canada) ..... [9786-47]

11:50 am: **Position-based adjustment of landmark-based correspondence finding in electromagnetic sensor-based colonoscope tracking method**, Masahiro Oda, Hiroaki Kondo, Nagoya Univ. (Japan); Takayuki Kitasaka, Aichi Institute of Technology (Japan); Kazuhiro Furukawa M.D., Ryoji Miyahara M.D., Nagoya Univ. Graduate School of Medicine (Japan); Yoshiki Hirooka M.D., Nagoya Univ. Hospital (Japan); Hidemi Goto M.D., Nagoya Univ. Graduate School of Medicine (Japan); Nassir Navab, Technische Univ. München (Germany); Kensaku Mori, Nagoya Univ. (Japan) [9786-48]

Lunch Break ..... Tue 12:10 pm to 1:20 pm

9786 continues on page 48



**CONFERENCE 9783**

Physics of Medical Imaging

Room: Town & Country

**SESSION 10**

Room: Town & Country . . . Tue 1:20 to 3:00 pm

**Photon Counting CT I: Instrumentation**

Session Chairs: **Mats Danielsson**, KTH Royal Institute of Technology (Sweden); **Stephen J. Glick**, Univ. of Massachusetts Medical School (USA)

1:20 pm: **Estimation of signal and noise for a whole-body research photon counting CT system**, Zhoubo Li, Shuai Leng, Zhicong Yu, Mayo Clinic (USA); Steffen G. Kappler, Siemens AG (Germany); Cynthia H. McCollough, Mayo Clinic (USA) . . . . . [9783-50]

1:40 pm: **Material decomposition and virtual non-contrast imaging in photon counting computed tomography: an animal study**, Ralf Gutjahr, Technische Univ. München (Germany) and Siemens Healthcare (Germany); Christoph Polster, Institut für Klinische Radiologie, Ludwig-Maximilians-Univ. Hospital München (Germany) and Siemens Healthcare (Germany); Steffen G. Kappler, Siemens Healthcare (Germany); Hubertus Pietsch, Gregor Jost, Bayer Schering Pharma AG (Germany); Katharina Hahn, Friederike Schöck, Martin Sedlmair, Thomas Allmendinger, Bernhard Schmidt, Bernhard Krauss, Thomas G. Flohr, Siemens Healthcare (Germany) . . . . . [9783-51]

2:00 pm: **On the analogy between pulse-pile-up in energy-sensitive, photon-counting detectors, and level-crossing of shot noise**, Ewald Roessler, Matthias Bartels, Heiner Daerr, Roland M. Proksa, Philips Research (Germany) . . . . . [9783-52]

2:20 pm: **Lossless compression of projection data from photon counting detectors**, Picha Shunhavanich, Norbert J. Pelc, Stanford Univ. (USA) . . . . . [9783-53]

2:40 pm: **A high-resolution imaging technique using a whole-body research photon counting detector CT system**, Shuai Leng, Zhicong Yu, Mayo Clinic (USA); Ahmed Halaweish, Siemens Healthcare (USA); Steffen G. Kappler, Katharina Hahn, Andre Henning, Siemens Healthcare (Germany); Zhoubo Li, John I. Lane, David L. Levin, Steven M. Jorgensen, Erik L. Ritman, Cynthia H. McCollough, Mayo Clinic (USA) . . . . . [9783-54]

Coffee Break . . . . . Tue 3:00 pm to 3:30 pm

9783 continues on page 49 ➡

**CONFERENCE 9784**

Image Processing

Room: San Diego

**SESSION 3**

Room: San Diego . . . Tue 1:20 pm to 3:00 pm

**Computational Anatomy**

Session Chairs: **Mads Nielsen**, Niels Bohr Institute (Denmark); **Benoit M. Dawant**, Vanderbilt Univ. (USA)

1:20 pm: **Enhanced cortical thickness measurements for rodent brains via Lagrangian-based RK4 streamline computation**, Joohwi Lee, Sun Hyung Kim, Ilwoo Lyu, The Univ. of North Carolina at Chapel Hill (USA); Ipek Oguz, The Univ. of Iowa (USA); Martin A. Styner, The Univ. of Iowa (USA) and The Univ. of North Carolina at Chapel Hill (USA) . . . . . [9784-10]

1:40 pm: **Anatomy-aware measurement of segmentation accuracy**, Hamid R. Tizhoosh, Univ. of Waterloo (Canada); Ahmed A. Othman, Suez Canal Univ. (Egypt) . . . . . [9784-11]

2:00 pm: **Automatic segmentation and statistical shape modeling of the paranasal sinuses to estimate natural variations**, Ayushi Sinha, Simon Leonard, Austin Reiter, Johns Hopkins Univ. (USA); Masaru Ishii M.D., Johns Hopkins Bayview Medical Ctr. (USA); Russell H. Taylor, Gregory D. Hager, Johns Hopkins Univ. (USA) . . . . . [9784-12]

2:20 pm: **Combining multi-atlas segmentation with brain surface estimation**, Yuankai Huo, Vanderbilt Univ. (USA); Aaron Carass, Johns Hopkins Univ. (USA); Susan M. Resnick, National Institute on Aging (USA); Dzong L. Pham, Henry M. Jackson Foundation (USA); Jerry L. Prince, Johns Hopkins Univ. (USA); Bennett A. Landman, Vanderbilt Univ. (USA) . [9784-13]

2:40 pm: **Automated segmentation of upper digestive tract from abdominal contrast-enhanced CT data using hierarchical statistical modeling of organ inter-relations**, Shunta Hirayama, Yoshito Otake, Nara Institute of Science and Technology (Japan); Toshiyuki Okada, Univ. of Tsukuba (Japan); Masatoshi Hori M.D., Noriyuki Tomiyama M.D., Osaka Univ. (Japan); Yoshinobu Sato, Nara Institute of Science and Technology (Japan) . . . . . [9784-14]

Coffee Break . . . . . Tue 3:00 pm to 3:30 pm

9784 continues on page 49 ➡

**CONFERENCE 9785**

Computer-Aided Diagnosis

Room: Golden West

**SESSION 10**

Room: Golden West . . Tue 1:20 pm to 3:00 pm

**Radiomics II**

Session Chairs: **Nico Karssemeijer**, Radboud Univ. Medical Ctr. (Netherlands); **Heang-Ping Chan**, Univ. of Michigan Health System (USA)

1:20 pm: **Applying a radiomics approach to predict prognosis of lung cancer patients**, Nastaran Emaminejad, Shiju Yan, The Univ. of Oklahoma (USA); Wei Qian, The Univ. of Texas at El Paso (USA); Yubao Guan, Guangzhou Medical College (China); Bin Zheng, The Univ. of Oklahoma (USA) . . . . . [9785-49]

1:40 pm: **Radiomics versus physician assessment for the early prediction of local cancer recurrence after stereotactic radiotherapy for lung cancer**, Sarah A. Mattonen, Western Univ. (Canada) and London Regional Cancer Program (Canada); Carol Johnson, London Regional Cancer Program (Canada); David A. Palma, Western Univ. (Canada) and London Regional Cancer Program (Canada); George Rodrigues, Alexander V. Louie, Western Univ. (Canada); Suresh Senan, Vrije Univ. Medical Ctr. (Netherlands); Timothy P. C. Yeung, Aaron D. Ward, Western Univ. (Canada) and London Regional Cancer Program (Canada) . . . . . [9785-50]

2:00 pm: **Automatic staging of bladder cancer on CT urography**, Sankeerth S. Garapati, Lubomir M. Hadjiiski, Kenny H. Cha, Heang-Ping Chan, Elaine M. Caoili M.D., Richard H. Cohan M.D., Alon Weizer, Ajjai Alva, Chintana Paramagul, Jun Wei, Chuan Zhou, Univ. of Michigan (USA) . . . . . [9785-51]

2:20 pm: **Signal intensity analysis of ecological defined habitat in soft tissue sarcomas to predict metastasis development**, Hamidreza Farhidzadeh, Univ. of South Florida (USA); Jacob G Scott, H. Lee Moffitt Cancer Ctr. & Research Institute (USA); Dmitry B. Goldgof, Lawrence O. Hall, Univ. of South Florida (USA); Robert A. Gatenby, Robert J. Gillies, Meera Raghavan, H. Lee Moffitt Cancer Ctr. & Research Institute (USA) . . . . . [9785-52]

Coffee Break . . . . . Tue 3:00 pm to 3:30 pm

**CONFERENCE 9786**

Image-Guided Procedures, Robotic Interventions, and Modeling

Room: California

**SESSION 10**

Room: California . . . Tue 1:20 pm to 3:00 pm

**Keynote and New Robotic Applications**

Session Chairs: **Robert J. Webster III**, Vanderbilt Univ. (USA); **Ziv Yaniv**, National Library of Medicine (USA)

1:20 pm: **Robot-assisted tumor resection: Palpation, incision, debridement, and adhesive closure (Keynote Presentation)**, Kenneth Y. Goldberg, Univ. of California, Berkeley (USA); W. Douglas Boyd, Univ. of California, Davis (USA) . . . . . [9786-49]

2:20 pm: **Toward automated cochlear implant insertion using tubular manipulators**, Josephine Granna, Leibniz Univ. Hannover (Germany); Thomas S. Rau, Medizinische Hochschule Hannover (Germany); Thien-Dang Nguyen, Leibniz Univ. Hannover (Germany); Thomas Lenarz, Omid Majdani, Medizinische Hochschule Hannover (Germany); Jessica Burgner-Kahrs, Leibniz Univ. Hannover (Germany) . . . . . [9786-50]

2:40 pm: **Increasing safety of a robotic system for inner ear surgery using probabilistic error modeling near vital anatomy**, Neal Dillon, Michael A. Siebold, Jason E. Mitchell, J. Michael Fitzpatrick, Robert J. Webster III, Vanderbilt Univ. (USA) . . . . . [9786-51]

Coffee Break . . . . . Tue 3:00 pm to 3:30 pm

9786 continues on page 49 ➡

2:40 pm: **Classification of recurrence free survival nasopharyngeal carcinoma tumors**, Hamidreza Farhidzadeh, Univ. of South Florida (USA); Joo Y Kim, H. Lee Moffitt Cancer Ctr. & Research Institute (USA) and The Royal Australian and New Zealand College of Radiologists (New Zealand); Jacob G. Scott, H. Lee Moffitt Cancer Ctr. & Research Institute (USA); Dmitry B. Goldgof, Lawrence O. Hall, Univ. of South Florida (USA); Louis B. Harrison, H. Lee Moffitt Cancer Ctr. & Research Institute (USA) . . . . . [9785-53]

Coffee Break . . . . . Tue 3:00 pm to 3:30 pm

9785 continues on page 49 ➡

**CONFERENCE 9788**

Biomedical Applications in Molecular, Structural, and Functional Imaging

Room: Royal Palm One

**SESSION 1**

Room: Royal Palm One . . Tue 1:20 to 3:00 pm

**Novel Imaging Methods**

Session Chairs: **Andrzej Krol**, SUNY Upstate Medical Univ. (USA); **Robert C. Molthen**, Medical College of Wisconsin (USA)

1:20 pm: **Alzheimer's disease imaging biomarkers using small-angle x-ray scattering**, Mina Choi, Nadia Halam, Tajdar Warraich, Bahaa Ghammaroui, Aldo Badano, U.S. Food and Drug Administration (USA) . . . . . [9788-1]

1:40 pm: **Investigation of signal thresholding to reduce the effects of instrument noise of an EMCCD based micro-CT system**, Alexander R. Podgorsak, Sumukh Bysani Krishnakumar, Univ. at Buffalo (USA) and Toshiba Stroke and Vascular Research Ctr. (USA); Swetadri Vasan Setlur Nagesh, Daniel R. Bednarek, Toshiba Stroke and Vascular Research Ctr. (USA); Stephen Rudin, Toshiba Stroke and Vascular Research Ctr. (USA) and Univ. at Buffalo (USA); Ciprian N. Ionita, Univ. at Buffalo (USA) and Toshiba Stroke and Vascular Research Ctr. (USA) . . . . . [9788-2]

2:00 pm: **High-resolution dynamic speech imaging with joint low-rank and atlas-driven sparsity constraints**, Maojing Fu, Univ. of Illinois at Urbana-Champaign (USA); Jonghye Woo, Ctr. for Advanced Medical Imaging Sciences, Massachusetts General Hospital (USA); Zhi-Pei Liang, Bradley P. Sutton, Univ. of Illinois at Urbana-Champaign (USA) . . . . . [9788-3]

2:20 pm: **Design and evaluation of a grid reciprocity scheme for use in digital breast tomosynthesis**, Tushita Patel, Helen Sporkin, Heather Peppard, Mark B. Williams, Univ. of Virginia (USA) . . . [9788-4]

2:40 pm: **Performance modeling of a wearable Brain PET (BET) camera**, Charles R. Schmidlein, Memorial Sloan-Kettering Cancer Ctr. (USA); James N. Turner, Binghamton Univ. (USA); Michael O. Thompson, Cornell Univ. (USA); Krishna C. Mandal, Univ. of South Carolina (USA); Jiahan Zhang, Syracuse Univ. (USA); John L. Humm, Memorial Sloan-Kettering Cancer Ctr. (USA); David H. Feiglin, Andrzej Krol, SUNY Upstate Medical Univ. (USA) . . . . . [9788-5]

Coffee Break . . . . . Tue 3:00 pm to 3:30 pm

9788 continues on page 49 ➡



**CONFERENCE 9783**

Physics of Medical Imaging

Room: Town & Country

**CONFERENCE 9784**

Image Processing

Room: San Diego

**CONFERENCE 9785**

Computer-Aided Diagnosis

Room: Golden West

**CONFERENCE 9786**

Image-Guided Procedures, Robotic Interventions, and Modeling

Room: California

**CONFERENCE 9788**

Biomedical Applications in Molecular, Structural, and Functional Imaging

Room: Royal Palm One

**SESSION 11**

Room: Town & Country . . Tue 3:30 to 4:50 pm

**PET and MR**

Session Chairs: **Jinyi Qi**, Univ. of California, Davis (USA); **Christoph Hoeschen**, Helmholtz Zentrum München GmbH (Germany)

3:30 pm: **Short term reproducibility of a high contrast 3D isotropic optic nerve imaging sequence in healthy controls**, Robert L. Harrigan, Alex K. Smith, Seth A. Smith, Bennett A. Landman, Vanderbilt Univ. (USA) . . . . . [9783-55]

3:50 pm: **Crystal timing offset calibration method for time of flight PET scanners**, Jinghan Ye, Xiyun Song, Philips Healthcare (USA) . . . . . [9783-56]

4:10 pm: **Solving outside-axial-field-of-view scatter correction problem in PET via digital experimentation**, Andriy Andreyev, Yang-Ming Zhu, Jinghan Ye, Xiyun Song, Zhiqiang Hu, Philips Healthcare (USA) . . . . . [9783-57]

4:30 pm: **Initial experience in primal-dual optimization reconstruction from PET patient data**, Zheng Zhang, The Univ. of Chicago Medical Ctr. (USA); Jinghan Ye, Philips Healthcare (USA); Buxin Chen, The Univ. of Chicago Medical Ctr. (USA); Amy Perkins, Philips Healthcare (USA); Chien-Min Kao, Emil Y. Sidky, Xiaochuan Pan, The Univ. of Chicago Medical Ctr. (USA) . . . . . [9783-58]

**WORKSHOP**

**NIH Funding Opportunities: Navigating the System and Tips for Applicants**

Room: Town & Country  
Tue 5:00 pm to 7:00 pm

Workshop Chair:  
**Antonio Sastre**,

National Institute of Biomedical Imaging and Bioengineering (USA)

See *Special Events* for additional information.

9783 continues on page 56 ➡

**SESSION 4**

Room: San Diego . . . Tue 3:30 pm to 4:50 pm

**Segmentation: Brain**

Session Chairs: **Miguel Angel González Ballester**, Univ. Pompeu Fabra (Spain); **Ivana Isgum**, Univ. Medical Ctr. Utrecht (Netherlands)

3:30 pm: **Segmentation and labeling of the ventricular system in normal pressure hydrocephalus using patch-based tissue classification and multi-atlas labeling**, Lotta M. Ellingsen, Univ. of Iceland (Iceland) and Johns Hopkins Univ. (USA); Snehashis Roy, Henry M. Jackson Foundation (USA); Aaron Carass, Ari M. Blitz, Johns Hopkins Univ. (USA); Dzung L. Pham, Henry M. Jackson Foundation (USA); Jerry L. Prince, Johns Hopkins Univ. (USA) . . . . . [9784-15]

3:50 pm: **Generation and evaluation of an ultra-high-field atlas with applications in DBS planning**, Brian T. Wang, Western Univ. (Canada) and Robarts Research Institute (Canada); Stefan Poirier, Western Univ. (Canada) and Robarts Research Institute (Canada); Ting Guo, The Hospital for Sick Children (SickKids) (Canada); Terry M. Peters, Ali R. Khan, Western Univ. (Canada) and Robarts Research Institute (Canada) . . . . . [9784-16]

4:10 pm: **The bumps on the hippocampus**, Yi Gao, Stony Brook Univ. (USA); Lawrence Ver Hoef, The Univ. of Alabama at Birmingham (USA) . . . [9784-17]

4:30 pm: **Unsupervised fetal cortical surface parcellation**, Sonia Dahdouh, Catherine Limperopoulos, Children's National Medical Ctr. (USA) . . . . . [9784-18]

**WORKSHOP**

**Image Synthesis**

Room: San Diego · Tue 5:00 pm to 7:00 pm

Workshop Chair:

**Jerry L. Prince**, Johns Hopkins Univ., (USA)

**Sebastien Ourselin**, Univ. College London (United Kingdom)

See *Special Events* for additional information.

9784 continues on page 56 ➡

**SESSION 11**

Room: Golden West . Tue 3:30 to 4:50 pm

**SPIE-AAPM-NCI PANEL DISCUSSION: CAD Grand Challenges: Paving the Way for Imaging in the Era of Precision Medicine**

Moderator: **Samuel G. Armato III**, The Univ. of Chicago, (USA)

Panelists: **Maryellen Giger**, The Univ. of Chicago, (USA); **Ronald M. Summers**, National Institutes of Health, (USA); **Joel H. Saltz**, Stony Brook Univ.,(USA); **Fabrice Meriaudeau**, Univ. de Bourgogne, (France); **Hugo Aerts**, Dana-Farber Cancer Institute, (USA)

As part of the 2016 SPIE Medical Imaging Symposium, the CAD Conference will host a panel discussion to explore current imaging challenges that are worthy of becoming the subject of a future CAD Grand Challenge. The successful LUNGx Challenge that was held in conjunction with the 2015 SPIE Medical Imaging Symposium (Armato, et al., Journal of Medical Imaging, 2015) involved quantitative image analysis methods (radiomics) for the classification of malignant and benign lung nodules on thoracic CT scans – an important and clinically significant issue, but one that has been under investigation for decades. This panel discussion will encourage attendees to think about the next generation of radiologic tasks that should be advanced through the commitment of a Grand Challenge. The panel also will touch on the technical requirements necessary to develop an open-source informatics infrastructure for the support of grand challenges and the evaluation of clinical support systems.

**WORKSHOP**

**Live Demonstrations**

Room: Grand Exhibit Hall  
Tue 5:00 pm to 7:00 pm

Workshop Chairs:

**Dr. Heang-Ping Chan**, Univ. of Michigan Health System, (USA)

**Dr. Horst Hahn**, Fraunhofer MEVIS, (Germany)

See *Special Events* for additional information.

9785 continues on page 56 ➡

**SESSION 11**

Room: California . . . Tue 3:30 pm to 4:50 pm

**Prostate Procedures**

Session Chairs: **Purang Abolmaesumi**, The Univ. of British Columbia (Canada); **Frank Sauer**, Siemens Corp., Corporate Technology (USA)

3:30 pm: **A comparison of needle tip localization accuracy using 2D and 3D-guided ultrasound for high-dose-rate prostate brachytherapy treatment planning**, W. Thomas Hrinivich, Western Univ. (Canada); Douglas A. Hoover, Western Univ. (Canada) and London Regional Cancer Program (Canada); Kathleen Surry, Western Univ. (Canada); Chandima Edirisinghe, Jacques Montreuil, Robarts Research Institute (Canada); David D'Souza, Western Univ. (Canada) and London Regional Cancer Program (Canada); Aaron Fenster, Western Univ. (Canada) and Robarts Research Institute (Canada); Eugene Wong, Western Univ. (Canada) and London Regional Cancer Program (Canada) and Robarts Research Institute (Canada) . . . . . [9786-52]

3:50 pm: **An MRI guided system for prostate laser ablation with treatment planning and multi-planar temperature monitoring**, Sheng Xu, National Institutes of Health (USA); Harsh Agarwal, Philips Research (USA); Marcelino Bernardo, Baris Turkbey, National Institutes of Health (USA); Ari Partanen, Philips Healthcare (USA); Ayele Negussie, National Institutes of Health (USA); Neil Glossop, Traxtal Technologies (Canada); Peter Choyke, Peter Pinto, Bradford J. Wood, National Institutes of Health (USA) . . . . . [9786-53]

4:10 pm: **How does prostate biopsy guidance error impact pathologic cancer risk assessment?**, Peter R. Martin, Mena Gaed, José A. Gómez, Madeleine Moussa, Western Univ. (Canada); Eli Gibson, Univ. College London (UK) and Radboud Univ. Medical Ctr. (Netherlands); Derek W. Cool, Joseph L. Chin, Stephen Pautler, Aaron Fenster, Aaron D. Ward, Western Univ. (Canada) . . . . . [9786-54]

4:30 pm: **Impact of contouring variability on focal therapy coverage assessment**, Eli D. Gibson, Univ. College London (UK) and Radboud Univ. Medical Ctr. (Netherlands); Ian A. Donaldson, Taimur T. Shah, Univ. College London (UK); Yipeng Hu, Radboud Univ. Medical Ctr. (Netherlands); Hashim Ahmed, Dean Barratt, Univ. College London (UK)[9786-55]

**CONFERENCE 9786 ENDS**

**SESSION 2**

Room: Royal Palm One . . Tue 3:30 to 4:50 pm

**Innovations in Image Processing**

Session Chairs: **Armando Manduca**, Mayo Clinic (USA); **Robert C. Molthen**, Medical College of Wisconsin (USA)

3:30 pm: **3D choroid neovascularization growth prediction based on reaction-diffusion model**, Shuxia Zhu, Xinjian Chen, Dehui Xiang, Fei Shi, Soochow Univ. (China); Haoyu Chen, Shantou Univ. (China) . . . . . [9788-6]

3:50 pm: **Automatic classification of endoscopic images for premalignant conditions of the esophagus**, Davide Boschetto, IMT Institute for Advanced Studies Lucca (Italy) and Univ. degli Studi di Padova (Italy); Gloria Gambaretto, Enrico Grisan, Univ. degli Studi di Padova (Italy) . . . . . [9788-7]

4:10 pm: **Automatic classification for CLE of small bowel mucosa alterations in celiac disease**, Davide Boschetto, IMT Institute for Advanced Studies Lucca (Italy) and Univ. degli Studi di Padova (Italy); Gianluca Di Claudio, Univ. degli Studi di Padova (Italy); Hadis Mirzaei, Rupert W. L. Leong, The Univ. of New South Wales (Australia); Enrico Grisan, Univ. degli Studi di Padova (Italy) . . . . . [9788-8]

4:30 pm: **Non-rigid estimation of cell motion in calcium time-lapse images**, Siham Hachi, Edinson Lucumi Moreno, Luxembourg Ctr. for Systems Biomedicine (Luxembourg); An-Sofie Desmet, Pieter Vanden Bergh, KU Leuven (Belgium); Ronan M. T. Fleming, Luxembourg Ctr. for Systems Biomedicine (Luxembourg) . . . . . [9788-9]

9788 continues on page 56 ➡

**CONFERENCE 9787**

Image Perception, Observer Performance, and Technology Assessment

**WORKSHOP**

**Validation of Medical Image-Perception Models**

Room: California · Tue 5:00 to 7:00 pm

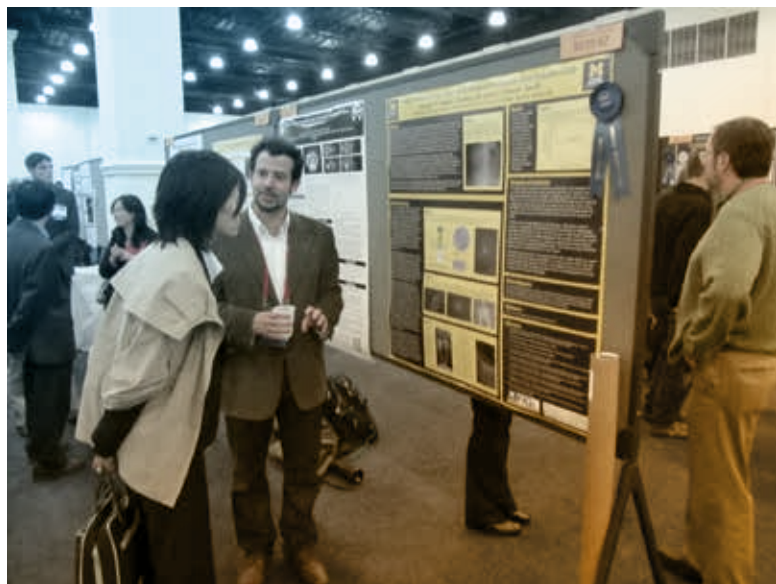
Workshop Chairs:

**Craig K. Abbey**, **Matthew A. Kupinski**, College of Optical Sciences, The Univ. of Arizona, (USA)

See *Special Events* for additional information.

## Participate in the Poster Sessions

Gain valuable feedback and one-on-one networking with colleagues.



### TUESDAY/WEDNESDAY POSTERS

Location: Grand Exhibit Hall

Posters will be on display Tuesday and Wednesday with extended viewing until 9:00 pm on Tuesday. The interactive poster session with authors in attendance will be Wednesday evening from 5:30 to 7:00 pm. Award winners will be identified with ribbons during the reception. Award announcement times are listed in the conference schedule.

#### POSTER AUTHORS:

- Display your poster early on Tuesday for extended viewing and consideration for a poster award.
- Poster boards will be available at morning coffee break on Tuesday.
- Posters not displayed at the beginning of the interactive poster session and reception will be considered a no show.
- Stand with your poster during the interactive poster session and reception from 5:30 to 7:00 pm on Wednesday.
- Authors should remove their poster after the interactive poster session on Wednesday.
- Posters remaining on the boards after the reception will be discarded.

## CONFERENCE 9784

### Image Processing

#### Classification and Machine Learning

**Mutual information criterion for feature selection with application to classification of breast microcalcifications.** Idit Diamant, Tel Aviv Univ. (Israel); Jacob Goldberger, Bar-Ilan Univ. (Israel); Hayit Greenspan, Tel Aviv Univ. (Israel) . . . . . [9784-63]

**Single trial classification for the categories of perceived emotional facial expressions: an event-related fMRI study.** Sutao Song, Univ. of Jinan (China); Yuxia Huang, Zhiying Long, Beijing Normal Univ. (China); Gongxiang Chen, Jinan Univ. (China) . . . . . [9784-64]

**Template-based automatic extraction of the joint space of foot bones from CT scan.** Eunbi Park, Taeho Kim, Jinah Park, KAIST (Korea, Republic of) . . . . . [9784-65]

**Tissue classification of large-scale multi-site MR data using fuzzy k-nearest neighbor method.** Ali Ghayoor, The Univ. of Iowa (USA); Jane S. Paulsen, Regina E. Y. Kim, The Univ. of Iowa Carver College of Medicine (USA); Hans J. Johnson, The Univ. of Iowa (USA) . . . . . [9784-66]

**Texture analysis for survival prediction of pancreatic ductal adenocarcinoma patients with neoadjuvant chemotherapy.** Jayasree Chakraborty, Liana Langdon-Embry, Joanna G. Escalon M.D., Peter J. Allen M.D., Maeve A. Lowery M.D., Eileen M. O'Reilly M.D., Richard K. Do M.D., Amber L. Simpson, Memorial Sloan-Kettering Cancer Ctr. (USA) . . . . . [9784-67]

**Learning-based landmarks detection for osteoporosis analysis.** Erkang Cheng, Broncus Medical, Inc. (USA); Ling Zhu, Shanghai Jiao Tong Univ. School of Medicine (China); Jie Yang, Temple Univ. (USA); Azhari Azhari, Suhardjo Sitam, Univ. Padjadjaran (Indonesia); Xin Liang, Dalian Medical Univ. (China); Haibin Ling, Temple Univ. (USA) . . . . . [9784-68]

**2D image classification for 3D anatomy localization: employing deep convolutional neural networks.** Bob D. De Vos, Jelmer M. Wolterink, Pim A. de Jong, Max A. Viergever, Ivana Išgum, Univ. Medical Ctr. Utrecht (Netherlands) . . . . . [9784-69]

**Neural network-based visual body weight estimation for drug dosage finding.** Christian Pfitzner, Stefan May, Technische Hochschule Nürnberg Georg Simon Ohm (Germany); Andreas Nüchter, Julius-Maximilians-Univ. Würzburg (Germany) . . . . . [9784-70]

**Localization of skeletal and aortic landmarks in trauma CT data based on the discriminative generalized Hough transform.** Cristian Lorenz, Eberhard Hansis, Philips Research (Germany); Jürgen Weese, Philips Technologie GmbH (Germany); Heike Carolus, Philips Research (Germany) . . . . . [9784-71]

**Supervised novelty detection in brain tissue classification, with an application to white matter hyperintensities.** Hugo J. Kuijff, Image Sciences Institute (Netherlands) and Univ. Medical Ctr. Utrecht (Netherlands); Pim Moeskops, Bob D. de Vos, Image Sciences Institute, Univ. Medical Ctr. Utrecht (Netherlands); Willem Bouvy, Jeroen de Bresser, Geert Jan Biessels, Max A. Viergever, Univ. Medical Ctr. Utrecht (Netherlands); Koen L. Vincken, Image Sciences Institute (Netherlands) . . . . . [9784-72]

**A bayesian framework for early risk prediction in traumatic brain injury.** Shikha Chaganti, Andrew J. Plassard, Vanderbilt Univ. (USA); Laura Wilson, Miya A. Smith, Mayur B. Patel, Vanderbilt Univ. Medical Ctr. (USA); Bennett A. Landman, Vanderbilt Univ. (USA) . . . . . [9784-73]

**HT-BONE: A graphical user interface for the identification of bone profiles in CT images via extended Hough transform.** Anna Maria Massone, Istituto dei Materiali per l'Elettronica ed il Magnetismo (Italy); Cristina Campi, Annalisa Perasso, Consiglio Nazionale delle Ricerche (Italy); Mauro C. Beltrametti, Univ. degli Studi di Genova (Italy); Gianmario Sambucetti, IRCCS San Martino-IST (Italy) and Univ. degli Studi di Genova (Italy); Michele Piana, Univ. degli Studi di Genova (Italy) and CNR-SPIN (Italy) . . . . . [9784-74]

**GBM heterogeneity characterization by radiomic analysis of phenotype anatomical planes.** Ahmad Chaddad, Christian Desrosiers, Matthew Toews, École de Technologie Supérieure (Canada) . . . . . [9784-75]

**A framework for classification and segmentation of branch retinal artery occlusion in SD-OCT.** Jingyun Guo, Fei Shi, Weifang Zhu, Soochow Univ. (China); Haoyu Chen, Shantou Univ. (China); Xinjian Chen, Soochow Univ. (China) . . . . . [9784-76]

**Segmentation techniques evaluation based on a single compact breast mass classification scheme.** Bruno R. Matheus, Karem D. Marcomini, Homero Schiabel, Univ. de São Paulo (Brazil) . . . . . [9784-77]

**Capturing population based patient-specific characters for prostate segmentation on 3D CT images.** Baowei Fei, Emory Univ. (USA); Ling Ma, Emory Univ. (USA) and Beijing Institute of Technology (China); Rongrong Guo, Zhiqiang Tian, Emory Univ. (USA); Rajesh Venkataraman, Saradwata Sarkar, Eigen Inc. (USA); Xiabi Liu, Beijing Institute of Technology (China); Funmilayo Tade, David M. Schuster, Emory Univ. (USA) . . . . . [9784-78]

**Patch Forest: when random forest meets patch-based segmentation.** Zhongliu Xie, Duncan F. Gillies, Imperial College London (UK) . . . . . [9784-79]

**Automated detection of retinal landmarks for the identification of clinically relevant regions in fundus photography.** Giovanni Ometto, Aarhus Univ. Hospital (Denmark); Francesco Calivà, Univ. of Lincoln (UK); Toke Bek, Aarhus Univ. Hospital (Denmark); Andrew Hunter, Univ. of Lincoln (UK) . . . . . [9784-80]

**Automatic basal slice detection for cardiac analysis.** Mahsa Paknezhad, National Univ. of Singapore (Singapore); Stephanie Marchesseau, A\*STAR-NUS Clinical Imaging Research Ctr. (Singapore); Michael S. Brown, National Univ. of Singapore (Singapore) . . . . . [9784-81]

#### Segmentation

**Guidewire path tracking and segmentation in 2D fluoroscopic time series using device paths from previous frames.** Martin G. Wagner, Charles M. Strother, Charles A. Mistretta, Univ. of Wisconsin-Madison (USA) . . . . . [9784-82]

**Diseased pancreas segmentation.** Konstantin Dmitriev, Ievgeniia Gutenko, Saad Nadeem, Arie Kaufman, Stony Brook Univ. (USA) . . . . . [9784-83]

**Fast global interactive volume segmentation with regional supervoxel descriptors.** Imanol Luengo, The Univ. of Nottingham (UK); Mark Basham, Diamond Light Source Ltd. (UK); Andrew P. French, The Univ. of Nottingham (UK) . . . . . [9784-84]

**Unsupervised 3D renal segmentation based on image partitioning.** Varduhi Yeghiazaryan, Irina Voiculescu, Univ. of Oxford (UK) . . . . . [9784-85]

**3D Transrectal Ultrasound (TRUS) prostate segmentation based on optimal feature learning framework.** Xiaofeng Yang, Peter J. Rossi, Ashesh B. Jani, Hui Mao, Tomi Ogunleye, Walter J. Curran, Tian Liu, Emory Univ. (USA) . . . . . [9784-86]

**Accurate airway segmentation based on intensity structure analysis and graph-cut.** Qier Meng, Takayuki Kitsaka, Yukitaka Nimura, Masahiro Oda, Kensaku Mori, Nagoya Univ. (Japan) . . . . . [9784-87]

## POSTERS – TUESDAY/WEDNESDAY

**Random-forest-classification of large volume structures for visuo-haptic rendering in CT images**, Andre Mastmeyer, Dirk Fortmeier, Heinz Handels, Univ. zu Lübeck (Germany) . . . . . [9784-88]

**Active appearance model and deep learning for more accurate prostate segmentation on MRI**, Ruida Cheng, Holger R. Roth, Le Lu, Shijun Wang, Baris Turkbey, William Gandler, Evan S. McCreedy, Harsh Agarwal, Peter Choyke, Ronald M. Summers, Matthew McAuliffe, National Institutes of Health (USA) . . . . . [9784-89]

**Automated segmentation of MS lesions in FLAIR, DIR and T2-w MR images via an information theoretic approach**, Sunanda D. Mitra, Jason E. Hill, Kevin Matlock, Ranadip Pal, Brian Nutter, Texas Tech Univ. (USA) . . . . . [9784-90]

**Lung vessel segmentation in CT images using graph cuts**, Zhiwei Zhai, Marius Staring, Berend C. Stoel, Leiden Univ. Medical Ctr. (Netherlands) . . . . . [9784-91]

**Enhancing a diffusion algorithm for 4D image segmentation using local information**, Philipp Lösel, Vincent Heuveline, Ruprecht-Karls-Univ. Heidelberg (Germany) . . . . . [9784-92]

**Precise renal artery segmentation for estimation of renal vascular dominant regions**, Chenglong Wang, Mitsuru Kagaio, Nagoya Univ. Graduate School of Information Science (Japan); Yoshihiko Nakamura, Tomakomai National College of Technology (Japan); Masahiro Oda, Nagoya Univ. Graduate School of Information Science (Japan); Yasushi Yoshino, Tokunori Yamamoto, Nagoya Univ. Graduate School of Medicine (Japan); Kensaku Mori, Nagoya Univ. Information and Communications HQ (Japan) . . . . . [9784-93]

**An SPM12 extension for multiple sclerosis lesion segmentation**, Eloy Roura, Arnau Oliver, Univ. de Girona (Spain); Mariano Cabezas, Univ. de Girona (Spain) and Hospital Univ. Vall d'Hebron (Spain); Sergi Valverde, Univ. de Girona (Spain); Deborah Pareto, Hospital Univ. Vall d'Hebron (Spain); Joan C. Vilanova, Clínica Girona (Spain); Lluís Ramió-Torrentà, Hospital Univ. de Girona (Spain); Àlex Rovira, Hospital Univ. Vall d'Hebron (Spain); Xavier Lladó, Univ. de Girona (Spain) . . . . . [9784-94]

**A neural network approach to lung nodule segmentation**, Yaouxu Hu, SYSU-CMU Joint Institute of Engineering (China); Prahlad G. Menon, Duquesne Univ. (USA) . . . . . [9784-95]

**Loosely coupled level sets for retinal layers and drusen segmentation in subjects with dry age-related macular degeneration**, Jelena Novosel, Rotterdam Ophthalmic Institute (Netherlands) and Technische Univ. Delft (Netherlands); Ziyuan Wang, Technische Univ. Delft (Netherlands); Henk de Jong, Koenraad A. Vermeer, Rotterdam Ophthalmic Institute (Netherlands); Lucas J. van Vliet, Technische Univ. Delft (Netherlands) . . . . . [9784-96]

**Self-correcting multi-atlas segmentation**, Yi Gao, Stony Brook Univ. (USA); Andrew Wilford, McGill Univ. (Canada); Liang Guo, The Ohio State Univ. (USA) . . . . . [9784-97]

**Improving cerebellar segmentation with statistical fusion**, Andrew J. Plassard, Vanderbilt Univ. (USA); Zhen Yang, Johns Hopkins Univ. (USA); Swati Rane, Univ. of Washington (USA); Jerry L. Prince, Johns Hopkins Univ. (USA); Daniel O. Claassen, Bennett A. Landman, Vanderbilt Univ. (USA) . . . . . [9784-98]

**Automatic brain tumor segmentation with a fast Mumford-Shah algorithm**, Sabine Müller, Joachim Weickert, Univ. des Saarlandes (Germany); Norbert Graf, Universitätsklinikum des Saarlandes (Germany) . . . . . [9784-99]

**Cellular image segmentation using n-agent cooperative game theory**, Ian Dimock, Justin W. L. Wan, Univ. of Waterloo (Canada) . . . . . [9784-100]

**Cochlea segmentation using iterated random walks with shape prior**, Esmeralda Ruiz Pujadas, Univ. Pompeu Fabra (Spain); Hans M. Kjer, Technical Univ. of Denmark (Denmark); Sergio Vera, Alma IT Systems (Spain); Mario Ceresa, Univ. Pompeu Fabra (Spain); Miguel Angel González Ballester, Univ. Pompeu Fabra (Spain) and Institutació Catalana de Recerca i Estudis Avançats (Spain) . . . . . [9784-101]

**A novel 3D graph cut based co-segmentation of lung tumor on PET-CT images with gaussian mixture models**, Kai Yu, Dehui Xiang, Soochow Univ. (China); Bin Zhang, The First Affiliated Hospital of Soochow Univ. (China); Xinjian Chen, Soochow Univ. (China) . . . [9784-102]

**Automatic co-segmentation of lung tumor based on random forest in PET-CT images**, Xueqing Jiang, Dehui Xiang, Soochow Univ. (China); Bin Zhang, The First Affiliated Hospital of Soochow Univ. (China); Xinjian Chen, Soochow Univ. (China) . . . . . [9784-103]

**Segmentation of multiple organs based on computational anatomy models**, Chunhua Dong, Ritsumeikan Univ. (Japan) . . . . . [9784-104]

**Joint detection and segmentation of vertebral bodies in CT images by sparse representation error minimization**, Robert Korez, Boštjan Likar, Franjo Pernuš, Tomaž Vrtovec, Univ. of Ljubljana (Slovenia) . . . . . [9784-105]

### Shape and Model-based Image Analysis

**A method for mapping tissue volume model onto target volume using volumetric self-organizing deformable model**, Shoko Miyachi, Ken'ichi Morooka, Tokuo Tsuji, Kyushu Univ. (Japan); Yasushi Miyagi, Kaizuka Hospital (Japan); Takaichi Fukuda, Kumamoto Univ. (Japan); Ryo Kurazume, Kyushu Univ. (Japan) [9784-106]

**Shape-based multifeature brain parcellation from Stony Brook University**, Saad Nadeem, Arie Kaufman, Stony Brook Univ. (USA) . . . . . [9784-107]

**A multi-GPU optical flow algorithm for real-time cloud-based 3D deformable image registration**, Anand Santhanam, John Neylon, Yugang Min, Katelyn Hasse, Univ. of California, Los Angeles (USA) . . . . . [9784-108]

**Estimation of aortic valve leaflets from 3D CT images using local shape dictionaries and linear coding**, Liang Liang, Yale Univ. (USA); Caitlin Martin, Qian Wang, Wei Sun, Georgia Institute of Technology (USA); James S. Duncan, Yale Univ. (USA) . . . . . [9784-109]

**Multi-level approach for statistical appearance models with probabilistic correspondences**, Julia Krüger, Jan Ehrhardt, Heinz Handels, Univ. zu Lübeck (Germany) . . . . . [9784-110]

**Shape complexes in continuous max-flow segmentation**, John S. H. Baxter, Robarts Research Institute (Canada) . . . . . [9784-111]

**Automatic segmentation of 4D cardiac MR images for extraction of ventricular chambers using a spatio-temporal approach**, Angélica M. Atehortúa Labrador, Univ. Nacional de Colombia (Colombia); Maria A. Zuluaga, Sébastien Ourselin, Univ. College London (UK); Eduardo Romero Castro M.D., Univ. Nacional de Colombia (Colombia) . . . . . [9784-112]

**Interactive and scale invariant segmentation of the rectum/sigmoid via user-ufined templates**, Tobias Lüddemann, Technische Univ. München (Germany); Jan Egger, Technische Univ. Graz (Austria) . . . . . [9784-113]

**Automatic segmentation of mammogram and tomosynthesis images**, Dustin Sargent, Sun Young Park, Merge Healthcare (USA); Jin Ho Jung, Doowon Technical College (Korea, Republic of) . . . . . [9784-114]

**Automated separation of merged Langerhans islets**, Jan Švihlík, Univ. of Chemistry and Technology Prague (Czech Republic), Czech Technical Univ. in Prague (Czech Republic); Jan Kybic, Czech Technical Univ. in Prague (Czech Republic); David Habart, Institute for Clinical and Experimental Medicine (Czech Republic) . . . . . [9784-115]

**Quantitative comparison between the straight-forward and anatomical insertion technique for pedicle screw placement**, Dejan Knez, Univ. of Ljubljana (Slovenia); Janez Mohar, Valdoltra Orthopaedic Hospital (Slovenia); Boštjan Likar, Franjo Pernuš, Tomaž Vrtovec, Univ. of Ljubljana (Slovenia) . . . . . [9784-116]

**Reconstruction of coronary artery centrelines from x-ray rotational angiography using a probabilistic mixture model**, Serkan Cimen, Ali Gooya, Alejandro F. Frangi, The Univ. of Sheffield (UK) . . . . . [9784-117]

**A fast myocardium blood flow estimation method based on super-pixel and deconvolution**, Hao Wu, Rachid Fahmi, Brendan L. Eck, Jacob Levi, Case Western Reserve Univ. (USA); Anas Fares M.D., Univ. Hospitals Case Medical Ctr. (USA); Mani Vembar, Amar C. Dhanantwari, Philips Healthcare (USA); Hiram G. Bezerra, David L. Wilson, Case Western Reserve Univ. (USA) . . . . . [9784-118]

### Diffusion/Functional MRI and Brain Connectivity

**Rotationally invariant clustering of diffusion MRI data using spherical harmonics**, Matthew G. Liptrot, Francois B. Lauze, Univ. of Copenhagen (Denmark) . . . . . [9784-119]

**Effects of EPI distortion correction pipelines on the connectome in Parkinson's disease**, Justin Galvis, Adam Mezher, Anjanibhargavi Ragothaman, Julio E. Villalón-Reina, The Univ. of Southern California (USA); Preston T. Fletcher, The Univ. of Utah (USA); Paul M. Thompson, Gautam Prasad, The Univ. of Southern California (USA) . . . . . [9784-120]

**Fitting parametric models of diffusion MRI in regions of partial volume**, Zach Eaton-Rosen, Manuel Jorge Cardoso, Andrew Melbourne, Eliza Orasanu, Univ. College London (UK); Alan Bainbridge, Univ. College Hospital (UK); Giles Kendall, Nicola J. Robertson, Neil Marlow, UCL Institute for Women's Health (UK); Sebastien Ourselin, Univ. College London (UK) . . . . . [9784-121]

**Motion correction for q-space imaging by multiple interleaved b0 images**, Miyu Muto, Mizuki Iwabuchi, Weiwei Du, Masayuki Fukuzawa, Kyoto Institute of Technology (Japan); Koji Sakai, Jun Tazoe, Kei Yamada, Kyoto Prefectural Univ. of Medicine (Japan) . . . . . [9784-122]

**Axonal diameter and density estimated with 7-Tesla hybrid diffusion imaging in transgenic Alzheimer rats**, Madelaine Daianu, Univ. of California, Los Angeles (USA); Russell E. Jacobs, California Institute of Technology (USA); Terrence C. Town, The Univ. of Southern California (USA); Paul M. Thompson, Univ. of California, Los Angeles (USA) . . [9784-123]

**Segmentation of thalamus from MR images via task-driven dictionary learning**, Luoluo Liu, Jeffrey Glaister, Xiaoxia Sun, Aaron Carass, Trac D. Tran, Jerry L. Prince, Johns Hopkins Univ. (USA) . . . . . [9784-124]

**Finding significantly connected voxels based on histograms of connection strengths**, Niklas Kasenburg, Morten V. Pedersen, Sune Darkner, Univ. of Copenhagen (Denmark) . . . . . [9784-125]

**Thalamus parcellation using multi-modal feature classification and thalamic nuclei priors**, Jeffrey Glaister, Aaron Carass, Johns Hopkins Univ. (USA); Joshua V. Stough, George Mason Univ. (USA); Peter A. Calabresi, Jerry L. Prince, Johns Hopkins Univ. (USA) . . . . [9784-126]

**A 3D high resolution ex vivo white matter atlas of the common squirrel monkey (Saimiri sciureus) based on diffusion tensor imaging**, Yurui Gao, Prasanna Parvathaneni, Kurt G. Schilling, Zhoubing Xu, Ann S. Choe, Bennett A. Landman, Adam M. Anderson, Vanderbilt Univ. (USA) . . . . . [9784-127]

**Fast and accurate simulations of diffusion-weighted MRI signals for the evaluation of acquisition sequences**, Gaetan Renssonnet, Damien Jacobs, Benoit M. Macq, Univ. Catholique de Louvain (Belgium); Maxime Taquet, Harvard Medical School (USA) . . . . . [9784-128]

**BOLD delay times using group delay in sickle cell disease**, Julie Coloigner, Children's Hospital Los Angeles (USA); Chau Vu, Children's Hospital, Los Angeles (USA); Adam Bush, Matthew Borzage, Children's Hospital Los Angeles (USA); Vidya Rajagopalan, Children's Hospital Los Angeles (USA) and Rudi Schulte Research Institute Santa Barbara (USA); Natasha Leporé, Children's Hospital Los Angeles (USA); John Wood, Children's Hospital, Los Angeles (USA) . . . . . [9784-129]



**Image Restoration and Enhancement**

**Luminosity and contrast normalization in color retinal images based on standard reference image**, Ehsan Shahrian Varnousfaderani, Siamak Yousefi, Akram Belghith, Michael H. Goldbaum M.D., Hamilton Glaucoma Ctr. (USA) . . . . . [9784-130]

**A Shearlet-based algorithm for quantum noise removal in low-dose CT images**, Aguan Zhang, Zhengzhou Univ. (China); Huiqin Jiang, Zhengzhou Univ. (China) and Zhengzhou Engineering Technology Research Ctr. for Medical Informatization (China); Ling Ma, FAST Corp. (Japan); Yumin Liu, Zhengzhou Univ. (China); Xiaopeng Yang, First Affiliated Hospital of Zhengzhou Univ. (China) and Zhengzhou Engineering Technology Research Ctr. for Medical Informatization (China) . [9784-131]

**Glasses for 3D ultrasound computer tomography: phase compensation**, Michael Zapf, Torsten Hopp, Nicole V. Ruiter, Karlsruhe Institut für Technologie (Germany) . . . . . [9784-132]

**Adaptive non-local means method for speckle reduction in ultrasound images**, Ling Ai, Ming Yue Ding, Xuming Zhang, Huazhong Univ. of Science and Technology (China) . . . . . [9784-133]

**Subject-specific patch-based denoising for contrast-enhanced cardiac MR images**, Lorraine Ma, Mehran Ebrahimi, Shraddey Jani, Univ. of Ontario Institute of Technology (Canada); Mihaela Pop, Sunnybrook Research Institute (Canada) and Univ. of Toronto (Canada) . . [9784-134]

**Calibration free beam hardening correction for cardiac CT perfusion imaging**, Jacob Levi, Rachid Fahmi, Brendan L. Eck, Case Western Reserve Univ. (USA); Anas Fares M.D., Univ. Hospitals of Cleveland (USA); Hao Wu, Case Western Reserve Univ. (USA); Amar C. Dhanantwari, Mani Vembar, Philips Healthcare (USA); Hiram G. Bezerra, Univ. Hospitals of Cleveland (USA); David L. Wilson, Case Western Reserve Univ. (USA) . . . . . [9784-135]

**Temporal enhancement of two dimensional color doppler echocardiography**, Alexey B. Terentjev, Saint-Petersburg State Polytechnical Univ. (Russian Federation); Scott H. Settlementier, Philips Healthcare (USA); Douglas P. Perrin, Pedro J. del Nido M.D., Boston Children's Hospital (USA) and Harvard Medical School (USA); Igor V. Shturts, Saint-Petersburg State Polytechnical Univ. (Russian Federation); Nikolay V. Vasilyev M.D., Boston Children's Hospital (USA) and Saint-Petersburg State Polytechnical Univ. (Russian Federation) and Harvard Medical School (USA) . . . . . [9784-136]

**An adaptive undersampling scheme of wavelet-encoded parallel MR imaging for more efficient MR data acquisition**, Sunanda D. Mitra, Hua (Oliver) Xie, Texas Tech Univ. (USA); John C. Bosshard, Texas A&M Univ. (USA); Jason E. Hill, Texas Tech Univ. (USA); Steven M. Wright, Texas A&M Univ. (USA) . . . . . [9784-137]

**Improve synthetic retinal OCT images with present of pathologies and textural information**, Ehsan Shahrian Varnousfaderani, Hamilton Glaucoma Ctr. (USA) and Univ. of California, San Diego (USA); Wolf-Dieter Vogl, Jing Wu, Bianca S. Gerendas, Christian Simader M.D., Georg Langs, Sebastian M. Waldstein M.D., Ursula Schmidt-Erfurth M.D., Christian Doppler Lab. for Ophthalmic Image Analysis (Austria) . . . . . [9784-139]

**Registration**

**Speeding up 3D speckle tracking using PatchMatch**, Maria Zontak, Matthew O'Donnell, Univ. of Washington (USA) . . . . . [9784-140]

**Respiration correction by clustering in ultrasound images**, Kaizhi Wu, Nanchang Hangkong Univ. (China); Xi Chen, China Southern Power Grid Co. (China); Ming Yue Ding, Nong Sang, Huazhong Univ. of Science and Technology (China) [9784-141]

**Demons versus level-set motion registration for coronary 18F-sodium fluoride PET**, Mathieu Rubeaux, Cedars-Sinai Medical Ctr. (USA); Nikhil Joshi, Marc R. Dweck, Alison Fletcher, Univ. of Edinburgh (UK); Manish Motwani, Louise E. Thomson, Guido Germano, Damini Dey, Daniel S. Berman, Cedars-Sinai Medical Ctr. (USA); David E. Newby, The Univ. of Edinburgh (UK); Piotr J. Slomka, Cedars-Sinai Medical Ctr. (USA) . . . . . [9784-142]

**Comparison of different tools for 3D linear assessment in slicer software**, Antonio Ruellas, UFRJ (Brazil) and Univ. of Michigan (USA); Marilia Yatabe, Univ. de São Paulo (Brazil) and Univ. of Michigan (USA); Karina Devito, Univ. Federal de Juiz de Fora (Brazil); Maria Augusta Visconti, UFRJ (Brazil); Bernardo Souki, Pontificia Univ. Católica De Minas Gerais (Brazil); Lucie Macron, Univ. of Michigan (USA); Beatriz Paniagua, Francois Budin, Martin A. Styner, The Univ. of North Carolina at Chapel Hill (USA); Lucia H. S. Cevidanes, Univ. of Michigan (USA) . . . . . [9784-143]

**Deformable image registration for multimodal lung cancer staging**, William E. Higgins, Ronnarit Cheirsilp, Rebecca Bascom, Thomas W. Allen, Rickhesvar P. M. Mahraj, The Pennsylvania State Univ. (USA) . . . . . [9784-144]

**Improved B-spline image registration between exhale and inhale lung CT images based on intensity and gradient orientation information**, Woo Hyun Nam, Jihun Oh, Jonghyun Yi, Yongsung Park, SAMSUNG Electronics Co., Ltd. (Korea, Republic of) . . . . . [9784-145]

**Unified registration framework for cumulative dose assessment in cervical cancer across external beam radiotherapy and brachytherapy**, Sharmili Roy, John J. Totman, A\*STAR-NUS Clinical Imaging Research Ctr. (Singapore); Bok Ai Choo, National Univ. Health System (Singapore) . . . . . [9784-146]

**Lung iodine mapping by subtraction with image registration allowing for tissue sliding**, Brian Mohr, Toshiba Medical Visualization Systems Europe, Ltd. (UK); Monique Brink, Luuk Oostveen, Radboud Univ. Medical Ctr. (Netherlands); Joanne D. Schuijff, Toshiba Medical Systems Europe B.V. (Netherlands); Mathias Prokop M.D., Radboud Univ. Medical Ctr. (Netherlands) . . . . . [9784-147]

**Improved registration of DCE-MR images of the liver by adding prior information into autocorrelation of local image structure (ALOST)**, Tian Zhang, Technische Univ. Delft (Netherlands); Zhang Li, National Univ. of Defense Technology (China); Jurgen H. Runge, Cristina Lavini, Academisch Medisch Centrum (Netherlands); Lucas J. van Vliet, Technische Univ. Delft (Netherlands); Frans M. Vos, Technische Univ. Delft (Netherlands) and Academisch Medisch Centrum (Netherlands) . . . . . [9784-148]

**Precise anatomy localization in CT data by an improved probabilistic tissue type atlas**, Astrid Franz, Nicole Schadewaldt, Heinrich Schulz, Torbjörn Vik, Daniel Byströv, Philips Research (Germany) . . . . . [9784-149]

**A first step toward uncovering the truth about weight tuning in deformable image registration**, Kleopatra Pirpinia, The Netherlands Cancer Institute (Netherlands); Peter A. N. Bosman, Ctr. voor Wiskunde en Informatica (Netherlands); Jan-Jakob Sonke, The Netherlands Cancer Institute (Netherlands); Marcel B. van Herk, Institute of Cancer Sciences, Univ. of Manchester (UK) and Academisch Medisch Centrum (Netherlands); Tanja Alderliesten, Academisch Medisch Centrum (Netherlands) . . . . . [9784-150]

**Multi-modal co-registration via multi-scale textural and spectral embedding representations**, Lin Li, Case Western Reserve Univ. (USA) . . . . . [9784-151]

**Smart grid initialization reduces the computational complexity of multi-objective image registration based on a dual-dynamic transformation model to account for large anatomical differences**, Peter A. N. Bosman, Ctr. voor Wiskunde en Informatica (Netherlands); Tanja Alderliesten, Academisch Medisch Centrum (Netherlands) . . . . . [9784-152]

**Accurate quantification of local changes for carotid arteries in 3D ultrasound images using convex optimization-based deformable registration**, Jieyu Cheng, City Univ. of Hong Kong (Hong Kong, China); Wu Qiu, Jing Yuan, Aaron Fenster, Robarts Research Institute (Canada); Bernard C. Y. Chiu, City Univ. of Hong Kong (Hong Kong, China) . . . . . [9784-153]

**FLIRT: an open-software suite for real-time 2D/3D image registration for image guided radiotherapy research**, Hugo C. Furtado, Medizinische Univ. Wien (Austria) and Christian Doppler Lab. for Medical Radiation Research for Radiation Oncology (Austria); Christelle Gendrin, Jakob Spoerk, Elisabeth Steiner, Medizinische Univ. Wien (Austria); Tracy Underwood, Institut Univ. du Cancer de Toulouse (France); Thomas Kuenzler, Institut für Medizinische Physik, Landeskrankenhaus Feldkirch (Austria); Dietmar Georg, Wolfgang Birkfellner, Medizinische Univ. Wien (Austria) . [9784-154]

**In-vivo cell tracking to quantify endothelial cell migration during zebrafish angiogenesis**, Prahlad G. Menon, Duquesne Univ. (USA) and Univ. of Pittsburgh (USA); Elizabeth R. Rochon, Beth L. Roman, Univ. of Pittsburgh (USA) . . . . . [9784-155]

**Deformable image registration with a featurelet algorithm: implementation as a 3D-slicer extension and validation**, Andreas Renner, Hugo C. Furtado, Yvette Seppenwoolde, Wolfgang Birkfellner, Dietmar Georg, Medizinische Univ. Wien (Austria) . . . . . [9784-156]

**CONFERENCE 9787**  
**Image Perception, Observer Performance, and Technology Assessment**

**Breast ultrasound lesions classification: a performance evaluation between manual delineation and computer segmentation**, Moi Hoon Yap, Manchester Metropolitan Univ. (UK); Chuin Hong Yap, Univ. of Malaya (Malaysia) . . . . . [9787-43]

**Impact of patient photos on visual search during radiograph interpretation**, Elizabeth A. Krupinski, The Univ. of Arizona (USA); Kimberly Applegate, Ariadne DeSimone, Alex Chung, Srinri Tridandanpani, Emory Univ. (USA)[9787-45]

**Changes in frequency of recall recommendations of examinations depicting cancer with the availability of either priors or digital breast tomosynthesis**, Christiane M. Hakim, Magee-Womens Hospital (USA); Andriy I. Bandos, Univ. of Pittsburgh (USA); Marie A. Ganott, Victor J. Catullo, Denise M. Chough, Amy E. Kelly, Dilip D. Shinde, Magee-Womens Hospital (USA); Jules H. Sumkin, Magee-Womens Hospital (USA) and Univ. of Pittsburgh (USA); Luisa P. Wallace, Magee-Womens Hospital (USA); Robert M. Nishikawa, David Gur, Univ. of Pittsburgh (USA) . . . . . [9787-46]

**The study of surgical image quality evaluation system by subjective quality factor method**, Jian J. Zhang, Jason R. Xuan, Xirong Yang, Boston Scientific Corp. (USA) . . . . . [9787-47]

**Inter-observer variability within BI-RADS and RANZCR mammographic density assessment schemes**, Christine N. Damases, The Univ. of Sydney (Australia) and Univ. of Namibia (Namibia); Claudia R. Mello-Thoms, The Univ. of Sydney (Australia) and Univ. of Pittsburgh (USA); Mark F. McEntee, The Univ. of Sydney (Australia) . . . . . [9787-48]

**Observer study to evaluate the simulation of mammographic calcification clusters**, Maria Angelica Z. Sousa, Karem D. Marcomini, Homero Schiabel, Univ. de São Paulo (Brazil) . . . . . [9787-49]

**A four-alternative forced choice (4AFC) software for observer performance evaluation in radiology**, Guozhi Zhang, Lesley Cockmartin, UZ Leuven (Belgium); Hilde Bosmans, KU Leuven (Belgium) . . . . . [9787-50]

**The study on the color reproduction by illumination source for disposable endoscope**, Sang Kyeong Park, Young Jae Won, Osong Medical Innovation Foundation (Korea, Republic of) . . . . . [9787-51]

**Cellular automata segmentation of the boundary between the compacta of vertebral bodies and surrounding structures**, Jan Egger, Technische Univ. Graz (Austria); Christopher Nimsky, Universitätsklinikum Giessen und Marburg GmbH (Germany) . . . . . [9787-52]

**CONFERENCE 9788**

**Biomedical Applications in Molecular, Structural, and Functional Imaging**

**Novel Imaging Methods**

**Regional placental BOLD changes with gestational age in normally developing pregnancies using long duration R2\* mapping in utero.** Manjiri Dighe, Yun Jung Kim, Sharmishta Seshamani, Ania Blazejewska, Susan McKown, Jason Caucutt, Christopher Gatenby, Colin Studholme, Univ. of Washington (USA) . . . . . [9788-52]

**Innovations in Image Processing**

**A novel Kalman filter based video image processing scheme for two-photon fluorescence microscopy.** Wenqing Sun, Xia Huang, Chunqiang Li, Chuan Xiao, Wei Qian, The Univ. of Texas at El Paso (USA) . . . . . [9788-54]

**Definition and automatic anatomy recognition of lymph node zones in the abdomen and pelvis on CT images.** Yu Liu, Univ. of Pennsylvania (USA) and Jilin Univ. (China); Jayaram K. Udupa, Dewey Odhner, Univ. of Pennsylvania (USA); Yubing Tong, Univ. of Pennsylvania School of Medicine (USA); Drew A. Torigian, Univ. of Pennsylvania (USA) . . . . . [9788-55]

**Comparison of volume estimation methods for pancreatic islet cells.** Jiri Dvorák, Jan Švihlík, Jan Kybic, Czech Technical Univ. in Prague (Czech Republic); David Habart M.D., Institute for Clinical and Experimental Medicine (Czech Republic) . . . . . [9788-56]

**Natural image classification driven by human brain activity.** Dai Zhang, Hanyang Peng, Jinqiao Wang, Ming Tang, National Lab. of Pattern Recognition (China); Zhentao Zuo, Rong Xue, Institute of Biophysics (China); Yong Fan, Univ. of Pennsylvania School of Medicine (USA) . . . . . [9788-57]

**Iterative weighted average diffusion as a novel external force in the active contour model.** Ilya S. Mirov, The Univ. of Alabama at Birmingham (USA) and Univ. of Richmond (USA); Arie Nakhmani, The Univ. of Alabama at Birmingham (USA) [9788-58]

**Ultrafast superpixel segmentation of large medical datasets.** Antoine Leblond, Claude Kauffmann, Ctr. Hospitalier de l'Univ. de Montréal (Canada) . . . . [9788-59]

**Liver recognition based on statistical shape model in CT images.** Xueqing Jiang, Dehui Xiang, Fei Shi, Weifang Zhu, Xinjian Chen, Soochow Univ. (China) . . . . [9788-60]

**Optimal target VOI size for accurate 4D coregistration of DCE-MRI.** Brian J. Park M.D., Univ. of Pennsylvania (USA) [9788-61]

**Bone and Skeletal Imaging, Biomechanics**

**Effect of low-dose CT and iterative reconstruction on trabecular bone microstructure assessment.** Felix K. Kopp, Thomas H. Baum, Radin A. Nasirudin, Kai Mei, Eduardo G. Garcia, Rainer Burgkart, Ernst J. Rummeny M.D., Jan S. Bauer, Peter B. Noël, Technische Univ. München (Germany) . . . . . [9788-62]

**Linking bone microarchitecture to projections texture analysis.** Erwan Freuchet, Florent Autrusseau, Univ. de Nantes (France); Yves Amouric, Ctr. Hospitalier Univ. de Nantes (France); Jean-Pierre V. Guédon, Paul Pilet, Pierre Weiss, Univ. de Nantes (France) . . . . . [9788-63]

**Segmentation of ribs in digital chest radiographs.** Lin Cong, Shanghai United Imaging Healthcare Co., Ltd. (China); Wei Guo, Shenyang Aerospace Univ. (China); Qiang Li M.D., Shanghai Advanced Research Institute (China) and Shanghai United Imaging Healthcare Co., Ltd. (China) . . . . . [9788-64]

**Automatic construction of patient-specific biomechanical models of the spine from IVDs and vertebra segmentations.** Isaac Castro-Mateos, José M. Pozo, The Univ. of Sheffield (UK); Áron Lazary, National Ctr. for Spinal Disorders (Hungary); Alejandro F. Frangi, The Univ. of Sheffield (UK) . . . . . [9788-65]

**Neurological Imaging**

**Three modality image registration of brain SPECT/CT and MR images for quantitative analysis of dopamine transporter imaging.** Yuzuho Yamaguchi, Yuta Takeda, Takeshi Hara, Gifu Univ. (Japan); Xiangrong Zhou, Gifu Univ. (Japan); Masaki Matsusako, Yuki Tanaka, Kazuhiko Hosoya, Tsutomu Nihei, St. Luke's International Hospital (Japan); Tetsuro Katafuchi, Hiroshi Fujita, Gifu Univ. (Japan) . . . . . [9788-66]

**Investigating changes in brain network properties in HIV-associated neurocognitive disease (HAND) using mutual connectivity analysis (MCA).** Anas Z. Abidin, Adora M. D'Souza, Mahesh B. Nagarajan, Axel Wismüller M.D., Univ. of Rochester Medical Ctr. (USA) . . . [9788-67]

**Transcranial direct current stimulation transiently increases the blood-brain barrier solute permeability in vivo.** Da Wi Shin, Niranjan Khadka, Jie Fan, Marom Bikson, Bingmei Fu, The City College of New York (USA) . . . . . [9788-68]

**Multimodal brain visualization from Stony Brook University.** Saad Nadeem, Arie Kaufman, Stony Brook Univ. (USA) . . . . . [9788-69]

**Comparative study of multimodal intra-subject image registration methods on a publicly available database.** Mohammad Saleh Miri, Ali Ghayoor, Hans J. Johnson, Milan Sonka, The Univ. of Iowa (USA) . . . . . [9788-70]

**Automated tissue classification of pediatric brains from magnetic resonance images using age-specific atlases.** Andrew J. Metzger, The Univ. of Iowa (USA); Amanda M. Benavides, Peggy Nopoulos, The Univ. of Iowa Carver College of Medicine (USA); Vincent A. Magnotta, The Univ. of Iowa Hospitals and Clinics (USA) . . . . . [9788-71]

**Predicting human age using regional morphometry and inter-regional morphological similarity.** Xunheng Wang, Lihua Li, Hangzhou Dianzi Univ. (China) . . . . . [9788-72]

**Comparison of template registration methods for multi-site meta-analysis of brain morphometry.** Joshua Faskowitz, Imaging Genetics Ctr. (USA); Greig I. de Zubicaray, Queensland Univ. of Technology (Australia); Katie L. McMahon, The Univ. of Queensland (Australia); Margaret J. Wright, Ctr. for Advanced Imaging, The Univ. of Queensland (Australia); Paul M. Thompson, Imaging Genetics Ctr. (USA) and Univ. of Southern California (USA); Neda Jahanshad, The Univ. of Southern California (USA) . . . . . [9788-73]

**An image registration pipeline for analysis of transsynaptic tracing in mice.** Kwame S. Kutton, Stephen M. Eacker, Valina L. Dawson, Ted L. Dawson M.D., J. Tilak Ratnanather, Michael I. Miller, Johns Hopkins Univ. (USA) . . . . . [9788-74]

**Comparison of stroke infarction between CT perfusion and diffusion weighted imaging: preliminary results.** Ashrani Aizzuddin Abd. Rahni, Israna Houssain Arka, Kalaivani Chellappan, Shahizon Azura Mukari, Zhe Kang Law, Univ. Kebangsaan Malaysia (Malaysia); Ramesh Sahathevan, Univ. Kebangsaan Malaysia (Malaysia), Calvary Hospital (Australia) . . . . . [9788-75]

**High-resolution in vivo Wistar rodent brain atlas based on T1 weighted image.** Su Huang, Zhongkang Lu, Weimin Huang, Institute for Infocomm Research (Singapore); Boominathan Ramasamy, Sankar Seramani, Singapore Bioimaging Consortium (Singapore); Cuntai Guan, Institute for Infocomm Research (Singapore); Sakthivel Sekar, Kishore Bhakoo, Singapore Bioimaging Consortium (Singapore) . . . . . [9788-106]

**fMRI**

**Investigating the relationship between subjective drug craving and temporal dynamics of the default mode network, executive control network, and salience network in methamphetamine dependents using rsfMRI.** Somayeh Soltanian-Zadeh, Univ. of Tehran (Iran, Islamic Republic of) and Duke Univ. (USA); Gholam-Ali Hossein-Zadeh, Univ. of Tehran (Iran, Islamic Republic of) and Institute for Studies in Theoretical Physics and Mathematics (Iran, Islamic Republic of); Alireza Shahbabaie, Tehran Univ. of Medical Sciences (Iran, Islamic Republic of) and Institute for Cognitive Science Studies (Iran, Islamic Republic of); Hamed Ekhtari, Tehran Univ. of Medical Sciences (Iran, Islamic Republic of) and Institute for Cognitive Sciences Studies (Iran, Islamic Republic of) . . . . . [9788-76]

**Functional connectivity analysis of resting-state fMRI networks in nicotine dependent patients.** Aria Smith, Anahid Ehtemami, Daniel Fratte, Anke Meyer-Baese, Olmo Zavala-Romero, Florida State Univ. (USA) . . . . . [9788-78]

**Optical**

**FEM-based simulation of a fluorescence tomography experiment using anatomical MR images.** Wuwei Ren, Andreas Elmer, Mark-Aurel Augath, Markus Rudin, ETH Zürich (Switzerland) . [9788-79]

**Measuring skin penetration by confocal Raman microscopy (CRM): correlation to results from conventional experiments.** Dominique Lunter, Eberhard Karls Univ. Tübingen (Germany) . [9788-80]

**Improve axial resolution of ultrasound-switchable fluorescence technique for deep-tissue high-resolution fluorescence imaging.** Baohong Yuan, Jayanth Kandukuri, Bingbing Cheng, Shuai Yu, The Univ. of Texas at Arlington (USA); Venugopal Bandi, Univ. of North Texas (USA); Kytai T. Nguyen, Yi Hong, The Univ. of Texas at Arlington (USA); Francis D'Souza, Univ. of North Texas (USA) . . . . . [9788-82]

**Nanoscale donor-acceptor labelled liposome contrast agent for ultrasound modulated fluorescence tomography.** Qimei Zhang, Stephen P. Morgan, The Univ. of Nottingham (UK); Melissa L. Mather, Keele Univ. (UK) . . . . . [9788-83]

**New conversion factors between human and automatic readouts of the CDMAM phantom for CR systems.** Johann Hummel, Medizinische Univ. Wien (Austria); Angelika Osanna-Elliott, Mammography Screening Reference Ctr. for Technical Quality Control (Austria); Marcus Kaar, Medizinische Univ. Wien (Austria); Friedrich Semtrus, Mammography Screening Reference Ctr. for Technical Quality Control (Austria); Michael Figl, Medizinische Univ. Wien (Austria) . . . . . [9787-53]

**Variability amongst radiographers in the categorization of clinical acceptability for digital trauma radiography.** Robin Decoster, Univ. College Dublin (Ireland) and Hogeschool-Univ. Brussel (Belgium); Rachel J. Toomey, Univ. College Dublin (Ireland); Dirk Smits, Hogeschool-Univ. Brussel (Belgium) and KU Leuven (Belgium); Harrie Mol, Hogeschool-Univ. Brussel (Belgium); Filip Verhelle, Univ. Ziekenhuis Brussel (Belgium); Marie-Louise Butler, Univ. College Dublin (Ireland) . . . . . [9787-54]

**A utility/cost analysis of breast cancer risk prediction algorithms.** Craig K. Abbey, Univ. of California, Santa Barbara (USA); Yirong Wu, Univ. of Wisconsin-Madison (USA); Elizabeth S. Burnside M.D., Univ. of Wisconsin Hospitals and Clinics (USA); Adam Wunderlich, Frank W. Samuelson, U.S. Food and Drug Administration (USA); John M. Boone, UC Davis Medical Ctr. (USA) . . . . . [9787-55]

**Development and application of a channelized Hotelling observer for digital breast tomosynthesis optimization on structured background test images with mass simulating targets.** Dimitar Petrov, UZ Leuven (Belgium); Koen Michielsens, KU Leuven (Belgium); Lesley Cockmartin, Gouzhi Zhang, UZ Leuven (Belgium); Kenneth C. Young, The Royal Surrey County Hospital NHS Trust (UK); Nicholas W. Marshall, Hilde Bosmans, UZ Leuven (Belgium) . . . [9787-57]

**Evaluation of image quality of MRI data for brain tumor surgery.** Frank Heckel, Fraunhofer MEVIS (Germany) and ICCAS Innovation Ctr. Computer Assisted Surgery (Germany); Felix Arlt, Universitätsklinikum Leipzig (Germany); Benjamin Geisler, Stephan Zidowitz, Fraunhofer MEVIS (Germany); Thomas Neumuth, ICCAS Innovation Ctr. Computer Assisted Surgery (Germany) . . . . . [9787-58]

**Evaluation of the possibility to use thick slabs of reconstructed outer breast tomosynthesis slices.** Hannie Petersson, Magnus Düstler, Anders Tingberg, Pontus A. Timberg, Lund Univ. (Sweden). [9787-59]



**3D registration of intravascular optical coherence tomography and cryo-image volumes for microscopic-resolution validation.** David Prabhu, Case Western Reserve Univ. (USA); Emile Mehanna, Univ. Hospitals Case Medical Ctr. (USA); Madhusudhana Gargasha, Case Western Reserve Univ. (USA); Eric Brandt, Niemke van Ditzhuijzen, Daniel Chamie, Yamamoto Hirosada, Yusuke Fujino, Ali Farmazilian, Univ. Hospitals Case Medical Ctr. (USA); Jaymin Patel, Case Western Reserve Univ. (USA); Marco Costa M.D., Hiram G. Bezerra, Univ. Hospitals Case Medical Ctr. (USA); David L. Wilson, Case Western Reserve Univ. (USA) . . . . . [9788-104]

**Fluids and Cardiovascular**

**Respiratory-gated electrical impedance tomography: a potential technique for quantifying stroke volume.** Saaid H. Arshad, Ethan K. Murphy, Ryan J. Halter, Thayer School of Engineering at Dartmouth (USA) . . . . . [9788-84]

**An efficient method for accurate segmentation of left ventricle in contrast-enhanced cardiac MRI images.** Venkata Suryanarayana K, Abhishek Mitra, Srikrishnan Viswanathan, Samsung R&D Institute India - Bangalore (India); Hyun Hee Jo, Anup Bidesi, SAMSUNG Electronics Co., Ltd. (Korea, Republic of) . . . [9788-85]

**Comparison of quantitative myocardial perfusion imaging CT to fluorescein microsphere-based flow from high-resolution cryo-images.** Brendan L. Eck, Rachid Fahmi, Jacob Levi, Case Western Reserve Univ. (USA); Anas Fares M.D., Univ. Hospitals of Cleveland (USA); Hao Wu, Yuemeng Li, Case Western Reserve Univ. (USA); Mani Vembar, Amar C. Dhanantwari, Philips Healthcare (USA); Hiram G. Bezerra, Univ. Hospitals Case Medical Ctr. (USA); David L. Wilson, Case Western Reserve Univ. (USA) . . . [9788-86]

**Nonrigid 2D registration of fluoroscopic coronary artery image sequence with layered motion.** Taewoo Park, Hankuk Univ. of Foreign Studies (Korea, Republic of) . . . . . [9788-87]

**Sensitivity evaluation of DSA-based parametric imaging using Doppler ultrasound in neurovascular phantoms.** Anusha Balasubramoniam, Daniel R. Bednarek, Stephen Rudin, Ciprian N. Ionita, Toshiba Stroke and Vascular Research Ctr. (USA) . . . . . [9788-88]

**Effect of beam hardening on transmural myocardial perfusion quantification in myocardial CT imaging.** Rachid Fahmi, Brendan L. Eck, Jacob Levi, Case Western Reserve Univ. (USA); Anas Fares, Univ. Hospitals Case Medical Ctr. (USA); Hao Wu, Case Western Reserve Univ. (USA); Mani Vembar, Amar C. Dhanantwari, Philips Healthcare (USA); Hiram G. Bezerra, Univ. Hospitals Case Medical Ctr. (USA); David L. Wilson, Case Western Reserve Univ. (USA) . . . . . [9788-89]

**Investigating relationships between left atrial volume, symmetry, and sphericity.** Prahlad G. Menon, Duquesne Univ. (USA) and Univ. of Pittsburgh (USA) and The Univ. of Texas at San Antonio (USA); Sotiris Nedios, Gerhard Hindricks, Andreas Bollmann, Univ. Hospital Leipzig (Germany) . . . . . [9788-90]

**Cancer Imaging**

**CT guided diffuse optical tomography for breast cancer imaging.** Reheem Baikiejang, Wei Zhang, Dianwen Zhu, Changqing Li, Univ. of California, Merced (USA) . . . . . [9788-91]

**Microscopic validation of whole mouse micro-metastatic tumor imaging agents using cryo-imaging and sliding organ image registration.** Yiqiao Liu, Bo Zhou, Mohammed Q. Qutaish, David L. Wilson, Case Western Reserve Univ. (USA) . . . . . [9788-93]

**Computerized segmentation algorithm with personalized atlases of murine MRIs in a SV40 large T antigen mouse mammary cancer model.** Adam Sibley, Maryellen L. Giger, The Univ. of Chicago (USA) . . . . . [9788-95]

**The 3D edgerrunner pipeline: a novel shape-based analysis for neoplasms characterization.** Fernando Yepes-Calderon, Children's Hospital Los Angeles (USA); Rebecca L. Johnson, Yi Lao, The Univ. of Southern California (USA); Darryl H. Hwang, Keck Medicine of USC (USA); Julie Coloiner, Children's Hospital Los Angeles (USA); Felix Yap, Desai Bushan, Philip Cheng, Inderbir Gill, Vinay Duddalwar, Keck Medicine of USC (USA); Natasha Leporé, Children's Hospital Los Angeles (USA) and The Univ. of Southern California (USA) . . . . . [9788-96]

**Lung**

**3D segmentation of lung CT data with graph-cuts; analysis of parameter sensitivities.** Jung won Cha, Neal Dunlap, Brian Wang, Amir A. Amini, Univ. of Louisville (USA) . . . . . [9788-97]

**Novel MR Techniques and Applications**

**Quantification of traumatic meningeal injury using dynamic contrast enhanced (DEC) fluid attenuated inversion recovery (FLAIR) imaging.** Marcelo A. Castro, Joshua P. Williford, Ctr. for Neuroscience and Regenerative Medicine (USA) and Henry M. Jackson Foundation (USA) and National Institutes of Health (USA); Martin R. Cota, Ctr. for Neuroscience and Regenerative Medicine (USA) and Henry M. Jackson Foundation (USA) and National Institutes of Health (USA); Judy M. MacLaren, Suburban Hospital (USA); Bernard J. Dardzinski, Uniformed Services Univ. of the Health Sciences (USA); John A. Butman, National Institutes of Health (USA); Dzung L. Pham, Lawrence L. Latour, Ctr. for Neuroscience and Regenerative Medicine (USA) and Henry M. Jackson Foundation (USA) . . . . . [9788-50]

**Application of probabilistic fiber-tracking method of MR imaging to measure impact of cranial irradiation on structural brain connectivity in children treated for medulloblastoma.** Elizabeth Duncan, Wilburn E. Reddick, John O. Glass, St. Jude Children's Research Hospital (USA) . . . . . [9788-98]

**Multi-temporal MRI carpal bone volumes analysis by principal axes registration.** Roberta Ferretti, Silvana Dellepiane, Univ. degli Studi di Genova (Italy) . . . . . [9788-100]

**A framework for incorporating DTI atlas builder registration into tract-based spatial statistics and a simulated comparison to standard TBSS.** Matthew J. Leming, The Univ. of North Carolina at Chapel Hill (USA); Rachel Steiner, Vanderbilt Univ. (USA); Martin A. Styner, The Univ. of North Carolina at Chapel Hill (USA) . . . . . [9788-101]

**Hippocampus shape analysis for temporal lobe epilepsy detection in magnetic resonance imaging.** Zohreh Kohan, Reza Azmi, Alzahra Univ. (Iran, Islamic Republic of) . . . . . [9788-102]

**Multi-site study of diffusion metric variability: effects of site, vendor, field strength, and echo time on regions-of-interest and histogram-bin analyses.** Karl Helmer, Athinoula A. Martinos Ctr. for Biomedical Imaging (USA); Ming-Chung Chou, Kaohsiung Medical Univ. (Taiwan);

Ronny I. Preciado, Athinoula A. Martinos Ctr. for Biomedical Imaging (USA); Barjor Gimi, The Geisel School of Medicine at Dartmouth (USA); Nancy Rollins, The Univ. of Texas Southwestern Medical Ctr. at Dallas (USA); Allen Song, Brain Imaging and Analysis Ctr., Duke Univ. School of Medicine (USA); Jessica Turner, The MIND Research Network (USA); Susumu Mori, Johns Hopkins Univ. School of Medicine (USA) . . . . . [9788-108]

**CONFERENCE 9791**  
**Digital Pathology**

Session Chair: **Elizabeth A. Krupinski**, Emory Univ. School of Medicine (USA)

**Automatic labeling of molecular biomarkers on a cell-by-cell basis in immunohistochemistry images using convolutional neural networks.** Fahime Sheikhzadeh, Univ. of British Columbia (Canada) and BC Cancer Research Ctr. (Canada); Anita Carraro, Jagoda Korbelik, Calum E. MacAulay, Martial Guillaud, BC Cancer Research Ctr. (Canada); Rabab K. Ward, The Univ. of British Columbia (Canada) . . . . . [9791-17]

**Whole histological slide image analysis for radiation-induced cellular and vascular changes in brain tumors.** Emmanuel Brun, MoreHisto (France); Raphael Serduc, INSERM U836 (France) . . . . . [9791-26]

**Deciphering protein signatures using color, morphological, and topological analysis of immunohistochemically stained human tissues.** Erwan Zerhouni, Bogdan Prisacari, IBM Research - Zürich (Switzerland); Qing Zhong, Peter Wild, UniversitätsSpital Zürich (Switzerland); Maria Gabrani, IBM Research - Zürich (Switzerland) . . . . . [9791-27]

**A machine learning approach to quantifying noise in medical images.** Aritra Chowdhury, Rensselaer Polytechnic Institute (USA); Kareem S. Aggour, Steven M. Gustafson, Christopher J. Sevinsky, GE Global Research (USA); Bülent Yener, Rensselaer Polytechnic Institute (USA) . . . . . [9791-28]

**Pathological Gleason prediction through gland ring morphology in immunofluorescent prostate cancer images.** Richard Scott, Icahn School of Medicine at Mount Sinai (USA); Faisal Khan, Rutgers, The State Univ. of New Jersey (USA) and Icahn School of Medicine at Mount Sinai (USA); Jack Zeineh, Michael Donovan, Gerardo Fernandez, Icahn School of Medicine at Mount Sinai (USA) . . . . . [9791-29]

**Color-texture based extreme learning machines for tissue tumor classification.** Xulei Yang, Si Yong Ye, Sum-Thai Wong, Gary Lee, Yi Su, A\*STAR Institute of High Performance Computing (Singapore); Jia Mei Hong, Andre B. H. Choo, Sulin Chen, A\*STAR Bioprocessing Technology Institute (Singapore) . [9791-30]

**Cell nuclei attributed relational graphs for efficient representation and classification of gastric cancer in digital histopathology.** Harshita Sharma, Technische Univ. Berlin (Germany); Norman Zerbe, Daniel Heim, Stephan Wienert, Sebastian Lohmann, Charité Universitätsmedizin Berlin (Germany); Olaf Hellwich, Technische Univ. Berlin (Germany); Peter Hufnagel, Charité Universitätsmedizin Berlin (Germany) . . . . . [9791-31]

**Mixture of online learners for cancer stem cell detection in CD133 colored microscopic images.** Oguzhan Oguz, Maen Mallah, Bilkent Univ. (Turkey); Christian Münzenmayer, Thomas Wittenberg, Fraunhofer-Institut für Integrierte Schaltungen (IIS) (Germany); Aysegül Üner, Hacettepe Univ. (Turkey); Rengül Çetin Atalay, Middle East Technical Univ. (Turkey); Ahmet E. Cetin, Bilkent Univ. (Turkey) . . . . . [9791-32]

**Automatic extraction of a novel imaging biomarker from fluorescence microscopic imaging of TRA-8/DR5 oligomers to predict TRA-8 therapeutic efficacy in breast and pancreatic cancer mouse models.** Hyunki Kim, Donald J. Buchsbaum, Kurt R. Zinn, The Univ. of Alabama at Birmingham (USA) . . [9791-33]

**Identification of leukocyte infiltration in hematoxylin-eosin stained breast cancer samples: texture-based classification of tissue morphologies.** Riku Turkki, Nina Linder, Panu E. Kovanen, Johan Lundin, Teijo Pellinen, Univ. of Helsinki (Finland) . . . . . [9791-34]

**Histology image segmentation with hierarchical multi-level thresholding.** Hady Ahmady Phoulady, Dmitry B. Goldgof, Lawrence O. Hall, Peter R. Mouton, Univ. of South Florida (USA) . . . . . [9791-35]

**Quantification of tumor morphology via 3D histology: Application to oral cavity cancers.** Scott Doyle, John E. Tomaszewski M.D., Margaret Brandwein-Gensler, Univ. at Buffalo (USA) . . [9791-36]



**Designing an automated classification method using latent support vector machine algorithms as a predictive tool for prostate cancer lesions,** Nilgoon Zarei, Univ. of British Columbia (Canada) and BC Cancer Research Ctr. (Canada); Amir Bakhtiari, Simon Fraser Univ. (Canada); Anita Carraro, Jagoda Korbek, Martial Guillaud, BC Cancer Research Ctr. (Canada); Mira Keyes, British Columbia Cancer Agency (Canada); Calum E. MacAulay, BC Cancer Research Ctr. (Canada) . . . . . [9791-37]

**Automatic cell detection and segmentation from H&E stained pathology slides using colorspace decorrelation stretching,** Mohammad Peikari, Univ. of Toronto (Canada); Anne L. Martel, Univ. of Toronto (Canada) and Sunnybrook Research Institute (Canada) . . . . . [9791-38]

**Deep learning-based gland quantification in digitized tissue samples from patients with colorectal cancer: associations with clinical data and outcome,** Dmitrii Bychkov, Riku Turkki, Univ. of Helsinki (Finland); Nina Linder M.D., Johan Lundin M.D., Univ. of Helsinki (Finland) and Karolinska Institutet (Sweden) . . . . . [9791-39]

**High-definition infrared imaging of colon sections for improved automated histology,** Saumya Tiwari, Shachi Mittal, Beckman Institute for Advanced Science and Technology (USA) and Univ. of Illinois at Urbana-Champaign (USA); Tomasz P. Wróbel, Beckman Institute for Advanced Science and Technology (USA); Rohit Bhargava, Beckman Institute for Advanced Science and Technology (USA) and Univ. of Illinois at Urbana-Champaign (USA) . . . . . [9791-40]

**Hierarchical nucleus segmentation in digital pathology images,** Yi Gao, Vadim Ratner, Liangjia Zhu, Tammy Diprima, Tahsin Kurc, Allen R. Tannenbaum, Joel H. Saltz M.D., Stony Brook Univ. (USA) . . . . . [9791-41]

**A four class model for digital breast histopathology using high-definition Fourier transform infrared (FT-IR) spectroscopic imaging,** Shachi Mittal, Univ. of Illinois at Urbana-Champaign (USA) . . . . . [9791-42]

**The role of imaging based prostate biopsy morphology in a data fusion paradigm for transducing prognostic predictions,** Faisal Khan, Rutgers, The State Univ. of New Jersey (USA) and Icahn School of Medicine at Mount Sinai (USA); Casimir A. Kulikowski, Rutgers, The State Univ. of New Jersey (USA) . . . . . [9791-43]

**Toward phenotypic analysis of whole zebrafish from synchrotron microCT images: Automated detection and segmentation of cell nuclei,** Yifu Ding, Thomas Tavolara, Penn State College of Medicine (USA); David J. Miller, The Pennsylvania State Univ. (USA); Keith C. Cheng, Penn State College of Medicine (USA) . . . . . [9791-44]

**Automatic choroid cells segmentation and counting in fluorescence microscopic image,** Jianjun Fei, Xinjian Chen, Weifang Zhu, Fei Shi, Xiao Lin, Lei Yang, Soochow Univ. (China) . . . . . [9791-45]

**Classification of human carcinoma cells using hyperspectral imagery,** Umut Çinar, Yasemin Yardimci Cetin, Rengül Çetin Atalay, Middle East Technical Univ. (Turkey); Ahmet E. Cetin, Bilkent Univ. (Turkey) . . . . . [9791-46]

**High-definition Fourier transform infrared spectroscopic imaging of prostate tissue,** Tomasz P. Wróbel, Univ. of Illinois at Urbana-Champaign (USA); Andre Kajdacsy-Balla, Univ. of Illinois at Chicago (USA); Rohit Bhargava, Univ. of Illinois at Urbana-Champaign (USA) . . . . . [9791-47]

**A generic nuclei detection method for histopathological breast images,** Henning Kost, André Homeyer, Fraunhofer MEVIS (Germany); Peter Bult, Maschenka Balkenhol, Jeroen A. W. M. van der Laak, Radboud Univ. Medical Ctr. (Netherlands); Horst K. Hahn, Fraunhofer MEVIS (Germany) . . . . . [9791-48]



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**SPIE** Proceedings

CONFERENCE 9783

Physics of Medical Imaging

Room: Town & Country

CONFERENCE 9784

Image Processing

Room: San Diego

CONFERENCE 9785

Computer-Aided Diagnosis

Room: Golden West

CONFERENCE 9787

Image Perception, Observer Performance, and Technology Assessment

Room: California

CONFERENCE 9788

Biomedical Applications in Molecular, Structural, and Functional Imaging

Room: Royal Palm One

SESSION 12

Room: Town & Country . Wed 8:00 to 9:40 am

Photon Counting CT II: Spectral Imaging

Session Chairs: Taly G. Gilat-Schmidt, Marquette Univ. (USA); Mats Danielsson, KTH Royal Institute of Technology (Sweden)

8:00 am: **Spatio-energetic cross-talks in photon counting detectors: detector model and correlated Poisson data generator**, Katsuyuki Taguchi, Okkyun Lee, Johns Hopkins Univ. (USA); Steffen G. Kappler, Siemens Healthcare (Germany) . . . . . [9783-59]

8:20 am: **Comparison of quantitative k-edge empirical estimators using an energy-resolved photon-counting detector**, Kevin C. Zimmerman, Taly G. Gilat-Schmidt, Marquette Univ. (USA) . . . . . [9783-60]

8:40 am: **Conventional CT images from spectral measurements**, Paurakh L. Rajbhandary, Norbert J. Pelc, Stanford Univ. (USA) . . . . . [9783-61]

9:00 am: **Improving material decomposition by spectral optimization of photon counting computed tomography**, Christoph Polster, Siemens Healthcare GmbH (Germany) and Institute for Clinical Radiology, Ludwig-Maximilians-Univ. Hospital (Germany); Katharina Hahn, Siemens Healthcare GmbH (Germany); Ralf Gutjahr, Siemens Healthcare GmbH (Germany) and CAMP, Technische Univ. München (Germany); Friederike Schöck, Steffen G. Kappler, Karl Stierstorfer, Siemens Healthcare GmbH (Germany); Olaf Dietrich, Institute for Clinical Radiology, Ludwig-Maximilians-Univ. Hospital München (Germany); Thomas G. Flohr, Siemens Healthcare GmbH (Germany) . . . . . [9783-62]

9:20 am: **Optimal selection of thresholds for photon counting CT**, Thomas P. O'Donnell, Siemens Healthcare (USA); Rabe'e Chehelatani, Univ. of Pennsylvania (USA); Friederike Schoeck, Siemens Healthcare (Germany); David Cormode, Univ. of Pennsylvania (USA); Zahi Fayad, Translational and Molecular Imaging Institute, Mount Sinai School of Medicine (USA) . . . . . [9783-63]

Coffee Break. . . . Wed 9:40 am to 10:10 am

9783 continues on page 57

SESSION 5

Room: San Diego . . . . . Wed 8:00 to 9:40 am

Image Enhancement

Session Chair: Elsa D. Angelini, Columbia Univ. (USA), Télécom ParisTech (France)

8:00 am: **Geodesic denoising for optical coherence tomography images**, Ehsan Shahrian Varnousfaderani, Hamilton Glaucoma Ctr. (USA); Wolf-Dieter Vogl, Jing Wu, Bianca S. Gerendas, Christian Simader, Georg Langs, Sebastian M. Waldstein M.D., Ursula Schmidt-Erfurth, Christian Doppler Lab. for Ophthalmic Image Analysis (Austria) . . . . . [9784-19]

8:20 am: **Combined self-learning based single-image super-resolution and dual-tree complex wavelet transform denoising for medical images**, Guang Yang, Imperial College London (UK); Xujiang Ye, Univ. of Lincoln (UK); Greg Slabaugh, City Univ. London (UK); Jennifer Keegan, Raad H. Mohiaddin, David Firmin, National Heart and Lung Institute (UK) . . . . . [9784-20]

8:40 am: **Sinogram smoothing and interpolation via alternating projections onto the slope and curvature constraints**, Davood Karimi, Rabab Kreidieh Ward, The Univ. of British Columbia (Canada) . . . . . [9784-21]

9:00 am: **A novel structured dictionary for fast processing of 3D medical images, with application to computed tomography restoration and denoising**, Davood Karimi, Rabab Kreidieh Ward, The Univ. of British Columbia (Canada) . . . . . [9784-22]

9:20 am: **Enhanced intravascular near-infrared spectroscopy (NIRS) imaging system for detection of lipid core plaques in coronary arteries**, Zhihua He, Stephen T. Sum, InfraReDx, Inc. (USA) . . . . . [9784-23]

Coffee Break. . . . Wed 9:40 am to 10:10 am

9784 continues on page 57

SESSION 12

Room: Golden West . . . . Wed 8:00 to 9:40 am

Colon and Prostate

Session Chairs: Janne J. Näppi, Massachusetts General Hospital (USA); Kenji Suzuki, Illinois Institute of Technology (USA)

8:00 am: **Decision forests for learning prostate cancer probability maps from multiparametric MRI**, Henry Ehrenberg, Daniel Cornfeld, Cayce B. Nawaf, Preston C. Sprenkle, James S. Duncan, Yale Univ. (USA) . . . . . [9785-54]

8:20 am: **Fusion of multi-parametric MRI and temporal ultrasound for characterization of prostate cancer: in vivo feasibility study**, Farhad Imani, Purang Abolmaesumi, The Univ. of British Columbia (Canada); Sahar Ghavidel, Queen's Univ. (Canada); Siavash Khallaghi, The Univ. of British Columbia (Canada); Eli Gibson, Western Univ. (Canada); Amir Khojaste, Queen's Univ. (Canada); Mena Gaed, Western Univ. (Canada); Madeleine Moussa, José A. Gomez, London Health Sciences Ctr. (Canada); Cesare Romagnoli, The Univ. of British Columbia (Canada); Derek W. Cool, Matthew Bastian-Jordan, Zahra Kassam, Western Univ. (Canada); D. Robert Siemens, Michael Leveridge, Kingston General Hospital (Canada); Silvia Chang, Vancouver General Hospital (Canada); Aaron Fenster, Aaron D. Ward, Western Univ. (Canada); Parvin Mousavi, Queen's Univ. (Canada) . . . . . [9785-55]

8:40 am: **An integrated classifier for computer-aided diagnosis of colorectal polyps based on random forest and location index strategies**, Yifan Hu, Hao Han, Wei Zhu, Zhengrong Liang, Stony Brook Univ. (USA) . . . . . [9785-56]

9:00 am: **Deep learning for electronic cleansing in dual-energy CT colonography**, Rie Tachibana, Institute of National Colleges of Technology (Japan); Janne J. Näppi, Toru Hironakaa, Massachusetts General Hospital (USA); Se Hyung Kim, Seoul National Univ. Hospital (Korea, Republic of); Hiroyuki Yoshida, Massachusetts General Hospital (USA) . . . . . [9785-57]

9:20 am: **Colitis detection on abdominal CT scans by rich feature hierarchies**, Jiamin Liu, Nathan Lay, Le Lu, Zhuoshi Wei, Lauren Kim, Evrim B. Turkbey, Ronald M. Summers, National Institutes of Health (USA) . . . . . [9785-58]

Coffee Break. . . . Wed 9:40 am to 10:10 am

9785 continues on page 57

SESSION 1

Room: California . . . . . Wed 8:00 to 9:40 am

Technology Assessment in Breast Imaging

Session Chair: Robert M. Nishikawa, Univ. of Pittsburgh (USA)

8:00 am: **Automatic and accurate: Quantra reproduces BI-RADS assessment on a two-point scale**, Ernest U. Ekpo, Mark F. McEntee, The Univ. of Sydney (Australia); Mary Rickard, The Univ. of Sydney (Australia) and Sydney Breast Clinic (Australia); Patrick C. Brennan, Claudia R. Mello-Thoms, The Univ. of Sydney (Australia) . . . . . [9787-21]

8:20 am: **Validated novel software to measure the conspicuity index of focal lesions within DICOM images**, Katy Szczepura, Univ. of Salford (UK); David J. Manning, Lancaster Univ. (UK) . . [9787-22]

8:40 am: **Impact of two types of image processing on cancer detection in mammography**, Lucy M. Warren, Mark D. Halling-Brown, Padraig T. Looney, The Royal Surrey County Hospital NHS Trust (UK); David R. Dance, The Royal Surrey County Hospital NHS Trust (UK) and Univ. of Surrey (UK); Louise Wilkinson, St George's Healthcare NHS Trust (UK); Matthew G. Wallis, Cambridge Univ. Hospitals NHS Foundation Trust (UK) and NIHR Cambridge Biomedical Research Ctr. (UK); Rosalind M. Given-Wilson, St. George's Hospital (UK); Julie Cooke, Jarvis Breast Screening and Diagnostic Ctr. (UK); Kenneth C. Young, The Royal Surrey County Hospital NHS Trust (UK) and Univ. of Surrey (UK) . . . . . [9787-23]

9:00 am: **Potential workflow advantages with single 8MP versus dual 5MP displays**, Elizabeth A. Krupinski, The Univ. of Arizona (USA) . . . . . [9787-25]

9:20 am: **Discriminatory power of common genetic variants in personalized breast cancer diagnosis**, Yirong Wu, Univ. of Wisconsin-Madison (USA); Jie Liu, Univ. of Washington (USA); Irene Ong, Univ. of Wisconsin-Madison (USA); Peggy Peissig, Adedayo A. Onitilo, Marshfield Clinic (USA); Jun Fan, Ming Yuan, Univ. of Wisconsin-Madison (USA); Elizabeth S. Burnside M.D., Univ. of Wisconsin Hospitals and Clinics (USA) . . . . . [9787-24]

Coffee Break. . . . Thu 9:40 am to 10:10 am

9787 continues on page 57

SESSION 3

Room: Royal Palm One . Wed 8:00 to 9:40 am

Bone and Skeletal Imaging, Biomechanics

Session Chairs: Robert C. Molthen, Medical College of Wisconsin (USA); Axel Wismüller M.D., Univ. of Rochester Medical Ctr. (USA)

8:00 am: **Automated reconstruction of standing posture panoramas from multi-sector long limb x-ray images**, Linzey Miller, Rochester Institute of Technology (USA); Caroline Trier, Washington Univ. in St. Louis (USA); Kfir Y. Ben-Zikri, Cristian A. Linte, Rochester Institute of Technology (USA) . . . [9788-10]

8:20 am: **Patellar segmentation from 3D magnetic resonance images using guided recursive ray-tracing for edge pattern detection**, Ruida Cheng, Jennifer Jackson, Evan S. McCreedy, William Gandler, National Institutes of Health (USA); Joost J. F. A. Eijkenboom, Marienke van Middelkoop, Erasmus MC (Netherlands); Matthew J. McAuliffe, Frances T. Gavelli, National Institutes of Health (USA) . . . . . [9788-11]

8:40 am: **Unsupervised segmentation of MRI knees using image partition forests**, Marija Marcan, Irina Voiculescu, Univ. of Oxford (UK) . . . . . [9788-12]

9:00 am: **Trabecular bone texture classification using wavelet leaders**, Zilong Zou, Temple Univ. (USA) and Beihang Univ. (China); Jie Yang, Temple Univ. (USA); Vasileios Megalookonomou, Univ. of Patras (Greece); Rachid Jennane, Univ. d'Orléans (France); Erkang Cheng, Broncus Medical, Inc. (USA); Haibin Ling, Temple Univ. (USA) . . . . . [9788-13]

9:20 am: **Intensity-based femoral atlas 2D/3D registration using Levenberg-Marquardt optimisation**, Ondrej Klima, Petr Kleparnik, Brno Univ. of Technology (Czech Republic); Michal Spanel, 3Dim Laboratory s.r.o. (Czech Republic); Pavel Zemcik, Brno Univ. of Technology (Czech Republic) . . . . . [9788-14]

Coffee Break. . . . Wed 9:40 am to 10:10 am

9788 continues on page 57



# WEDNESDAY 2 MARCH

## CONFERENCE 9783

Physics of Medical Imaging

Room: Town & Country

### SESSION 13

Room: Town & Country . . . . Wed 10:10 am to 12:10 pm

#### New Systems and Technologies

Session Chairs: **Rebecca Fahrig**, Stanford Health Care (USA); **Ingrid S. Reiser**, The Univ. of Chicago (USA)

10:10 am: **Method for dose-reduced 3D catheter tracking on a scanning-beam digital x-ray system using dynamic electronic collimation**, David A. P. Dunkerley, Univ. of Wisconsin-Madison (USA); Tobias Funk, Triple Ring Technologies, Inc. (USA); Michael A. Speidel, Univ. of Wisconsin-Madison (USA) . . . . . [9783-64]

10:30 am: **Multi-gamma-source CT imaging system: a feasibility study with the Poisson noise**, Sunhee Wi, Seungryong Cho, KAIST (Korea, Republic of) . . . [9783-65]

10:50 am: **Investigation of noise and contrast sensitivity of an electron multiplying charge couple device (EMCCD) based cone beam micro-CT system**, Sumukh Bysani Krishnakumar, Alexander R. Podgorsak, Toshiba Stroke and Vascular Research Ctr., Univ. at Buffalo (USA); Swetadri Vasan Setlur Nagesh, Amit Jain, Toshiba Stroke and Vascular Research Ctr. (USA); Daniel R. Bednarek, Stephen Rudin, Ciprian N. Ionita, Univ. at Buffalo (USA) and Toshiba Strike and Vascular Research Ctr. (USA) . . . [9783-66]

11:10 am: **High-spatial-resolution nanoparticle x-ray fluorescence tomography**, Jakob C. Larsson, William Vågberg, Carmen Vogt, Ulf Lundström, Daniel H. Larsson, Hans M. Hertz, KTH Royal Institute of Technology (Sweden) . . . [9783-67]

11:30 am: **Time resolved in vivo x-ray imaging at the micrometer scale in 3D opens new avenues in functional anatomy**, Rajmund Mokso, Goran Lovric, Paul Scherrer Institut (Switzerland); Martin Nyvlt, Marek Skeren, Czech Technical Univ. in Prague (Czech Republic); Johannes Schittny, Univ. Bern (Switzerland); Matthias Roth-Kleiner, Ctr. Hospitalier Univ. Vaudois (Switzerland); Marco F. M. Stamparoni, ETH Zürich (Switzerland) and Paul Scherrer Institut (Switzerland) . . . . . [9783-68]

11:50 am: **800-MeV magnetic-focused flash proton radiography for high-contrast imaging of low-density biologically relevant targets using an inverse-scatter collimator**, Matthew Freeman, Frank E. Merrill, Dale Tupa, Los Alamos National Lab. (USA) . . . . [9783-69]

Lunch Break . . . .Wed 12:10 pm to 1:20 pm

9783 continues on page 58 ➔

## CONFERENCE 9784

Image Processing

Room: San Diego

### SESSION 6

Room: San Diego . Wed 10:10 am to 12:10 pm

#### Shape

Session Chairs: **Cristian Lorenz**, Philips Research (Germany) **Tomaz Vrtovec**, Univ. of Ljubljana (Slovenia)

10:10 am: **Landmark based shape analysis for cerebellar ataxia classification and cerebellar atrophy pattern visualization**, Zhen Yang, Johns Hopkins Univ. (USA); Sayed M. Abulnaga, The Univ. of British Columbia (Canada); Aaron Carass, Johns Hopkins Univ. (USA); Kalyani Kansal, The Johns Hopkins School of Medicine (USA); Bruno M. Jedynak, Johns Hopkins Univ. (USA); Chiadi U. Onyike, Sarah H. Ying, Johns Hopkins School of Medicine (USA); Jerry L. Prince, Johns Hopkins Univ. (USA) . . . . . [9784-24]

10:30 am: **Multi-object, model-based, multi-atlas, segmentation for rodent brains using dense discrete correspondences**, Joohwi Lee, Ilwoo Lyu, Martin A. Styner, The Univ. of North Carolina at Chapel Hill (USA) . . . . . [9784-25]

10:50 am: **Fast correspondences for statistical shape models of brain structures**, Florian Bernard, Ctr. Hospitalier de Luxembourg (Luxembourg) and Luxembourg Ctr. for Systems Biomedicine (Luxembourg) and Hochschule Trier (Germany); Nikos A. Vlassis, Adobe Systems Inc. (USA); Peter Gemmar, Hochschule Trier (Germany); Andreas Husch, Ctr. Hospitalier de Luxembourg (Luxembourg) and Luxembourg Ctr. for Systems Biomedicine (Luxembourg) and Hochschule Trier (Germany); Johan Thunberg, Luxembourg Ctr. for Systems Biomedicine (Luxembourg); Jorge Goncalves, Luxembourg Ctr. for Systems Biomedicine (Luxembourg) and Univ. of Cambridge (UK); Frank Hertel, Ctr. Hospitalier de Luxembourg (Luxembourg) . . . . . [9784-26]

11:10 am: **Robust group-wise rigid registration of point sets using t-mixture model**, Nishant Ravikumar, Ali Gooya, Alejandro F. Frangi, Zeike A. Taylor, The Univ. of Sheffield (UK) . . . . . [9784-27]

11:30 am: **Multi-region statistical shape model for cochlear implantation**, Jordi Romera Romero, Univ. Pompeu Fabra (Spain); Hans M. Kjer, Technical Univ. of Denmark (Denmark); Mario Ceresa, Univ. Pompeu Fabra (Spain) . . . . . [9784-28]

11:50 am: **Whole abdominal wall segmentation using augmented active shape models (AASM) with multi-atlas label fusion and level set**, Zhoubing Xu, Vanderbilt Univ. (USA); Rebecca B. Baucum, Vanderbilt Univ. Medical Ctr. (USA); Richard G. Abramson, Vanderbilt Univ. (USA); Benjamin K. Poulouse, Vanderbilt Univ. Medical Ctr. (USA); Bennett A. Landman, Vanderbilt Univ. (USA) . . . [9784-29]

Lunch Break . . . . Wed 12:10 pm to 1:20 pm

9784 continues on page 58 ➔

## CONFERENCE 9785

Computer-Aided Diagnosis

Room: Golden West

### SESSION 13

Room: Golden West . . . . . Wed 10:10 am to 12:10 pm

#### Abdominal

Session Chairs: **Hiroyuki Yoshida**, Massachusetts General Hospital (USA); **Kensaku Mori**, Nagoya Univ. (Japan)

10:10 am: **Automatic detection of ureter lesions in CT urography**, Trevor Exell, Lubomir M. Hadjiiski, Heang-Ping Chan, Kenny H. Cha, Elaine M. Caoili, Richard H. Cohan M.D., Jun Wei, Chuan Zhou, Univ. of Michigan Health System (USA) . . [9785-59]

10:30 am: **Segmentation of hepatic arteries in multi-phase liver CT using directional dilation and connectivity analysis**, Lei Wang, Fraunhofer MEVIS (Germany); Alena-Kathrin Schnurr, Otto-von-Guericke Univ. Magdeburg (Germany); Stephan Zidowitz, Horst K. Hahn, Fraunhofer MEVIS (Germany); Christian Hansen, Otto-von-Guericke Univ. Magdeburg (Germany) . . . . . [9785-60]

10:50 am: **Semi-automatic assessment of pediatric hydronephrosis severity in 3D ultrasound**, Juan J. Cerralaza, Hansel Otero M.D., Children's National Health System (USA); Peter Yao, Princeton Univ. (USA); Elijah Biggs, Children's National Health System (USA); Roberto Ardon, Philips Research (France); James Jago, Philips Healthcare (USA); Craig A. Peters M.D., Marius G. Linguraru, Children's National Health System (USA) . . . [9785-61]

11:10 am: **Machine-learning based comparison of CT-perfusion maps and dual energy CT for pancreatic tumor detection**, Michael Goetz, Deutsches Krebsforschungszentrum (Germany); Stephan Skornitzke, UniversitätsKlinikum Heidelberg (Germany); Christian Weber, Deutsches Krebsforschungszentrum (Germany); Franziska Fritz, Philipp Mayer, Marco Koell, Wolfram Stiller, UniversitätsKlinikum Heidelberg (Germany); Klaus H. Maier-Hein, Deutsches Krebsforschungszentrum (Germany) [9785-62]

11:30 am: **Automatic anatomy recognition on CT images with pathology**, Lidong Huang, BeiHang Univ. (China) and Univ. of Pennsylvania (USA); Jayaram K. Udupa, Yubing Tong, Dewey Odhner, Drew A. Torigian, Univ. of Pennsylvania (USA) . . . . . [9785-63]

11:50 am: **Differentiating bladder carcinoma from bladder wall using 3D textural features: an initial study**, Xiaopan Xu, Xi Zhang, Yang Liu, Fourth Military Medical Univ. (China); Qiang Tian, Tangdu Hospital (China); Guopeng Zhang, Hongbing Lu, Fourth Military Medical Univ. (China) . . . . . [9785-64]

CONFERENCE 9785 ENDS

## CONFERENCE 9787

Image Perception, Observer Performance, and Technology Assessment

Room: California

### SESSION 2

Room: California . Wed 10:10 am to 12:10 pm

#### Model Observers I

Session Chair: **François O. Bochud**, Ctr. Hospitalier Univ. Vaudois (Switzerland)

10:10 am: **Can model observers be developed to reproduce radiologists' diagnostic performances? Our study says not so fast!**, Juhun Lee, Univ. of Pittsburgh Cancer Institute (USA); Robert M. Nishikawa, Univ. of Pittsburgh (USA); Ingrid S. Reiser, The Univ. of Chicago (USA); John M. Boone, UC Davis Medical Ctr. (USA) . . . . . [9787-4]

10:30 am: **Applying the J-optimal channelized quadratic observer to a SPECT phantom for myocardial perfusion defect detection**, Meredith K. Kupinski, College of Optical Sciences, The Univ. of Arizona (USA); Eric W. Clarkson, The Univ. of Arizona (USA); Michael Ghaly, Eric C. Frey, Johns Hopkins Univ. (USA) . . . . . [9787-5]

10:50 am: **Identification of error making patterns in lesion detection on digital breast tomosynthesis using computer-extracted image features**, Mengyu Wang, Duke Univ. (USA); Jing Zhang, Lamar Univ. (USA); Lars J. Grimm, Sujata V. Ghatge, Ruth Walsh, Karen S. Johnson, Joseph Y. Lo, Maciej A. Mazurowski, Duke Univ. (USA) . . . . . [9787-6]

11:10 am: **Location- and lesion-dependent estimation of background tissue complexity for anthropomorphic model observer**, Ali R. N. Avanaki, Barco, Inc. (USA) . . . . . [9787-7]

11:30 am: **Task-based optimization of flip angle for texture analysis in MRI**, Jonathan F. Brand, College of Optical Sciences, The Univ. of Arizona (USA); Lars R. Furenlid, The Univ. of Arizona College of Medicine (USA) and College of Optical Sciences, The Univ. of Arizona (USA); Maria I. Altbach, Jean-Philippe Galons, Puneet Sharma, Achyut Bhattacharyya M.D., Tulshi Bhattacharyya, Ali Bilgin, Diego R. Martin M.D., The Univ. of Arizona College of Medicine (USA) . . . . . [9787-8]

11:50 am: **Task-based detectability comparison of exponential transformation of free-response operating characteristic (FROC) curve and channelized Hotelling observer (CHO)**, Parag Khobragade, Marquette Univ. (USA); Jiahua Fan, Franco Rupcich, Dominic Crotty, GE Healthcare (USA); Taly G. Gilat-Schmidt, Marquette Univ. (USA) . . . . [9787-9]

Lunch Break . . . .Wed 12:10 pm to 1:20 pm

9787 continues on page 58 ➔

## CONFERENCE 9788

Biomedical Applications in Molecular, Structural, and Functional Imaging

Room: Royal Palm One

### SESSION 4

Room: Royal Palm One . . . . .Wed 10:10 am to 12:10 pm

#### Keynote and Neurological Imaging

Session Chairs: **Axel Wismüller M.D.**, Univ. of Rochester Medical Ctr. (USA); **Barjor Gimi**, Dartmouth Hitchcock Medical Ctr. (USA)

10:10 am: **Interesting in-vivo magnetic resonance experiments that are not quite ready for prime time and some that are (Keynote Presentation)**, Joseph J.H. Ackerman, Washington Univ. in St. Louis (USA) . . . . . [9788-15]

11:10 am: **Surface displacement based change in shape of central brain structures with pre-term birth**, Amanmeet Garg, Simon Fraser Univ. (Canada); Ruth E. Grunau, The Univ. of British Columbia (Canada); Steven Miller, Univ. of Toronto (Canada); Bruce Bjornson, Kenneth J. Poskitt, The Univ. of British Columbia (Canada); Mirza Faisal Beg, Simon Fraser Univ. (Canada) . . . . [9788-16]

11:30 am: **Modeling the brain morphology distribution in the general aging population**, Wyke Huizinga, Erasmus MC (Netherlands); Dirk H. J. Poot, Erasmus MC (Netherlands) and Technische Univ. Delft (Netherlands); Gennady Roshchupkin, Esther E. Bron, Arfan M. Ikram, Meike W. Vernooij, Erasmus MC (Netherlands); Daniel Rueckert, Imperial College London (UK); Wiro J. Niessen, Erasmus MC (Netherlands) and Technische Univ. Delft (Netherlands); Stefan Klein, Erasmus MC (Netherlands) . . . . . [9788-17]

11:50 am: **Enhancing genetic correlations between blood and brain using latent factors of correlated blood measures**, Neda Jahanshad, The Univ. of Southern California (USA) . . . . . [9788-18]

Lunch Break . . . .Wed 12:10 pm to 1:20 pm

9788 continues on page 58 ➔



# WEDNESDAY 2 MARCH

## CONFERENCE 9783

Physics of Medical Imaging

Room: Town & Country

### SESSION 14

Room: Town & Country . Wed 1:20 to 3:00 pm

#### Scatter and Diffraction Imaging

Session Chairs: **Mini Das**, Univ. of Houston (USA); **Guang-Hong Chen**, Univ. of Wisconsin-Madison (USA)

1:20 pm: **Method to study sample size limit of small-angle x-ray scattering computed tomography**, Mina Choi, U.S. Food and Drug Administration (USA) and Univ. of Maryland, College Park (USA); Bahaa Ghamraoui, Andreu Badal, Aldo Badano, U.S. Food and Drug Administration (USA) . . . . . [9783-70]

1:40 pm: **Onnidirectional scattering x-ray imaging with gratings**, Matias E. Kagias, Zhentian Wang, Paul Scherrer Institut (Switzerland) and ETH Zürich (Switzerland); Pablo Villanueva, Konstantin Jefimovs, Paul Scherrer Institut (Switzerland); Marco F. M. Stampanoni, Paul Scherrer Institut (Switzerland) and ETH Zürich (Switzerland) . . . . . [9783-71]

2:00 pm: **Coded aperture x-ray diffraction imaging for lung cancer detection**, Anuj J. Kapadia, Robert E. Morris, Manu N. Lakshmanan, Katie Albanese, Ehsan Samei, Joel A. Greenberg, Duke Univ. (USA) . . . . . [9783-72]

2:20 pm: **Coded aperture x-ray diffraction imaging with transmission computed tomography side-information**, Ikenna Odinaka, Joel A. Greenberg, Yan Kaganovsky, Andrew D. Holmgren, Mehadi Hassan, Duke Univ. (USA); David G. Politte, Joseph A. O'Sullivan, Washington Univ. in St. Louis (USA); Lawrence Carin, David J. Brady, Duke Univ. (USA) . . . . . [9783-73]

2:40 pm: **Coded aperture coherent scatter imaging for breast cancer detection: a Monte Carlo evaluation**, Manu N. Lakshmanan, Duke Univ. Medical Ctr. (USA); Joel A. Greenberg, Duke Univ. (USA); Ehsan Samei, Anuj J. Kapadia, Duke Univ. Medical Ctr. (USA) . . . . . [9783-74]

Coffee Break . . . Wed 3:00 pm to 3:30 pm

9783 continues on page 59

## CONFERENCE 9784

Image Processing

Room: San Diego

### SESSION 7

Room: San Diego . . . . . Wed 1:20 to 3:00 pm

#### Motion/Registration

Session Chair: **Kensaku Mori**, Nagoya Univ. (Japan)

1:20 pm: **Image-based navigation for functional endoscopic sinus surgery using structure from motion**, Simon Leonard, Austin Reiter, Ayushi Sinha, Masaru Ishii M.D., Russell H. Taylor, Gregory D. Hager, Johns Hopkins Univ. (USA) . . . . . [9784-30]

1:40 pm: **Coronary calcium visualization using dual energy chest radiography with sliding organ registration**, Di Wen, Case Western Reserve Univ. (USA); Katelyn Nye, GE Healthcare (USA); Bo Zhou, Case Western Reserve Univ. (USA); Robert C. Gilkeson, Univ. Hospitals Case Medical Ctr. (USA); David L. Wilson, Case Western Reserve Univ. (USA) . . . . . [9784-31]

2:00 pm: **Combined registration and motion correction of longitudinal retinal OCT data**, Andrew Lang, Aaron Carass, Omar Al-Louzi, Pavan Bhargava, Sharon D. Solomon, Peter A. Calabresi, Jerry L. Prince, Johns Hopkins Univ. (USA) . . . . . [9784-32]

2:20 pm: **Effects of spatial resolution on image registration**, Can Zhao, Aaron Carass, Amod Jog, Jerry L. Prince, Johns Hopkins Univ. (USA) . . . . . [9784-33]

2:40 pm: **Non-rigid contour-to-pixel registration of photographic and quantitative light-induced fluorescence imaging of decalcified teeth**, Rosalia Tatano, Benjamin Berkels, RWTH Aachen Univ. (Germany); Thomas Deserno, Uniklinik RWTH Aachen (Germany); Ekaterina Sirazitdinova, RWTH Aachen Univ. Hospital (Germany); Ulrike B. Fritz, Eva E. Ehrlich, Uniklinik-RWTH Aachen (Germany) . . . . . [9784-34]

Coffee Break . . . Wed 3:00 pm to 3:30 pm

9784 continues on page 59

## CONFERENCE 9787

Image Perception,  
Observer Performance, and  
Technology Assessment

Room: California

### SESSION 3

Room: California . . . . . Wed 1:20 to 3:00 pm

#### Perception Metrology

Session Chair: **Frank W. Samuelson**, U.S. Food and Drug Administration (USA)

1:20 pm: **Semi-parametric estimation of the area under the precision-recall curve**, Berkman Sahiner, Weijie Chen, Aria X. Pezeshk, Nicholas A. Petrick, U.S. Food and Drug Administration (USA) . . . [9787-10]

1:40 pm: **Proper bi-beta ROC model: algorithm, software, and performance evaluation**, Weijie Chen, U.S. Food and Drug Administration (USA); Nan Hu, The Univ. of Iowa (USA) . . . . . [9787-11]

2:00 pm: **MRMC analysis of agreement studies**, Brandon D. Gallas, U.S. Food and Drug Administration (USA); Amrita Anam, U.S. Food and Drug Administration (USA) and Univ. of Maryland, Baltimore County (USA); Weijie Chen, Adam Wunderlich, Zhiwei Zhang, U.S. Food and Drug Administration (USA) . . . . . [9787-12]

2:20 pm: **Quality metrics can help the expert during neurological clinical trials**, Laure Mahé, Univ. de Nantes (France) and KEOSYS (France); Florent Atrousseau, Hubert Desal, Jean-Pierre V. Guédon, Yves Le Teunier, Univ. de Nantes (France); Henri Der Sarkissian, Sylvie Davila, Jérôme Beranger, KEOSYS (France) . . . . . [9787-13]

2:40 pm: **Performance comparison of semantics and lung-RADS in the National Lung Screening Trial**, Qian Li, Tianjin Medical Univ. (China) and H. Lee Moffitt Cancer Ctr. & Research Institute (USA); Yoganand Balagurunathan, H. Lee Moffitt Cancer Ctr. & Research Institute (USA); Ying Liu, Tianjin Medical Univ. (China) and H. Lee Moffitt Cancer Ctr. & Research Institute (USA); Matthew Schabath, Robert J. Gillies, H. Lee Moffitt Cancer Ctr. & Research Institute (USA) . . . . . [9787-14]

Coffee Break . . . Wed 3:00 pm to 3:30 pm

9787 continues on page 59

## CONFERENCE 9788

Biomedical Applications in  
Molecular, Structural, and  
Functional Imaging

Room: Royal Palm One

### SESSION 5

Room: Royal Palm One . Wed 1:20 to 3:20 pm

#### fMRI

Session Chairs: **Axel Wismüller M.D.**, Univ. of Rochester Medical Ctr. (USA); **Barjor Gimi**, Dartmouth Hitchcock Medical Ctr. (USA)

1:20 pm: **Mutual connectivity analysis (MCA) using generalized radial basis function neural networks for nonlinear functional connectivity network recovery in resting-state functional MRI**, Adora M. D'Souza, Anas Z. Abidin, Mahesh B. Nagarajan, Axel Wismüller M.D., Univ. of Rochester Medical Ctr. (USA) . . . . . [9788-19]

1:40 pm: **Large-scale Granger causality analysis on resting state functional MRI**, Adora M. D'Souza, Anas Z. Abidin, Univ. of Rochester Medical Ctr. (USA); Lutz Leistritz, Friedrich-Schiller-Univ. Jena (Germany); Axel Wismüller M.D., Univ. of Rochester Medical Ctr. (USA) . . . [9788-20]

2:00 pm: **Examining the neural correlates of depressive and motor symptoms in Parkinson's disease using Frequency Component Analysis (FCA)**, Xiaopeng Song, Peking Univ. (China); Xiao Hu, The Affiliated Brain Hospital, Nanjing Medical Univ. (China); Shuqin Zhou, Peking Univ. (China); Yijun Liu, Peking Univ. (China); Weiguo Liu, The Affiliated Brain Hospital, Nanjing Medical Univ. (China) . . . . . [9788-21]

2:20 pm: **Detecting altered connectivity patterns in HIV-associated neurocognitive impairment using mutual connectivity analysis**, Anas Z. Abidin, Adora M. D'Souza, Mahesh B. Nagarajan, Axel Wismüller M.D., Univ. of Rochester Medical Ctr. (USA) . . . [9788-22]

2:40 pm: **Evaluating effects of methylphenidate on brain activity in cocaine addiction: a machine-learning approach**, Irina Rish, IBM Thomas J. Watson Research Ctr. (USA); Pouya Bashivan, The Univ. of Memphis (USA); Guillermo A. Cecchi, IBM Thomas J. Watson Research Ctr. (USA); Rita Goldstein, Mount Sinai Hospital (USA) . . . . . [9788-23]

Coffee Break . . . Wed 3:20 pm to 3:30 pm

9788 continues on page 59

## CONFERENCE 9791

Digital Pathology

Room: Golden West

### SESSION 1

Room: Golden West . . . . Wed 1:20 to 3:00 pm

#### Keynote and Trends

Session Chairs: **Metin N. Gurcan**, The Ohio State Univ. Wexner Medical Ctr. (USA); **Anant Madabhushi**, Case Western Reserve Univ. (USA)

1:20 pm: **Current challenges in digital pathology (Keynote Presentation)**, Kenneth J. Bloom, Clariant, Inc. (USA) . . . . . [9791-1]

2:20 pm: **Automated robust registration of grossly misregistered whole-slide images with varying stains**, Geert J. S. Litjens, Hamamatsu TIGA Ctr. (Germany) and Steinbeis-Transferzentrum Medizinische Systembiologie (Germany); Kai Safferling, Niels Grabe, Hamamatsu TIGA Ctr. (Germany) and Nationales Centrum für Tumorerkrankungen Heidelberg (Germany) and Steinbeis-Transferzentrum Medizinische Systembiologie (Germany) . . . . . [9791-2]

2:40 pm: **Model coupling for predicting a developmental patterning process**, Bülent Yener, Rensselaer Polytechnic Institute (USA); Nimit Dhulekar, The MathWorks, Inc. (USA); Basak Oztan, American Science and Engineering, Inc. (USA) . . . . . [9791-3]

Coffee Break . . . Wed 3:00 pm to 3:30 pm

9791 continues on page 59

# WEDNESDAY 2 MARCH

## CONFERENCE 9783

Physics of Medical Imaging

Room: Town & Country

### SESSION 15

Room: Town & Country . Wed 3:30 to 5:30 pm

#### Task Driven Imaging, Observers, Detectability, Phantom Studies

Session Chairs: **Hee-Joung Kim**, Yonsei Univ. (Korea, Republic of); **Anders Tingberg**, Lund Univ. (Sweden)

3:30 pm: **Task-driven tube current modulation and regularization design in computed tomography with penalized-likelihood reconstruction**, Grace J. Gang, Jeffrey H. Stewerdsen, Joseph W. Stayman, Johns Hopkins Univ. (USA) . . . . . [9783-75]

3:50 pm: **Design, fabrication, and implementation of voxel-based 3D printed textured phantoms for task-based image quality assessment in CT**, Justin B. Solomon, Duke Univ. School of Medicine (USA); Alexandre H. Ba, Institut Univ. de Radiophysique Appliquée (Switzerland); Andrew Diao, Duke Univ. (USA); Joseph Y. Lo, Elianna Bier, Duke Univ. School of Medicine (USA); François O. Bochud, Institut Univ. de Radiophysique Appliquée (Switzerland); Michael E. Gehm, Duke Univ. (USA); Ehsan Samei, Duke Univ. School of Medicine (USA) . . . . . [9783-76]

4:10 pm: **Detectable change of lung nodule volume with CT in a phantom study with high- and low-contrast tasks**, Marios A. Gavrielides, Qin Li, Rongping Zeng, Qi Gong, Kyle J. Myers, Berkman Sahiner, Nicholas A. Petrick, U.S. Food and Drug Administration (USA) . . . . . [9783-77]

4:30 pm: **Investigation of optimal parameters for penalized maximum-likelihood reconstruction applied to iodinated contrast-enhanced breast CT**, Andrey V. Makeev, Lynda C. Ikejimba, U.S. Food and Drug Administration (USA); Joseph Y. Lo, Duke Univ. (USA); Stephen J. Glick, U.S. Food and Drug Administration (USA) . . . . . [9783-78]

4:50 pm: **Predicting detection performance with model observers: Fourier domain or spatial domain?**, Baiyu Chen, Lifeng Yu, Shuai Leng, James Kofler, Christopher P. Favazza, Thomas J. Vrieze, Cynthia H. McCollough, Mayo Clinic (USA) . . . . . [9783-79]

5:10 pm: **Assessing task performance in FFDM, DBT and synthetic mammography using uniform and anthropomorphic physical phantoms**, Lynda C. Ikejimba, Duke Univ. Medical Ctr. (USA); Stephen J. Glick, U.S. Food and Drug Administration (USA); Ehsan Samei, Joseph Y. Lo, Duke Univ. Medical Ctr. (USA) . . . . . [9783-80]

## CONFERENCE 9784

Image Processing

Room: San Diego

### SESSION 8

Room: San Diego . . . . . Wed 3:30 to 5:30 pm

#### Machine Learning

Session Chair: **Murray H. Loew**, The George Washington Univ. (USA); **Hayit Greenspan**, Tel Aviv Univ. (Israel)

3:30 pm: **Slide specific models for segmentation of differently stained digital histopathology whole slide images**, Nicolas Brieu, Olivier Pauly, Johannes Zimmermann, Gerd Binnig, Günter Schmidt, Definiens AG (Germany) . . . . . [9784-35]

3:50 pm: **Relative value of diverse brain MRI and blood-based biomarkers for predicting cognitive decline in the elderly**, Sarah Madsen, Greg Ver Steeg, The Univ. of Southern California (USA); Madeline Daiuan, Univ. of California, Los Angeles (USA); Adam Mezher, Neda Jahanshad, Talia M. Nir, Xue Hua, Boris A. Gutman, Aram Galstyan, Paul M. Thompson, The Univ. of Southern California (USA) . . . . . [9784-36]

4:10 pm: **Measuring glomerular number from kidney MRI images**, Jayaraman J. Thiagarajan, Lawrence Livermore National Lab. (USA); Karthikeyan Natesan Ramamurthy, IBM Thomas J. Watson Research Ctr. (USA); Berkay Kanberoglu, David H. Frakes, Kevin M. Bennett, Andreas S. Spanias, Arizona State Univ. (USA) . . . . . [9784-37]

4:30 pm: **Response monitoring using quantitative ultrasound methods and supervised dictionary learning in locally advanced breast cancer**, Mehrdad J. Gangeh, Univ. of Toronto (Canada); Brandon Fung, Sunnybrook Research Institute (Canada); Hadi Tadayyon, Univ. of Toronto (Canada); William T. Tran, Sunnybrook Research Institute (Canada); Gregory J. Czarnota, Sunnybrook Health Sciences Ctr. (Canada) . . . . . [9784-38]

4:50 pm: **Deeply learnt hashing forests for content based image retrieval in prostate MR images**, Amit Shah, Sailesh Conjeti, Nassir Navab, Amin Katouzian, Technische Univ. München (Germany) . . . . . [9784-39]

5:10 pm: **A high-throughput mouse phenotyping framework using robust principal component analysis**, Zhongliu Xie, Imperial College London (UK); Asanobu Kitamoto, National Institute of Informatics (Japan); Masaru Tamura, RIKEN (Japan); Toshihiko Shiroishi, National Institute of Genetics (Japan); Duncan F. Gillies, Imperial College London (UK) . . . . . [9784-40]

9784 continues on page 60 ➔

## CONFERENCE 9787

Image Perception, Observer Performance, and Technology Assessment

Room: California

### SESSION 4

Room: California . . . . . Wed 3:30 to 5:30 pm

#### Perception

Session Chair: **Claudia R. Mello-Thoms**, The Univ. of Sydney (Australia)

3:30 pm: **The classification of normal screening mammograms**, Zoey Z. Y. Ang, Mohammad A. Rawashdeh, Patrick C. Brennan, Robert Heard, Warwick B. Lee, Sarah J. Lewis, The Univ. of Sydney (Australia) . . . . . [9787-15]

3:50 pm: **The potential of pigeons as surrogate observers in medical image perception studies**, Elizabeth A. Krupinski, The Univ. of Arizona (USA); Richard M. Levenson, UC Davis Medical Ctr. (USA); Victor Navarro, Edward A. Wasserman, The Univ. of Iowa (USA) . . . . . [9787-16]

4:10 pm: **The impact of radiology expertise upon the localization of subtle pulmonary lesions**, John W. Robinson, Patrick C. Brennan, Claudia R. Mello-Thoms, Sarah J. Lewis, The Univ. of Sydney (Australia) . . . . . [9787-17]

4:30 pm: **Semantics to predict cancer status in lung nodules**, Ying Liu, Tianjin Medical Univ. (China) and H. Lee Moffitt Cancer Ctr. & Research Institute (USA); Yoganand Balagurunathan, H. Lee Moffitt Cancer Ctr. & Research Institute (USA); Thomas Atwater, Sanja Antic, Vanderbilt Univ. (USA); Qian Li, Tianjin Medical Univ. (China) and H. Lee Moffitt Cancer Ctr. & Research Institute (USA); Ronald C. Walker, Gary Smith, Pierre Massion, Vanderbilt Univ. (USA); Mathew Schabath, Robert J. Gillies, H. Lee Moffitt Cancer Ctr. & Research Institute (USA) . . . . . [9787-18]

4:50 pm: **Shapelet analysis of pupil dilation for modeling visuo-cognitive behavior in screening mammography**, Folami T. Alamudun, Texas A&M Univ. (USA); Hong-Jun Yoon, Oak Ridge National Lab. (USA); Tracy Hammond, Texas A&M Univ. (USA); Kathleen Hudson, The Univ. of Tennessee Medical Ctr. (USA); Garnetta Morin-Ducote, The Univ. of Tennessee (USA); Georgia D. Tourassi, Oak Ridge National Lab. (USA) . . . . . [9787-19]

5:10 pm: **Image similarity ranking of focal computed tomography liver lesions using a 2AFC technique**, Jessica Faruque, Sameer K. Antani, Rodney Long, Lauren Kim, George R. Thoma, National Institutes of Health (USA) . . . . . [9787-20]

9787 continues on page 60 ➔

## CONFERENCE 9788

Biomedical Applications in Molecular, Structural, and Functional Imaging

Room: Royal Palm One

### SESSION 6

Room: Royal Palm One . Wed 3:30 to 5:30 pm

#### Optical

Session Chairs: **Yu Chen**, Univ. of Maryland, College Park (USA); **Baohong Yuan**, The Univ. of Texas at Arlington (USA)

3:30 pm: **Voxel based morphometry in optical coherence tomography: validation and core findings**, Bhavna J. Antony, Johns Hopkins Univ. (USA); Min Chen, Univ. of Pennsylvania (USA); Aaron Carass, Bruno M. Jedynek, Omar Al-Louzi, Sharon D. Solomon, Shiv Saidha, Peter A. Calabresi, Jerry L. Prince, Johns Hopkins Univ. (USA) . . . . . [9788-24]

3:50 pm: **Multiple pinhole collimator based microscopic x-ray luminescence computed tomography**, Wei Zhang, Dianwen Zhu, Changqing Li, Univ. of California, Merced (USA) . . . . . [9788-25]

4:10 pm: **Optimization and performance evaluation of a conical mirror-based fluorescence molecular tomography imaging system**, Yue Zhao, Wei Zhang, Dianwen Zhu, Changqing Li, Univ. of California, Merced (USA) . . . . . [9788-26]

4:30 pm: **Compressive sensing-based preclinical molecular optical tomography**, Xavier Intes, Rensselaer Polytechnic Institute (USA) . . . . . [9788-27]

4:50 pm: **A novel reconstruction algorithm for bioluminescent tomography based on Bayesian compressive sensing**, Yaqi Wang, Jinchao Feng, Kebin Jia, Zhonghua Sun, Huijun Wei, Beijing Univ. of Technology (China) . . . . . [9788-28]

5:10 pm: **Modulation of fluorescence via ultrasound-switchable fluorescence for deep-tissue high-resolution imaging**, Baohong Yuan, Jayanth Kandukuri, Bingbing Cheng, Shuai Yu, The Univ. of Texas at Arlington (USA); Venugopal Bandi, Univ. of North Texas (USA); Kytaï T. Nguyen, Yi Hong, The Univ. of Texas at Arlington (USA); Francis D'Souza, Univ. of North Texas (USA) . . . . . [9788-81]

9788 continues on page 60 ➔

## CONFERENCE 9791

Digital Pathology

Room: Golden West

### SESSION 2

Room: Golden West . . . . Wed 3:30 to 5:30 pm

#### Precision Medicine and Grading

Session Chair: **John E. Tomaszewski M.D.**, Univ. at Buffalo (USA)

3:30 pm: **Classification of breast cancer stroma as a tool for prognosis**, Sara Reis, Univ. College London (UK); Patrycja Gazinska, King's College London (UK); John H. Hipwell, Thomy Mertzanidou, Univ. College London (UK); Kalnisha Naidoo, The Institute of Cancer Research (UK); Sarah Pinder, King's College London (UK); David J. Hawkes, Univ. College London (UK) . [9791-4]

3:50 pm: **Automated tubule nuclei quantification on ER+ breast cancer images: Comparison with Oncotype DX risk categories**, David E. Romo-Bucheli, Univ. Nacional de Colombia (Colombia); Andrew Janowczyk, Case Western Reserve Univ. (USA); Eduardo Romero Castro, Univ. Nacional de Colombia (Colombia); Hannah L. Gilmore M.D., Univ. Hospitals Case Medical Ctr. (USA); Anant Madabhushi, Case Western Reserve Univ. (USA) [9791-5]

4:10 pm: **Computer-assisted bladder cancer grading:  $\alpha$ -shapes for color space decomposition**, Muhammad Khalid Khan Niazi, Anil V. Parwani M.D., The Ohio State Univ. Medical Ctr. (USA); Metin N. Gurcan, The Ohio State Univ. Wexner Medical Ctr. (USA) . . . . . [9791-6]

4:30 pm: **Multi-instance multi-label learning for whole slide breast histopathology**, Caner Mercan, Bilkent Univ. (Turkey); Ezgi Mercan, Univ. of Washington (USA); Selim Aksoy, Bilkent Univ. (Turkey); Linda G. Shapiro, Univ. of Washington (USA) . . . . . [9791-7]

4:50 pm: **Intraoperative neuropathology of glioma recurrence: cell detection and classification**, Fazly S. Abas, The Ohio State Univ. (USA) and Multimedia Univ. (Malaysia); Hamza N. Gokozan, Univ. Hospitals of Cleveland (USA); Behiye Goksel, Jose J. Otero, Metin N. Gurcan, The Ohio State Univ. (USA) . . . . . [9791-8]

5:10 pm: **Preliminary evaluation of a fully-automated quantitative framework for characterizing general breast tissue histology via color histogram and color texture analysis**, Brad M. Keller, Aimilia Gastounioti, Rebecca C. Batiste, Despina Kontos, Michael D. Feldman, Univ. of Pennsylvania School of Medicine (USA) . . . . . [9791-9]

9791 continues on page 60 ➔

CONFERENCE 9783 ENDS



## CONFERENCE 9784

Image Processing

Room: San Diego

### SESSION 9

Room: San Diego ..... Thu 8:00 to 9:40 am

#### Model-based Image Analysis and Image Synthesis

Session Chair: **Jerry L. Prince**, Johns Hopkins Univ. (USA)

8:00 am: **On the fallacy of quantitative segmentation for T1-weighted MRI**, Andrew J. Plassard, Robert L. Harrigan, Allen T. Newton, Vanderbilt Univ. (USA); Swati Rane, Univ. of Washington (USA); Srivastan Pallavaram, Pierre F. D'Haese, Benoit M. Dawant, Daniel O. Claassen, Bennett A. Landman, Vanderbilt Univ. (USA) ..... [9784-41]

8:20 am: **Computed tomography synthesis from magnetic resonance images of the pelvic region by a combination of random classification and regression forests and auto-context features**, Daniel Andreasen, Technical Univ. of Denmark (Denmark) and Gentofte and Herlev Hospital (Denmark); Jens M. Edmund, Gentofte and Herlev Hospital (Denmark); Vasileios Zografos, Bjoern H. Menze, Technische Univ. München (Germany); Koen Van Leemput, Technical Univ. of Denmark (Denmark) and A.A. Martinos Ctr. for Biomedical Imaging, Massachusetts General Hospital (USA) ..... [9784-42]

8:40 am: **Endoscopic-CT: learning-based photometric reconstruction for endoscopic sinus surgery**, Austin Reiter, Simon Leonard, Ayushi Sinha, Masaru Ishii, Russell H. Taylor, Gregory D. Hager, Johns Hopkins Univ. (USA) ..... [9784-43]

9:00 am: **Framework for quantitative evaluation of 3D vessel segmentation approaches using vascular phantoms in conjunction with 3D landmark localization and registration**, Stefan Wörz, Deutsches Krebsforschungszentrum (Germany) and Ruprecht-Karls-Univ. Heidelberg (Germany); Philipp Hoegen, UniversitätsKlinikum Heidelberg (Germany); Wei Liao, Ruprecht-Karls-Univ. Heidelberg (Germany); Matthias Müller-Eschner, Hans-Ulrich Kauczor, UniversitätsKlinikum Heidelberg (Germany); Hendrik von Tengg-Kobligk, Inselspital Bern (Switzerland); Karl Rohr, Ruprecht-Karls-Univ. Heidelberg (Germany) . . . [9784-44]

9:20 am: **Learning of anatomical views and measurements from redundant but inconsistent reference data for 3D sonographic fetal brain screening**, Irina Waechter-Stehle, Tobias Klinder, Cristian Lorenz, Philips Research (Germany); Jean Michel Rouet, Philips France (France); David Roundhill, Gary Andrews, Philips Ultrasound, Inc. (USA); Angelo Cavallaro, Raffaele Napolitano, Malid Molloholli, Tess Norris, Univ. of Oxford (UK); Aris Papageorgiou, Univ. of Oxford (UK) ..... [9784-45]

#### POSTER AWARDS SESSION

Room: San Diego ..... 9:40 am to 9:45 am

The Image Processing conference poster award recipients will be recognized and certificates distributed.

Coffee Break ..... Thu 9:45 am to 10:10 am

9784 continues on page 61 

## CONFERENCE 9787

Image Perception,  
Observer Performance, and  
Technology Assessment

Room: California

### SESSION 5

Room: California ..... Thu 8:00 to 9:40 am

#### Keynote and ROC Analysis

Session Chairs: **Craig K. Abbey**, Univ. of California, Santa Barbara (USA);  
**Matthew A. Kupinski**, College of Optical Sciences, The Univ. of Arizona (USA)

8:00 am: **Image perception foundation of success for NLST (Keynote Presentation)**, Francine L. Jacobson, Brigham and Women's Hospital (USA) ..... [9787-1]

Coffee Break ..... Wed 8:40 am to 9:00 am

9:00 am: **Minimum detectable change in size of pulmonary nodules with chest tomosynthesis: a human observer study using simulated nodules**, Christina Söderman, Åse A. Johnsson, Jenny Vikgren, Rauni Rossi Norrlund, David Molnar, Angelica Svalkvist, Lars G. Månsson, Magnus Båth, Univ. of Gothenburg (Sweden) and Sahlgrenska Univ. Hospital (Sweden) ..... [9787-2]

9:20 am: **Assessing nodule detection on lung cancer screening CT: the effects of tube current modulation and model observer selection on detectability maps**, John M. Hoffman, Univ. of California, Los Angeles (USA); Frédéric Noo, The Univ. of Utah (USA); Kyle McMillan, Stefano Young, Michael F. McNitt-Gray, Univ. of California, Los Angeles (USA) ..... [9787-3]

#### POSTER AWARDS SESSION

Room: California ..... 9:40 am to 9:45 am

The Image Perception, Observer Performance, and Technology Assessment conference poster award recipients will be recognized and certificates distributed.

Coffee Break ..... Thu 9:40 am to 10:10 am

9787 continues on page 61 

## CONFERENCE 9788

Biomedical Applications in  
Molecular, Structural, and  
Functional Imaging

Room: Royal Palm One

### SESSION 7

Room: Royal Palm One ..... Thu 8:00 to 9:40 am

#### Fluids and Cardiovascular

Session Chairs: **Armando Manduca**, Mayo Clinic (USA);  
**Robert C. Molthen**, Medical College of Wisconsin (USA)

8:00 am: **MPI as high-temporal resolution imaging technique for in vivo bolus tracking of Ferucarbotran in mouse model**, Caroline Jung, Johannes Salamon, Martin Hofmann, Michael G. Kaul, Gerhard Adam, Harald Ittrich, Tobias Knopp, Univ. Hospital Hamburg-Eppendorf (Germany) ..... [9788-30]


8:20 am: **A dual energy CT study on vascular effects of gold nanoparticles in radiation therapy**, Jeffrey Ashton, Melodi Whitley, Everett Moding, David G. Kirsch, Duke Univ. School of Medicine (USA); Jennifer L. West, Cristian T. Badea, Duke Univ. (USA) . . . [9788-31]

8:40 am: **Analysis of cardiac interventricular septum motion in different respiratory states**, Lennart Tautz, Fraunhofer MEVIS (Germany); Li Feng, Ricardo Otazo, New York Univ. Langone Medical Ctr. (USA); Anja B. Hennemuth, Fraunhofer MEVIS (Germany); Leon Axel, New York Univ. Langone Medical Ctr. (USA) . . [9788-32]

9:00 am: **Comprehensive serial study of dynamic remodeling of atherosclerotic coronary arteries using intravascular ultrasound**, Zhi Chen, Andreas Wahle, Ling Zhang, The Univ. of Iowa (USA); Tomas Kovarnik, Charles Univ. in Prague (Czech Republic); John J. Lopez, Loyola Univ. Chicago (USA); Milan Sonka, The Univ. of Iowa (USA) ..... [9788-33]

9:20 am: **Motion correction for improving the accuracy of myocardial perfusion CT imaging**, Jed D. Pack, Zhye Yin, GE Global Research (USA); Guanglei Xiong, Simon I. Dunham, Kimberly D. Elmore, Dalio Institute of Cardiovascular Imaging (USA) and Weill Cornell Medical College (USA); Peter M. Edic, GE Global Research (USA); James K. Min M.D., Dalio Institute of Cardiovascular Imaging (USA) and Weill Cornell Medical College (USA) ..... [9788-34]

Coffee Break ..... Thu 9:40 am to 10:10 am

9788 continues on page 61 

## CONFERENCE 9791

Digital Pathology

Room: Golden West

### SESSION 3

Room: Golden West ..... Thu 8:00 to 9:40 am

#### Detection and Segmentation

Session Chair: **Anne L. Martel**, Sunnybrook Research Institute (Canada)

8:00 am: **Hotspot detection in pancreatic neuroendocrine tumors: Density approximation by  $\alpha$ -shape maps**, Muhammad Khalid Khan Niazi, The Ohio State Univ. Medical Ctr. (USA); Douglas J. Hartman M.D., Liron Pantanowitz M.D., Univ. of Pittsburgh Medical Ctr. (USA); Metin N. Gurcan, The Ohio State Univ. Medical Ctr. (USA) ..... [9791-10]

8:20 am: **Adaptive local thresholding for robust nucleus segmentation using shaper prior**, Shawn Wang, Chukka Srinivas, Christophe Chef'd'hotel, Ventana Medical Systems, Inc. (USA) . . . . . [9791-11]

8:40 am: **Non-uniform object counting method in large-format pyramid images applied to CD31 vessel counting in whole-mount digital pathology sections**, Mayan Murray, Melissa L. Hill, Kela Liu, James G. Mainprize, Sunnybrook Research Institute (Canada); Martin J. Yaffe, Sunnybrook Research Institute (Canada) and Univ. of Toronto (Canada) ..... [9791-12]

9:00 am: **Segmentation of vessel structures in serial whole slide sections using region-based context features**, Michael Schwieter, Horst K. Hahn, Fraunhofer MEVIS (Germany); Uta Dahmen, Friedrich-Schiller-Univ. Jena (Germany); Olaf Dirsch, Chemnitz Central Hospital (Germany) ..... [9791-13]


9:20 am: **Automated quantification of glomeruli features in renal pathology**, Brandon Ginley, Univ. at Buffalo (USA); Piyush Tripathi, Feng Chen, Washington Univ. in St. Louis (USA); Edwin Anand, John E. Tomaszewski M.D., Pinaki Sarder, Univ. at Buffalo (USA) ..... [9791-14]

Coffee Break ..... Thu 9:40 am to 10:10 am

#### POSTER AWARDS SESSION

Room: Golden West ..... 9:40 am to 9:45 am

The Digital Pathology conference poster award recipients will be recognized and certificates distributed.

9791 continues on page 61 



## CONFERENCE 9784

Image Processing

Room: San Diego

### SESSION 10

Room: San Diego ..... Thu 10:10 am to 12:10 pm

#### Segmentation

Session Chair: **Aaron Fenster**, Robarts Research Institute (Canada); **Koen Van Leemput**, Massachusetts General Hospital (USA)

10:10 am: **Breast segmentation in MRI using Poisson surface reconstruction initialized with random forest edge detection**, Anne L. Martel, Sunnybrook Research Institute (Canada); Cristina Gallego-Ortiz, Univ. of Toronto (Canada); Yingli Lu, Sunnybrook Research Institute (Canada) .....[9784-46]

10:30 am: **Simultaneous segmentation of retinal surfaces and microcystic macular edema in SDOCT volumes**, Bhavna J. Antony, Andrew Lang, Johns Hopkins Univ. (USA); Emily K. Swingle, The Ohio State Univ. (USA); Omar Al-Louzi, Aaron Carass, Sharon D. Solomon, Peter A. Calabresi, Shiv Saidha, Jerry L. Prince, Johns Hopkins Univ. (USA) ..... [9784-47]


10:50 am: **A generative model for segmentation of tumor and organs-at-risk for radiation therapy planning of glioblastoma patients**, Mikael Agn, Oula Puonti, Technical Univ. of Denmark (Denmark); Ian Law, Per Munck af Rosenschöld, Rigshospitalet (Denmark); Koen Van Leemput, Technical Univ. of Denmark (Denmark) and Martinos Ctr. for Biomedical Imaging, Harvard Medical School (USA) ..... [9784-48]

11:10 am: **Optimal retinal cyst segmentation from OCT images**, Ipek Oguz, Li Zhang, Michael D. Abramoff, Milan Sonka, The Univ. of Iowa (USA) ..... [9784-49]

11:30 am: **Simultaneous macula detection and optic disc boundary segmentation in retinal fundus images**, Fantin Girard, Ecole Polytechnique de Montréal (Canada); Conrad Kavalec, St. Mary's Hospital Ctr. (Canada); Sébastien Grenier, Ecole Polytechnique de Montréal (Canada); Houssem Ben Tahar, DIAGNOS Inc. (Canada); Farida Cheriet, Ecole Polytechnique de Montréal (Canada) ..... [9784-50]

11:50 am: **Structural functional associations of the orbit in thyroid eye disease: Kalman filters to track extraocular muscles**, Shikha Chaganti, Katrina M. Nelson, Vanderbilt Univ. (USA); Kevin Mundy, Vanderbilt Univ. Medical Ctr. (USA); Yifu Luo, Robert L. Harrigan, Stephen M. Damon, Daniel Fabbri, Vanderbilt Univ. (USA); Louise A. Mawn, Vanderbilt Univ. Medical Ctr. (USA); Bennett A. Landman, Vanderbilt Univ. (USA) ..... [9784-51]

Lunch Break ..... Thu 12:10 pm to 1:20 pm

9784 continues on page 62 

## CONFERENCE 9787

Image Perception,  
Observer Performance, and  
Technology Assessment

Room: California

### SESSION 6

Room: California ..... Thu 10:10 am to 12:10 pm

#### Model Observers II: Search

Session Chairs: **Howard C. Gifford**, Univ. of Houston (USA); **Subok Park**, U.S. Food and Drug Administration (USA)

10:10 am: **Ranking inconsistencies in the assessment of digital breast tomosynthesis (DBT) reconstruction algorithms using a location-known task and a search task**, Xin He, Rongping Zeng, Frank W. Samuelson, Berkman Sahiner, U.S. Food and Drug Administration (USA) ..... [9787-26]

10:30 am: **Model observer design for detecting multiple abnormalities in anatomical background images**, Gezheng Wen, The Univ. of Texas at Austin (USA) and U.S. Food and Drug Administration (USA) and The Univ. of Texas M.D. Anderson Cancer Ctr. (USA); Mia K. Markey, The Univ. of Texas at Austin (USA) and The Univ. of Texas M.D. Anderson Cancer Ctr. (USA); Subok Park, U.S. Food and Drug Administration (USA) ..... [9787-27]

10:50 am: **Visual-search observers for SPECT simulations with clinical backgrounds**, Howard C. Gifford, Univ. of Houston (USA) ..... [9787-28]

11:10 am: **Three scenarios of location-known detection and search performance ranking inconsistencies: a collection of experimental findings after an initial exploration of the underlying mechanism**, Xin He, Frank W. Samuelson, Rongping Zeng, Berkman Sahiner, U.S. Food and Drug Administration (USA) ..... [9787-29]

11:30 am: **Investigation on location-dependent detectability of a small mass for digital breast tomosynthesis evaluation**, Changwoo Lee, Jongduk Baek, Yonsei Univ. (Korea, Republic of); Subok Park, U.S. Food and Drug Administration (USA) ... [9787-30]

11:50 am: **Machine-learning model observer for detection and localization tasks in clinical SPECT-MPI**, Felipe M. Parages, Illinois Institute of Technology (USA); J. Michael O'Connor, Univ. of Massachusetts Lowell (USA); Hendrik P. Pretorius, Univ. of Massachusetts Medical School (USA); Jovan G. Brankov, Illinois Institute of Technology (USA) [9787-31]

Lunch Break ..... Thu 12:10 pm to 1:20 pm

9787 continues on page 62 

## CONFERENCE 9788

Biomedical Applications in  
Molecular, Structural, and  
Functional Imaging

Room: Royal Palm One

### SESSION 8

Room: Royal Palm One ..... Thu 10:10 am to 12:10 pm

#### Cancer Imaging

Session Chairs: **Barjor Gimi**, Dartmouth Hitchcock Medical Ctr. (USA); **Baohong Yuan**, The Univ. of Texas at Arlington (USA)

10:10 am: **Multimodal in vivo imaging of tumor xenografts using novel receptor-targeted peptide tracers**, Sarah Erdmann, Nicola Beindorff, Eva J. Koziolok, Juan D. Castillo Gómez, Sandy Hallmann, Asja Wagener, Sebastian Bandholtz, Winfried Brenner, Carsten Grötzing, Charité Universitätsmedizin Berlin (Germany) ..... [9788-35]

10:30 am: **Predicting response before initiation of neoadjuvant chemotherapy in breast cancer using new methods for the analysis of dynamic contrast enhanced MRI (DCE MRI) data**, Julio Cárdenas-Rodríguez, Joseph DeGrandchamp, The Univ. of Arizona (USA) ..... [9788-36]

10:50 am: **Hyperspectral imaging of neoplastic progression in a mouse model of oral carcinogenesis**, Baowei Fei, Guolan Lu, Xulei Qin, Dongsheng Wang, Emory Univ. (USA); Susan Muller M.D., Emory Univ. School of Medicine (USA); Hongzheng Zhang, Emory Univ. (USA); Amy Y. Chen, Emory Univ. School of Medicine (USA); Georgia Z. Chen, Emory Univ. (USA) ..... [9788-37]

11:10 am: **Superpixel-based spectral classification for the detection of head and neck cancer with hyperspectral imaging**, Baowei Fei, Emory Univ. (USA); Hyunwoo Chung, Emory Univ. School of Medicine (USA); Guolan Lu, Zhiqiang Tian, Dongsheng Wang, Georgia Z. Chen, Emory Univ. (USA) ..... [9788-38]

11:30 am: **Quantitative evaluation of epigenetic modification in tumor with 18F-FAHA PET imaging**, Fiona Li, Western Univ. (Canada) and Lawson Health Research Institute (Canada) and Robarts Research Institute (Canada); Sung J. Cho, Western Univ. (Canada); Lihai Yu, Western Univ. (Canada) and Lawson Health Research Institute (Canada); Robert H. E. Hudson, Western Univ. (Canada); Leonard G. Luyt, Michael S. Kovacs, Western Univ. (Canada) and Lawson Health Research Institute (Canada); Christopher Pin, Western Univ. (Canada); James Koropatnick, Western Univ. (Canada) and Lawson Health Research Institute (Canada); Ting-Yim Lee, Western Univ. (Canada) and Lawson Health Research Institute (Canada) ..... [9788-39]

11:50 am: **Respiration gating and bloch fitting improve pH measurements with acidoCEST-MRI in an ovarian orthotopic tumor model**, Kyle Jones, Mark D. Pagel, Christine Howison, Edward Randtke, The Univ. of Arizona (USA) ..... [9788-40]

Lunch Break ..... Thu 12:10 pm to 1:20 pm

9788 continues on page 62 

## CONFERENCE 9791

Digital Pathology

Room: Golden West

### SESSION 4

Room: Golden West ..... Thu 10:10 am to 12:10 pm

#### Machine Learning

Session Chairs: **Aaron D. Ward**, Western Univ. (Canada); **Josien P. W. Pluim**, Technische Univ. Eindhoven (Netherlands)

10:10 am: **Differentiation of arterioles from venules in mouse histology images using machine learning**, Sachi Elkertor, Yiwen Xu, J. Geoffrey Pickering, Aaron D. Ward, Western Univ. (Canada) ..... [9791-15]

10:30 am: **Lymphoma diagnosis in histopathology using a multi-stage visual learning approach**, Noel Codella, IBM Thomas J. Watson Research Ctr. (USA); Mehdi Moradi, IBM Research - Almaden (USA); Matt Matasar, Memorial Sloan-Kettering Cancer Ctr. (USA); Tanveer F. Syeda-Mahmood, IBM Research - Almaden (USA); John R. Smith, IBM Thomas J. Watson Research Ctr. (USA) ..... [9791-16]

10:50 am: **Evaluating stability of histomorphometric features across scanner and staining variations: predicting biochemical recurrence from prostate cancer whole slide images**, Patrick Leo, George Lee, Anant Madabhushi, Case Western Reserve Univ. (USA) ..... [9791-25]

11:10 am: **A structure-based approach for colon gland segmentation in digital pathology**, Bassem Ben Cheikh, UPMC Sorbonne Univ. (France); Philippe Bertheau, Univ. Paris Diderot (France) and Hôpital Saint-Louis (France); Daniel Racoceanu, UPMC Sorbonne Univ. (France) and INSERM (France) ..... [9791-18]

11:30 am: **Miniature objective lens for array microscopy digital pathology: evaluation and improvement**, Brian P. McCall, Fresnel Technologies Inc. (USA); Mark C. Pierce, Rutgers, The State Univ. of New Jersey (USA); Edward A. Graviss, The Methodist Hospital Research Institute (USA); Rebecca Richards-Kortum, Tomasz S. Tkaczyk, Rice Univ. (USA) [9791-19]

11:50 am: **Quantitative diagnosis of tongue cancer on histological images in an animal model**, Baowei Fei, Guolan Lu, Xulei Qin, Dongsheng Wang, Susan Muller M.D., Hongzheng Zhang, Amy Y. Chen, Georgia Z. Chen, Emory Univ. (USA) ..... [9791-20]

Lunch Break ..... Thu 12:10 pm to 1:20 pm

9791 continues on page 62 

CONFERENCE 9784

Image Processing

Room: San Diego

SESSION 11

Room: San Diego ..... Thu 1:20 to 3:00 pm

Classification/Population

Session Chairs: **Baowei Fei**, Emory Univ. (USA); **Dzung L. Pham**, Henry M. Jackson Foundation (USA)

1:20 pm: **Quality assurance using outlier detection on an automatic segmentation method for the cerebellar peduncles**, Ke Li, Johns Hopkins Univ. (USA); Chuyang Ye, Brainnetome Ctr., Institute of Automation (China); Zhen Yang, Aaron Carass, Johns Hopkins Univ. (USA); Sarah H. Ying, The Johns Hopkins School of Medicine (USA); Jerry L. Prince, Johns Hopkins Univ. (USA) .....[9784-52]

1:40 pm: **A learning-based, fully automatic liver tumor segmentation pipeline based on sparsely annotated training data**, Michael Goetz, Eric Heim, Keno Maerz, Tobias Norajitra, Deutsches Krebsforschungszentrum (Germany); Mohammadreza R. Hafezi, Nassim Fard, Arianeb Mehrabi, Ruprecht-Karls-Univ. Heidelberg (Germany); Max Knoll, Christian Weber, Deutsches Krebsforschungszentrum (Germany); Lena Maier-Hein, Klaus H. Maier-Hein, Deutsches Krebsforschungszentrum (Germany) .....[9784-53]

2:00 pm: **SVM-based failure detection of GHT localizations**, Thomas Blaffert, Cristian Lorenz, Hannes Nickisch, Jochen Peters, Jürgen Weese, Philips Research (Germany) .....[9784-54]

2:20 pm: **Embedded sparse representation of fMRI data via group-wise dictionary optimization**, Dajiang Zhu, Univ. of Southern California (USA); Binbin Lin, Univ. of Michigan (USA); Joshua Faskowitz, Univ. of Southern California (USA); Jieping Ye, Univ. of Michigan (USA); Paul M. Thompson, Univ. of Southern California (USA) .....[9784-55]

2:40 pm: **Genome-wide association study of coronary and aortic calcification in lung cancer screening CT**, Bob D. De Vos, Jessica Van Setten, Pim A. de Jong, Willem P. T. M. Mali, Univ. Medical Ctr. Utrecht (Netherlands); Matthijs Oudkerk, Univ. Medical Ctr. Groningen (Netherlands); Max A. Viergever, Ivana Isgum, Univ. Medical Ctr. Utrecht (Netherlands) .....[9784-56]

Coffee Break ..... Thu 3:00 pm to 3:30 pm

9784 continues on page 63

CONFERENCE 9787

Image Perception, Observer Performance, and Technology Assessment

Room: California

SESSION 7

Room: California ..... Thu 1:20 to 3:00 pm

Breast Imaging II

Session Chair: **Pontus A. Timberg**, Scania Univ. Hospital (Sweden)

1:20 pm: **Varying performance in mammographic interpretation across two countries: Do results indicate reader or population variances?**, BaoLin Pauline Soh, Singapore General Hospital (Singapore); Warwick B. Lee, BreastScreen NSW (Australia); Jill Wong, National Cancer Ctr. of Singapore (Singapore); Llewellyn Sim, Singapore General Hospital (Singapore); Stephen L. Hillis, The Univ. of Iowa (USA); Kriscia A. Tapia, Patrick C. Brennan, The Univ. of Sydney (Australia) .....[9787-32]

1:40 pm: **Luminance level of a monitor: influence on detectability and detection rate of breast cancer in 2D mammography**, Frédéric Belmelmans, KU Leuven (Belgium); Alaleh Rashid Nasab, KU Leuven (Belgium) and Univ. College London (UK); Frédérique Chesterman, Tom R. L. Kimpe, Barco N.V. (Belgium); Hilde Bosmans, KU Leuven (Belgium) and UZ Leuven (Belgium)[9787-33]

2:00 pm: **The effectiveness of the cranio-caudal mammogram projection among radiologists**, Phuong Dung Trieu, Warwick B. Lee, Kriscia A. Tapia, Patrick C. Brennan, The Univ. of Sydney (Australia) .....[9787-34]

2:20 pm: **Investigating the link between the radiological experience and the allocation of an equivocal finding**, Mohammad A. Rawashdeh, Camila Vidotti, Warwick B. Lee, Sarah J. Lewis, Claudia R. Mello-Thoms, Warren M. Reed, Kriscia A. Tapia, Patrick C. Brennan, The Univ. of Sydney (Australia) .....[9787-35]

2:40 pm: **The interplay of attention economics and CAD marks interpretation in screening mammography**, Tayler M. Schwartz, The Warren Alpert Medical School of Brown Univ. (USA); Radhika Sridharan, UKM Medical Ctr. (Malaysia); Wei Wei, Olga Lukyanchenko, William R. Geiser, Gary J. Whitman, The Univ. of Texas M.D. Anderson Cancer Ctr. (USA); Tamara M. Haygood, The Warren Alpert Medical School of Brown Univ. (USA) .....[9787-36]

Coffee Break ..... Thu 3:00 pm to 3:30 pm

9787 continues on page 63

CONFERENCE 9788

Biomedical Applications in Molecular, Structural, and Functional Imaging

Room: Royal Palm One

SESSION 9

Room: Royal Palm One ..... Thu 1:20 to 3:00 pm

Lung

Session Chair: **Robert C. Molthen**, Medical College of Wisconsin (USA)

1:20 pm: **A semi-automatic framework of measuring pulmonary arterial metrics at anatomic airway locations using CT imaging**, Dakai Jin, The Univ. of Iowa (USA); Junfeng Guo, Timothy M. Dougherty, The Univ. of Iowa Hospitals and Clinics (USA); Krishna S. Iyer, The Univ. of Iowa Carver College of Medicine (USA); Eric A. Hoffman, The Univ. of Iowa Hospitals and Clinics (USA); Punam K. Saha, The Univ. of Iowa (USA) .....[9788-41]

1:40 pm: **Fat quantification and analysis of lung transplant patients on unenhanced chest CT images based on standardized anatomic space**, Yubing Tong, Univ. of Pennsylvania School of Medicine (USA); Jayaram K. Udupa, Drew A. Torigian, Caiyun Wu, Univ. of Pennsylvania (USA); Jason D. Christie, Univ. of Pennsylvania School of Medicine (USA); David J. Lederer, Columbia Univ. Medical Ctr. (USA) .....[9788-42]

2:00 pm: **Patient-specific simulation of tidal breathing**, Martin A. Walters, Ian P. Jones, Andrew K. Wells, Ian S. Hamill, ANSYS UK Ltd. (UK); Bart Veeckmans, Materialise N.V. (Belgium); Wim Vos, Cedric Van Holsbeke, FLUIDDA nv (Belgium); Catalin Fetita, Christophe Lefèvre, Télécom SudParis (France) and Institut Mines-Télécom (France) .....[9788-43]

2:20 pm: **Preliminary study of visualizing membrane structures of spiculated pulmonary nodules in three-dimensional thoracic CT images**, Yoshiaki Kawata, Noboru Niki, The Univ. of Tokushima (Japan); Hironobu Ohmatsu, Keiju Aokage, Masahiko Kusumoto, Takaaki Tsuchida, National Cancer Ctr. Hospital East (Japan); Kenji Eguchi, Teikyo Univ. School of Medicine (Japan); Masahiro Kaneko, Tokyo Health Service Association (Japan) .....[9788-44]

2:40 pm: **Robust lung identification in MSCT via controlled flooding and shape constraints: dealing with anatomical and pathological specificity**, Catalin Fetita, Sebastian R. Tarando, Télécom SudParis (France); Pierre-Yves Brillet, Univ. Paris 13 (France) and Avicenne Hospital (France); Philippe A. Grenier M.D., Univ. Paris 6 (France) and Pitié-Salpêtrière Hospital (France) .....[9788-45]

Coffee Break ..... Thu 3:00 pm to 3:30 pm

9788 continues on page 63

CONFERENCE 9791

Digital Pathology

Room: Golden West

SESSION 5

Room: Golden West ..... Thu 1:20 to 2:40 pm

Emerging Technologies

Session Chairs: **Selim Aksoy**, Bilkent Univ. (Turkey); **Scott Doyle**, Univ. at Buffalo (USA)

1:20 pm: **Multi-scale learning based segmentation of glands in digital colonorectal pathology images**, Yi Gao, Stony Brook Univ. (USA); William Liu, Buckingham Browne & Nichols School (USA); Shipra Arjun, Liangjia Zhu, Vadim Ratner, Tahsin Kurc, Joel H. Saltz M.D., Allen R. Tannenbaum, Stony Brook Univ. (USA) .....[9791-21]

1:40 pm: **3D morphological measurement of whole slide histological vasculature reconstructions**, Yiwen Xu, J. Geoffrey Pickering, The Univ. of Western Ontario (Canada); Zengxuan Nong, Robarts Research Institute (Canada); Aaron D. Ward, The Univ. of Western Ontario (Canada) .....[9791-22]

2:00 pm: **High-resolution single pixel imaging: Pushing toward a real time hyperspectral imaging system**, Joseph A. Peller, Didier Dréau, Faramarz Farahi, Susan R. Trammell, The Univ. of North Carolina at Charlotte (USA) .....[9791-23]

2:20 pm: **Offset-sparsity decomposition for enhancement of color microscopic image of stained specimen in histopathology: further results**, Ivica Kopriva, Marijana Popović Hadžija, Mirko Hadžija, Institut Ruder Boškovic (Croatia); Gorana Aralica, Univ. Hospital Dubrava (Croatia), Univ. of Zagreb (Croatia) .....[9791-24]

SESSION 6

Room: Golden West ..... Thu 2:40 to 3:10 pm

Emerging Global Opportunities

Session Chairs: **Metin N. Gurcan**, The Ohio State Univ. Wexner Medical Ctr. (USA); **Anant Madabhushi**, Case Western Reserve Univ. (USA)

2:40 pm: **Cancer diagnostics in Africa: leapfrog technology and volunteers transform care** (*Invited Paper*), E. Blair Holladay, American Society for Clinical Pathology (USA), Northwestern Medical School (USA); Dan Milner, Brigham and Women's Hospital (USA), Harvard Univ. (USA) .....[9791-64]

CONFERENCE 9791 ENDS



# THURSDAY 3 MARCH

## CONFERENCE 9784

Image Processing

Room: San Diego

### SESSION 12

Room: San Diego ..... Thu 3:30 to 5:10 pm

#### Registration

Session Chairs: **Stefan Klein**, Erasmus MC (Netherlands); **Jayaram K. Udupa**, Univ. of Pennsylvania (USA)

3:30 pm: **Automatic localization of landmarks in partial head CT images with regression forests for image registration initialization**, Dongqing Zhang, Yuan Liu, Jack H. Noble, Benoit M. Dawant, Vanderbilt Univ. (USA) ..... [9784-57]

3:50 pm: **Semi-automated registration of pre- and intra-operative liver CT for image-guided interventions**, Gokhan Gunay, Luu Manh Ha, Theo van Walsum, Stefan Klein, Erasmus MC (Netherlands) ..... [9784-58]

4:10 pm: **Evaluation of body-wise and organ-wise registrations for abdominal organs**, Zhoubing Xu, Sahil A. Panjwani, Christopher P. Lee, Ryan P. Burke, Vanderbilt Univ. (USA); Rebecca B. Baucum, Benjamin K. Poulouse, Vanderbilt Univ. Medical Ctr. (USA); Bennett A. Landman, Richard G. Abramson, Vanderbilt Univ. (USA) ..... [9784-59]

4:30 pm: **3D prostate MR-TRUS non-rigid registration using dual optimization with volume-preserving constraint**, Wu Qiu, Jing Yuan, Aaron Fenster, Roberts Research Institute (Canada) ..... [9784-60]

4:50 pm: **Robust endoscopic pose estimation for intraoperative organ-mosaicking**, Daniel Reichard, Sebastian Bodenstedt, Stefan Suwelack, Karlsruhe Institut für Technologie (Germany); Martin Wagner, Hannes Kennigott, UniversitätsKlinikum Heidelberg (Germany); Beat Müller-Stich, Heidelberg School of Medicine (Germany); Rüdiger Dillmann, Stefanie Speidel, Karlsruhe Institut für Technologie (Germany). [9784-61]

5:10 pm: **The heritability of the functional connectome is robust to common nonlinear registration methods**, George Hafzalla, The Univ. of Southern California (USA); Gautam Prasad, Vatche G. Baboyan, Joshua Faskowitz, Univ. of Southern California, Imaging Genetics Ctr. (USA); Neda Jahanshad, The Univ. of Southern California (USA); Katie L. McMahon, Greig I. de Zubicaray, The Univ. of Queensland (Australia); Margaret J. Wright, QIMR Berghofer Medical Research Institute (Australia); Meredith N. Braskie, Imaging Genetics Ctr. (USA); Paul M. Thompson, Univ. of Southern California, Imaging Genetics Ctr. (USA) ..... [9784-62]

CONFERENCE 9784 ENDS

## CONFERENCE 9787

Image Perception,  
Observer Performance, and  
Technology Assessment

Room: California

### SESSION 8

Room: California ..... Thu 3:30 to 5:30 pm

#### Technology Assessment

Session Chair: **Maciej A. Mazurowski**, Duke Univ. (USA)

3:30 pm: **Importance of the grayscale in early assessment of image quality gains with iterative CT reconstruction**, Frédéric Noo, The Univ. of Utah (USA); Katharin Hahn, Siemens Healthcare GmbH (Germany); Zjia Guo, The Univ. of Utah (USA) ..... [9787-37]

3:50 pm: **Validation of no-reference image quality index for the assessment of digital mammographic images**, Helder C. R. de Oliveira, Bruno Barufaldi, Lucas R. Borges, Univ. de São Paulo (Brazil); Salvador Gabarda, Instituto de Óptica "Daza de Valdés" (Spain); Predrag R. Bakic, Andrew D. A. Maidment, The Univ. of Pennsylvania Health System (USA); Marcelo A. C. Vieira, Homero Schiabel, Univ. de São Paulo (Brazil) ..... [9787-38]

4:10 pm: **Impact of large beam collimation on image quality**, Damien Racine, Alexandre H. Ba, Julien G. Ott, François O. Bochud, Francis R. Verdun, Ctr. Hospitalier Univ. Vaudois (Switzerland) ..... [9787-39]

4:30 pm: **Predicting radiologists' true and false positive decisions in reading mammograms by using gaze parameters and image-based features**, Ziba Gandomkar, Kevin Tay, William J. Ryder, Patrick C. Brennan, Claudia R. Mello-Thoms, The Univ. of Sydney (Australia) ..... [9787-40]

4:50 pm: **Quantitative image quality evaluation for cardiac CT reconstructions**, Hsin-Wu Tseng, The Univ. of Arizona (USA); Jiahua Fan, GE Healthcare (USA); Matthew A. Kupinski, College of Optical Sciences, The Univ. of Arizona (USA); William H. Balhorn, Darin Okerlund, GE Healthcare (USA) ..... [9787-41]

5:10 pm: **Effect of anatomical backgrounds on detectability in volumetric cone beam CT images**, Minah Han, Yonsei Univ. (Korea, Republic of); Subok Park, U.S. Food and Drug Administration (USA); Jongduk Baek, Yonsei Univ. (Korea, Republic of) ..... [9787-42]

CONFERENCE 9787 ENDS

## CONFERENCE 9788

Biomedical Applications in  
Molecular, Structural, and  
Functional Imaging

Room: Royal Palm One

### SESSION 10

Room: Royal Palm One ..... Thu 3:30 to 5:30 pm

#### Novel MR Techniques and Applications

Session Chairs: **Barjor Gimi**, Dartmouth Hitchcock Medical Ctr. (USA); **Axel Wismüller M.D.**, Univ. of Rochester Medical Ctr. (USA)

3:30 pm: **Maturation index of developing human brain based on long- and short-range association fibers**, Minhui Ouyang, Tina Jeon, The Children's Hospital of Philadelphia (USA); Virendra R. Mishra, Lou Ruvo Ctr. for Brain Health (USA); Haixiao Du, Yu Wang, Tsinghua Univ. (China); Yun Peng, Capital Medical Univ. (China); Hao Huang, The Children's Hospital of Philadelphia (USA) and Univ. of Pennsylvania School of Medicine (USA) ..... [9788-46]

3:50 pm: **Perfusion deficits and functional connectivity alterations in patients with post-traumatic stress disorder**, Yang Liu, Baojuan Li, Xi Zhang, Linchuan Zhang, Liang Li, Hongbing Lu, Fourth Military Medical Univ. (China) ..... [9788-47]

4:10 pm: **Monitoring fractional anisotropy in developing rabbit brain using MR diffusion tensor imaging at 3T**, Jo-Chi Jao, Kaohsiung Medical Univ. (Taiwan); Yu-Ting Yang, Fooyin Univ. Hospital (Taiwan); Chia-Chi Hsiao, Kaohsiung Veterans General Hospital (Taiwan); Po-Chou Chen, I-Shou Univ. (Taiwan) [9788-48]

4:30 pm: **A pilot DTI analysis in patients with recent onset post-traumatic stress disorder**, Yang Liu, Liang Li, Baojuan Li, Xi Zhang, Hongbing Lu, Fourth Military Medical Univ. (China) ..... [9788-49]

4:50 pm: **Correlation between diffusion kurtosis and NODDI metrics in neonates and young children**, Shaheen Ahmed, Zhiyue J. Wang, Jonathan M. Chia, Nancy Rollins, The Univ. of Texas Southwestern Medical Ctr. at Dallas (USA) ..... [9788-99]

5:10 pm: **Multi-site study of diffusion metric variability: characterizing the effects of site, vendor, field strength, and echo time using the histogram distance**, Karl Helmer, Athinoula A. Martinos Ctr. for Biomedical Imaging (USA) and Massachusetts General Hospital (USA); Ming-Chung Chou, Kaohsiung Medical Univ. (Taiwan); Ronny I. Preciado, Athinoula A. Martinos Ctr. for Biomedical Imaging (USA) and Massachusetts General Hospital (USA); Barjor Gimi, The Geisel School of Medicine at Dartmouth (USA); Nancy Rollins, The Univ. of Texas Southwestern Medical Ctr. at Dallas (USA); Allen Song, Brain Imaging and Analysis Ctr., Duke Univ. School of Medicine (USA); Jessica Turner, The MIND Research Network (USA); Susumu Mori, Johns Hopkins Univ. School of Medicine (USA) ..... [9788-51]

#### POSTER AWARDS SESSION

Room: Royal Palm One ..... 5:30 pm to 5:35 pm

The Biomedical Applications in Molecular, Structural, and Functional Imaging conference poster award recipients will be recognized and certificates distributed.

CONFERENCE 9788 ENDS

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## A

Aagaard-Kienitz, Beverly D. [9783-27] S6  
 Aalamifar, Fereshteh [9790-42] SPS2, [9790-69] SPS7  
 Abadi, Ehsan [9783-121] SPS4  
 Abas, Fazy S. [9785-10] S2, [9791-8] S2  
 Abbey, Craig K. 9787 Conference Chair, 9787 S5 Session Chair, 9787 SWK5 Session Chair, [9787-55] SPWed, [9790-23] S5  
 Abd. Rahni, Ashrani Aizzuddin [9788-75] SPS4  
**Abdolmanafi, Atefeh** [9786-102] SPSMon  
**Abidin, Anas Z.** [9785-7] S2, [9788-19] S5, [9788-20] S5, [9788-22] S5, [9788-67] SPS4  
 Abi-Jaoudeh, Nadine [9786-40] S8  
 Abolmaesumi, Purang [9785-55] S12, 9786 Program Committee, 9786 S11 Session Chair, [9786-19] S4  
 Abokasis, David 9788 Program Committee  
 Abrámoff, Michael D. [9784-49] S10  
 Abramson, Richard G. [9784-29] S6, [9784-59] S12  
 Abugharbieh, Rafeef 9784 Program Committee  
**Abulnaga, Sayed Madsak** [9784-24] S6, [9785-97] SPS3  
 Acciavatti, Raymond J. [9783-1] S1, [9783-11] S2, [9783-220] SPS16  
 Acernese, Fausto [9785-5] S1  
 Ackerman, Joseph J.H. [9788-15] S4  
 Adam, Gerhard [9788-30] S7  
 Adam, Jean François [9783-201] SPS11  
 Aerts, Hugo 9785 S11 Panel Member, [9785-23] S5  
 Afshin, Mariam [9785-3] S1  
 Agarwal, Harsh [9784-89] SPS2, [9786-53] S11  
 Agarwal, Prachi [9785-139] SPS6  
 Agarwal, Suneeta [9789-15] S3  
 Agasthya, Greeshma [9783-121] SPS4  
 Aggour, Kareem S. [9791-28] SPSWed  
 Aghaei, Faranak [9785-26] S6, [9785-66] SPS1, [9785-73] SPS1  
 Agn, Mikael [9784-48] S10  
**Agurto Rios, Carla P.** [9785-43] S9, [9785-44] S9, [9785-87] SPS3  
 Ahmady Phoulady, Hady [9791-35] SPSWed  
 Ahmed, Azam S. [9783-27] S6  
 Ahmed, Hashim [9786-55] S11  
 Ahmed, Shaheen [9788-99] S10  
 Ai, Ling [9784-133] SPS5  
 Aklaghi, Nima [9790-62] SPS6  
 Aksoy, Selim 9791 Program Committee, 9791 S5 Session Chair, [9791-7] S2  
 Alakhras, Maram Mustafa [9783-97] SPS1  
 Alamo, Jorge [9783-90] SPS1  
 Alamudun, Folami T. [9787-19] S4  
 Albanese, Katie E. [9783-211] SPS14, [9783-72] S14  
 Alderliesten, Tanja [9784-150] SPS6, [9784-152] SPS6, [9786-95] SPSMon

Al-Diri, Bashir [9784-80] SPS1  
 Alessandrini, Martino [9790-5] S1  
 Alexandroni, Guy [9784-9] S2  
 Aljabar, Paul 9784 Program Committee  
 Allen, Peter J. [9784-67] SPS1  
 Allen, Thomas W. [9784-144] SPS6  
 Allmendinger, Thomas [9783-49] S9, [9783-51] S10  
 Allner, Sebastian [9783-13] S3  
 Al-Louzi, Omar [9784-32] S7, [9784-47] S10, [9788-24] S6  
 Almeida, Nuno [9790-12] S3  
 Al-Ola, Omar Abou [9783-168] SPS7  
 Alrehily, Faisal [9783-84] SPS1  
**Alsaleh, Samar** [9786-61] SPSMon, [9786-68] SPSMon  
 Altbach, Maria I. [9787-8] S2  
 Alva, Ajjai [9785-51] S10  
 Amezcua, Lilyana [9789-13] S3  
 Amini, Amir A. 9788 Program Committee, [9788-97] SPS9  
 Amouriq, Yves [9788-63] SPS3  
 An, Dong [9785-85] SPS3  
 Analoui, Mostafa 9784 Program Committee  
 Anam, Amrita [9787-12] S3  
 Anand, Edwin [9791-14] S3  
**Anastasio, Mark A.** [9783-147] SPS6, [9783-177] SPS9, [9783-198] SPS11, [9783-200] SPS11, 9790 Program Committee  
 Anavi, Yaron [9785-35] S7  
 Anderson, Adam M. [9784-127] SPS4  
 Anderson, Robert [9784-6] S2  
 Anderson, Ryan [9786-86] SPSMon  
 Andreasen, Daniel [9784-42] S9  
 Andrews, Gary [9784-45] S9  
 Andreyev, Andriy [9783-187] SPS10, [9783-57] S11  
**Ang, Zoey Zuo Y.** [9787-15] S4  
 Angelini, Elsa D. 9784 Conference Chair, 9784 S5 Session Chair  
 Anirudh, Rushil [9785-110] SPS4  
 Annangi, Pavan [9790-45] SPS3  
**Antani, Sameer K.** [9785-42] S8, [9787-20] S4, [9789-17] S4  
 Anthony, Brian W. 9790 S6 Session Chair, [9790-25] S6, [9790-26] S6, [9790-63] SPS6, [9790-64] SPS6  
 Antic, Sanja [9787-18] S4  
 Anton, Gisela [9783-196] SPS11, [9783-203] SPS11, [9783-25] S5  
**Antonuk, Larry E.** [9783-129] SPS5  
**Antony, Bhavna J.** [9784-47] S10, [9788-24] S6  
 Antropova, Natalia [9783-162] SPS7  
 Aokage, Keiju [9788-44] S9  
 Applegate, Kimberly [9787-45] SPWed  
 Aralica, Gorana [9791-24] S5  
 Ardon, Roberto [9785-61] S13  
 Arechavala, Stacie M. [9789-7] S2  
 Arjun, Shipra [9791-21] S5  
 Arka, Israna Houssain [9788-75] SPS4  
 Arit, Felix [9787-58] SPWed  
**Armato, Samuel G.** 9785 Conference Chair, 9785 S11 Panel Moderator, [9785-114] SPS4, [9785-117] SPS4  
 Arshad, Saaid H. [9788-84] SPS7

Ashizawa, Kazuto [9785-109] SPS4  
 Ashton, Jeffrey [9788-31] S7  
**Astley, Susan M.** 9785 Program Committee  
 Atehortúa Labrador, Angélica María María [9784-112] SPS3  
 Atwater, Thomas [9787-18] S4  
 Augath, Mark-Aurel [9788-79] SPS6  
 Augustine, Kurt E. [9783-208] SPS13  
 Autrusseau, Florent [9787-13] S3, [9788-63] SPS3  
 Avanaki, Ali R. N. [9787-7] S2  
 Avants, Brian B. 9784 Program Committee  
 Avila, Jesus [9785-27] S6  
**Aviles, Angelica I.** [9786-61] SPSMon, [9786-68] SPSMon  
 Axel, Leon [9788-32] S7  
 Aygun, Nafi [9783-103] SPS2, [9783-26] S6  
 Aylward, Stephen 9785 Program Committee, 9785 S1 Session Chair, SC1182  
 Azhari, Azhari [9784-68] SPS1  
 Aziz, Moez K. [9783-11] S2  
 Azmi, Reza [9788-102] SPS10  
 Azuma, Kagaku [9785-129] SPS5  
 Azuma, Takashi [9790-43] SPS2

## B

Ba, Alexandre H. [9783-76] S15, [9787-39] S8  
 Babino, Giovanni [9785-5] S1  
 Baboyan, Vatche G. [9784-62] S12  
 Bach Cuadra, Meritxell 9784 Program Committee  
 Badal, Andreu 9783 Program Committee, 9783 S2 Session Chair, [9783-117] SPS4, [9783-70] S14, [9783-8] S2  
 Badano, Aldo [9783-42] S8, [9787-3] S14, [9788-1] S1  
 Badawi, Ramsey D. [9783-12] S3  
 Badea, Alexandra [9784-6] S2  
**Badea, Cristian T.** [9783-154] SPS7, [9783-156] SPS7, [9783-206] SPS12, [9788-31] S7  
 Badoual, Anais [9786-89] SPSMon  
 Bae, Kyongtae Ty 9784 Program Committee, 9785 Program Committee  
 Baek, Cheol-Ha [9783-88] SPS1  
 Baek, Jongduk [9787-30] S6, [9787-42] S8  
 Baekgaard, Niels [9790-2] S1  
 Bagchi, Ansuman [9786-23] S5, [9786-71] SPSMon  
 Bagge, Jan [9790-35] S7  
 Bai, Yuanhan [9789-14] S3  
 Baikiejiang, Reheman [9788-91] SPS8  
 Bainbridge, Alan [9784-121] SPS4  
 Bainbridge, Daniel [9786-11] S1  
**Bak, Peter R.** 9789 Program Committee, 9789 S5 Session Chair  
 Baker, Alex [9790-62] SPS6  
 Bakhtiari, Amir [9791-37] SPSWed  
 Bakic, Predrag R. [9783-87] SPS1, [9783-93] SPS1, [9787-38] S8  
 Baksh, Aidan [9786-92] SPSMon  
 Bakthula, Rajitha [9789-15] S3

Balachandran, Ramya [9786-7] S2  
**Balagurunathan, Yoganand** [9785-113] SPS4, [9787-14] S3, [9787-18] S4  
 Balasubramoniam, Anusha [9788-88] SPS7  
 Balhorn, William H. [9787-41] S8  
 Balis, Ulysses J. 9791 Program Committee  
 Balkenhol, Maschenka C.A. [9791-48] SPSWed  
 Baloch, Zubair Wahid [9789-8] S2  
**Bamber, Jeffrey C.** 9790 Program Committee, [9790-22] S5  
 Bandholtz, Sebastian [9788-35] S8  
 Bandi, Venugopal [9788-81] SPS6, [9788-82] SPS6  
 Bandos, Andriy I. [9787-46] SPWed  
 Banerjee, Swapna [9785-127] SPS5  
 Bao, Shunxing [9789-24] S5  
 Barber, William C. [9783-206] SPS12  
 Barbes, Damien [9783-86] SPS1  
 Barbu, Adrian [9785-112] SPS4  
 Barillot, Christian 9784 Program Committee  
 Barish, Mathew [9785-140] SPS7  
 Barone, Fabrizio [9785-5] S1  
 Barratt, Dean [9786-55] S11  
 Barriga, Simon [9785-43] S9, [9785-44] S9, [9785-87] SPS3  
 Bartels, Matthias [9783-52] S10  
 Barufaldi, Bruno [9787-38] S8  
 Bascom, Rebecca [9784-144] SPS6, [9786-87] SPSMon  
 Basham, Mark [9784-84] SPS2  
 Bashivan, Pouya [9788-23] S5  
 Basilio, Francesco [9783-192] SPS10  
 Bastian-Jordan, Matthew [9785-55] S12  
 Báth, Magnus [9787-2] S5  
 Batiste, Rebecca C. [9791-9] S2  
 Baturin, Pavlo [9783-197] SPS11  
 Baucom, Rebecca B. [9784-29] S6, [9784-59] S12  
 Bauer, Jan S. [9785-7] S2, [9788-62] SPS3  
 Bauer, Ralf W. [9785-123] SPS5  
 Baum, Thomas [9785-7] S2, [9788-62] SPS3  
**Baum, Zachary M. C.** [9786-14] S3, [9786-92] SPSMon  
**Baugarten, Clément** [9786-29] S6  
**Baxter, John S. H.** [9784-111] SPS3, [9786-84] SPSMon  
 Beaumont, Hubert [9789-19] S4  
 Becchetti, Marc [9783-121] SPS4, [9783-216] SPS15  
 Bechsgaard, Thor [9790-2] S1, [9790-3] S1  
**Bednarek, Daniel R.** [9783-101] SPS2, [9783-102] SPS2, [9783-128] SPS5, [9783-133] SPS5, [9783-221] SPS16, [9783-233] SPS16, [9783-66] S13, [9788-2] S1, [9788-88] SPS7  
 Beecks, Christian [9786-66] SPSMon  
 Beers, Christopher [9790-33] S7, [9790-4] S1  
 Beg, Mirza Faisal [9788-16] S4  
 Behar, Jonathan [9786-100] SPSMon

**Behling, Rolf K.** SC1183  
**Beigi, Parmida** [9786-17] S4  
 Beindorff, Nicola [9788-35] S8  
 Bek, Tok [9784-80] SPS1  
 Bel, Arjan [9786-95] SPSMon  
 Belghith, Akram [9784-130] SPS5  
 Belhoua, Abdelkrim [9786-63] SPSMon  
 Belian, Anthony [9783-173] SPS8  
 Beller, Carsten J. [9783-190] SPS10  
 Bellezza, Johan [9786-63] SPSMon  
 Beltrametti, Mauro C. [9784-74] SPS1  
 Beltran, Chris [9783-208] SPS13  
 Beltran, William A. [9788-105] SPS2  
 Bemelmann, Frédéric [9783-92] SPS1, [9787-33] S7  
 Ben Cheikh, Bassem [9791-18] S4  
 Ben Tahar, Housssem [9784-50] S10  
 Benavides, Amanda M. [9788-71] SPS4  
 Benloch, José María [9783-90] SPS1  
 Bennett, Kevin M. [9784-37] S8  
 Beltran, Mariana P. [9785-95] SPS3  
 Benz, Michaela [9785-81] SPS2  
**Ben-Zikri, Kfir Yehuda** [9786-101] SPSMon, [9786-75] SPSMon, [9788-10] S3  
 Beranger, Jérôme [9787-13] S3  
**Berggren, Karl** [9783-7] S2  
 Bergholdt, Martin [9784-149] SPS6, [9785-38] S8  
 Berkels, Benjamin [9784-34] S7  
**Berliner, Leonard** 9785 SWK7 Workshop Chair, 9789 SWK7 Workshop Chair  
 Berman, Daniel S. [9784-142] SPS6, [9784-4] S1  
 Bernard, Florian [9784-26] S6  
 Bernardo, Marcelino [9786-53] S11  
 Bernelot Moens, Hein B. J. [9785-125] SPS5  
 Bersvendsen, Jørn [9790-14] S3, [9790-51] SPS3  
 Bertheau, Philippe [9791-18] S4  
**Besson, Guy M.** [9783-179] SPS9  
 Bezerra, Hiram G. [9784-118] SPS3, [9784-135] SPS5, [9786-4] S1, [9788-104] SPS6, [9788-86] SPS7, [9788-99] SPS7  
 Bhakoo, Kishore [9788-106] SPS4  
 Bhargava, Pavan [9784-32] S7  
 Bhargava, Rohit 9791 Program Committee, [9791-40] SPSWed, [9791-47] SPSWed  
 Bhattacharyya, Achyut [9787-8] S2  
 Bhattacharyya, Tulshi [9787-8] S2  
 Bian, Zhaoying [9783-119] SPS4, [9783-151] SPS7  
 Bidesi, Anup [9788-85] SPS7  
 Bier, Elianna [9783-76] S15  
 Biessels, Geert Jan [9784-72] SPS1  
 Biggs, Elijah [9785-61] S13  
 Bigot, Alexandre [9786-89] SPSMon  
 Bikowski, Joseph [9785-10] S2  
 Bilkon, Marom [9788-68] SPS4  
 Bilgin, Ali [9787-8] S2  
 Binaghi, Elisabetta [9783-192] SPS10  
 Bineshmarvasti, Tina [9785-3] S1  
 Binnig, Gerd [9784-35] S8

Birkfellner, Wolfgang [9784-154] SPS6, [9784-156] SPS6, 9786 Program Committee  
 Bjornson, Bruce [9788-16] S4  
 Blatt, Piet [9784-1] S1  
 Blaffert, Thomas [9784-54] S11  
 Blazejewska, Ania [9788-52] SPS1  
 Blevin, Ira [9783-33] S7  
 Blitz, Ari M. [9784-15] S4  
 Bloom, Kenneth J. [9791-1] S1  
 Bochud, François O. [9783-76] S15, 9787 Program Committee, 9787 S2 Session Chair, [9787-39] S8  
**Boctor, Emad M.** [9786-18] S4, [9790-42] SPS2, [9790-55] SPS4, [9790-56] SPS4, [9790-69] SPS7  
 Bodani, Vivek [9786-57] SPSMon  
 Bodenstedt, Sebastian [9784-61] S12, [9786-43] S9  
 Boedeker, Kirsten 9783 Program Committee, 9783 S7 Session Chair  
 Böer, Gordon [9785-8] S2  
 Boily, Mathieu [9790-50] SPS3  
 Bollmann, Andreas [9788-90] SPS7  
 Bone, Ashleigh [9786-23] S5, [9786-71] SPSMon  
 Boone, John M. [9783-124] SPS4, [9783-162] SPS7, [9783-218] SPS16, [9787-4] S2, [9787-55] SPWed  
 Boonn, William W. 9789 Program Committee  
 Borelli, Cristina [9785-20] S4  
 Borges, Lucas R. [9787-38] S8  
 Borschneck, Daniel [9786-15] S3, [9786-90] S6  
 Borzage, Matthew [9784-129] SPS4  
 Bosch, Johan G. 9790 Program Committee  
**Boschetto, Davide** [9788-7] S2, [9788-8] S2  
 Bosman, Peter A. N. [9784-150] SPS6, [9784-152] SPS6  
**Bosmans, Hilde** 9783 Program Committee, 9783 S4 Session Chair, [9783-92] SPS1, [9787-33] S7, [9787-50] SPWed, [9787-57] SPWed  
 Bosshard, John C. [9784-137] SPS5  
 Bottenus, Nick [9790-31] S7  
 Botzolakis, Emmanuel [9789-10] S3  
 Bourne, Roger [9783-97] SPS1  
 Bouvy, Willem [9784-72] SPS1  
 Bouzari, Hamed [9790-33] S7  
 Boyce, Sarah J. [9783-132] SPS5, [9783-135] SPS5  
 Boyd, Douglas [9783-218] SPS16  
 Boyd, Norman F. [9790-44] SPS2  
 Boyd, W. Douglas [9786-49] S10  
**Brady, David J.** [9783-210] SPS14, [9783-73] S14  
 Bramaje Adversalo, Xenia [9783-92] SPS1  
**Brand, Jonathan F.** [9787-8] S2  
 Brandt, Andreas Hjelm [9790-2] S1  
 Brandt, Eric [9788-104] SPS6  
 Brandwein-Gensler, Margaret [9791-36] SPSWed  
**Brankov, Jovan G.** [9783-161] SPS7, 9787 Program Committee, 9787 SWK5 Session Chair, [9787-31] S6

Braskie, Meredith N. [9784-62] S12  
 Braumann, Ulf-Dietrich [9791-Program] Committee  
**Brehm, Marcus** [9783-153] SPS7, [9783-18] S4  
 Bremer, Timo [9785-110] SPS4  
 Brennan, Patrick C. [9783-96] SPS1, [9783-97] SPS1, [9787-15] S4, [9787-17] S4, [9787-21] S1, [9787-32] S7, [9787-34] S7, [9787-35] S7, [9787-40] S8  
 Brenner, Winfried [9788-35] S8  
 Brieu, Nicolas [9784-35] S8  
 Brillet, Pierre-Yves [9785-25] S5, [9785-41] S8, [9788-45] S9  
 Brink, Monique [9784-147] SPS6  
 Brinkmann, Benjamin [9786-94] SPSMon  
 Brody, Steven L. [9783-177] SPS9  
 Bron, Esther E. [9788-17] S4  
 Brost, Alexander [9786-100] SPSMon  
 Brown, Matthew S. 9785 Program Committee, 9785 S3 Session Chair, [9785-134] SPS5, [9785-15] S3  
 Brown, Michael S. [9784-81] SPS1  
 Bruder, Herbert K. [9783-47] S9, [9783-49] S9  
 Brun, Emmanuel C. [9783-201] SPS11, [9791-26] SPSWed  
 Bryan, Robert N. [9789-10] S3  
 Buchsbaum, Donald J. [9791-33] SPSWed  
**Budde, Adam** [9783-116] SPS4  
 Budin, Francois [9784-7] S2  
 Buelow, Thomas [9786-31] S7  
 Bues, Martin [9783-208] SPS13  
 Built, Peter [9791-48] SPSWed  
 Burgkart, Rainer [9788-62] SPS3  
 Burgner-Kahrs, Jessica [9786 SWK1 Workshop Chair, 9786 SWK4 Session Chair, [9786-50] S10  
 Burke, Ryan P. [9784-59] S12  
 Burns, Joseph E. [9785-133] SPS5, [9785-24] S5  
 Burnside, Elizabeth S. [9787-24] S1, [9787-55] SPSWed  
 Bush, Adam [9784-129] SPS4  
 Bushan, Desai [9788-96] SPS8  
 Butler, Marie Louise [9787-54] SPSWed  
 Butman, John A. [9788-50] SPS10, [9789-11] S3  
 Bux, Roland [9786-56] SPSMon  
 Bychok, Dmitrii [9791-39] SPSWed  
 Byram, Brett C. 9790 S1 Session Chair, [9790-1] S1, [9790-29] S7  
 Byrnes, Patrick D. [9786-46] S9, [9786-87] SPSMon  
 Bysani Krishnakumar, Sumukh [9783-66] S13, [9788-2] S1  
 Bystrov, Daniel [9784-149] SPS6

**C**

Cabezas, Mariano [9784-94] SPS2  
 Cai, Yunliang [9786-13] S3  
**Cakir, Ahmet** [9786-21] S5  
 Calabrese, Evan [9784-6] S2  
 Calabresi, Peter A. [9784-126] SPS4, [9784-32] S7, [9784-47] S10, [9788-24] S6

Calivà, Francesco [9784-80] SPS1  
 Calliste, Jabari [9783-3] S1  
 Camp, Jon J. [9785-103] SPS3  
 Campi, Cristina [9784-74] SPS1  
 Candemir, Sema [9785-42] S8  
 Cao, Li [9786-74] SPSMon  
 Cao, Qian [9783-16] S4  
 Cao, Wanqing [9783-39] S8  
 Caoili, Elaine M. [9785-141] SPS7, [9785-37] S7, [9785-51] S10, [9785-59] S13  
 Carass, Aaron [9784-124] SPS4, [9784-126] SPS4, [9784-13] S3, [9784-15] S4, [9784-24] S6, [9784-32] S7, [9784-33] S7, [9784-47] S10, [9784-52] S11, [9785-97] SPS3, [9788-24] S6  
 Cárdenas-Rodríguez, Julio [9788-36] S8, [9788-94] SPS8  
 Cardona Cardenas, Diego Armando [9790-48] SPS3  
 Cardoso, Manuel Jorge [9784-121] SPS4  
 Carin, Lawrence [9783-73] S14  
 Carolus, Heike [9784-71] SPS1  
 Carraro, Anita [9791-17] SPSWed, [9791-37] SPSWed  
 Carrazza, Miguel [9785-111] SPS4  
 Carrilero López, Vicente [9783-90] SPS1  
 Carson, Paul L. [9790-36] SPS1  
 Carter, Kaci [9786-39] S8, [9786-69] SPSMon  
 Cartwright, Lucy [9783-96] SPS1  
 Casals, Alicia [9786-61] SPSMon, [9786-68] SPSMon  
 Casas, Rafael [9785-39] S8  
 Castillo Gómez, Juan Daniel [9788-35] S8  
 Castro, Marcelo Adrian [9788-50] SPS10, [9789-11] S3  
**Castro-Mateos, Isaac** [9788-65] SPS3  
 Catullo, Victor J. [9787-46] SPSWed  
 Caucutt, Jason [9788-52] SPS1  
 Caudevilla Torras, Oriol [9783-161] SPS7  
 Cavallaro, Angelo [9784-45] S9  
 Cebral, Juan R. 9788 Program Committee  
 Cecchi, Guillermo A. [9788-23] S5  
 Ceresa, Mario [9784-101] SPS2, [9784-28] S6  
 Cerrolaza, Juan J. [9785-61] S13  
 Çetin Atalay, Rengül [9791-32] SPSWed, [9791-46] SPSWed  
 Çetin, Ahmet Enis [9791-32] SPSWed, [9791-46] SPSWed  
 Cha, Jung won [9788-97] SPS9  
**Cha, Kenny H.** [9785-141] SPS7, [9785-33] S7, [9785-37] S7, [9785-51] S10, [9785-59] S13, [9785-65] SPS1, [9785-74] SPS1  
 Chaddad, Ahmad [9784-75] SPS1, [9785-94] SPS3  
 Chadebecq, Francois [9786-62] SPSMon  
 Chadwell, Jacob T. [9786-70] SPSMon  
 Chaganti, Shikha [9784-51] S10, [9784-73] SPS1  
 Chaisaowong, Kraisor [9785-108] SPS4  
 Chakraborty, Bidisha [9790-5] S1  
 Chakraborty, Jayasree [9784-67] SPS1, [9785-68] SPS1  
 Chakraborty, Manashi [9785-127] SPS5

Chamie, Daniel [9788-104] SPS6  
 Chan, Heang-Ping [9783-226] SPS16, 9785 Program Committee, 9785 S10 Session Chair, [9785-139] SPS6, [9785-141] SPS7, [9785-2] S1, [9785-33] S7, [9785-37] S7, [9785-51] S10, [9785-59] S13, [9785-65] SPS1, [9785-74] SPS1  
 Chand, Arpita [9789-7] S2  
 Chandramoorthi, Sowmiya [9790-49] SPS3  
 Chang, Silvia [9785-55] S12, [9786-19] S4  
 Chang, Yeun-Chung [9785-115] SPS4  
 Chaudhuri, Keya [9785-127] SPS5  
 Chaudhury, Baishali [9785-28] S6  
 Checefsky, Walter [9785-7] S2  
 Chef'd'hotel, Christophe [9791-11] S3  
 Cheheltani, Rabe'e [9783-63] S12  
 Cheirslip, Ronnarit [9784-144] SPS6, [9786-87] SPSMon  
 Chellappan, Kalavani [9788-75] SPS4  
 Chen, Amy [9788-37] S8, [9791-20] S4  
 Chen, Antong [9786-23] S5, [9786-71] SPSMon  
 Chen, Arthur [9783-39] S8  
 Chen, Baiyu [9783-215] SPS15, [9783-44] S9, [9783-79] S15  
 Chen, Buxin [9783-58] S11  
 Chen, Chung-Ming [9785-115] SPS4  
 Chen, Danyang [9786-30] S6  
**Chen, Elvis C. S.** [9783-191] SPS10, [9786-42] S8, [9786-77] SPSMon  
 Chen, Feng [9791-14] S3  
 Chen, Gongxiang [9784-64] SPS1  
**Chen, Guang-Hong** 9783 Program Committee, 9783 S14 Session Chair, 9783 S5 Session Chair, [9783-116] SPS4, [9783-22] S5, [9783-23] S5, [9783-27] S6, [9783-28] S6, [9783-31] S6, [9783-35] S7, [9783-48] S9  
 Chen, Haoyu [9784-76] SPS1, [9788-6] S2  
 Chen, Jian [9790-20] S5  
 Chen, Jiayu [9785-75] SPS1  
 Chen, Jimbo [9785-69] SPS1  
 Chen, Min [9788-105] SPS2  
 Chen, Min [9788-24] S6  
 Chen, Po-Chou [9788-48] S10  
 Chen, Po-Hao [9789-10] S3  
 Chen, Qiang [9785-135] SPS5  
 Chen, Sulin [9791-30] SPSWed  
 Chen, Ting [9783-9] S2, [9790-41] SPS2  
**Chen, Wei Richard** [9783-202] SPS11  
 Chen, Weijie [9787-10] S3, [9787-11] S3, [9787-12] S3  
 Chen, Xi [9784-141] SPS6  
 Chen, Xiaohui [9790-65] SPS7  
 Chen, Xiaojun [9790-47] SPS3  
 Chen, Xinjian [9784-102] SPS2, [9784-103] SPS2, [9784-76] SPS1, [9788-6] S2, [9788-60] SPS2, [9791-45] SPSWed  
 Chen, Yang [9783-48] S9  
 Chen, Yen-Wei [9784-104] SPS2  
 Chen, Ying [9783-231] SPS16, [9783-232] SPS16

Chen, Yu 9788 S6 Session Chair  
 Chen, Yujia [9783-198] SPS11  
 Chen, Yun [9783-158] SPS7  
 Chen, Zhi [9788-33] S7  
 Chen, Zhuo G. [9788-37] S8, [9788-38] S8, [9791-20] S4  
 Chen, Zihe [9786-30] S6  
 Cheng, Alexis [9786-18] S4, [9790-56] SPS4  
 Cheng, Bingbing [9788-81] SPS6, [9788-82] SPS6  
 Cheng, Chang-Chieh [9783-166] SPS7, [9783-170] SPS7  
 Cheng, Erkang [9784-68] SPS1, [9788-13] S3  
 Cheng, Jieyu [9784-153] SPS6  
 Cheng, Keith C. [9791-44] SPSWed  
 Cheng, Philip [9788-96] SPS8  
 Cheng, Ruida [9784-89] SPS2, [9788-11] S3  
 Cheng, Samuel [9785-71] SPS1, [9785-72] SPS1, [9785-73] SPS1  
 Cheriet, Farida [9784-50] S10  
 Cherry, Simon R. [9783-12] S3  
 Chesterman, Frédérique [9787-33] S7  
 Cheung, Carol Y. [9785-96] SPS3  
 Chia, Jonathan M. [9788-99] S10  
 Chin, Joseph L. [9786-54] S11  
 Ching, Yu-Tai [9783-166] SPS7, [9783-170] SPS7  
**Chitiboi, Teodora** [9784-3] S1  
 Chiu, Bernard Chi Yuen [9784-153] SPS6  
 Chizuru, Okamoto [9783-85] SPS1, [9783-91] SPS1  
 Cho, Min Kook [9783-125] SPS4  
**Cho, Seungrong** [9783-105] SPS2, [9783-65] S13  
 Cho, Sung J. [9788-39] S8  
 Choe, Ann S. [9784-127] SPS4  
 Choi, Jang-Hwan [9783-19] S4  
 Choi, Jong Woo [9789-5] S2  
 Choi, Mina [9783-70] S14, [9788-1] S1  
**Choi, Seungyeon** [9783-224] SPS16, [9783-225] SPS16, [9783-94] SPS1  
**Choi, Sunghoon** [9783-106] SPS2, [9783-224] SPS16, [9783-225] SPS16, [9783-229] SPS16, [9783-94] SPS1  
 Choi, Yong [9783-189] SPS10  
 Choo, Andre B. H. [9791-30] SPSWed  
 Choo, Bok Ai [9784-146] SPS6  
**Chou, Cheng-Ying** [9783-200] SPS11  
 Chou, Ming-Chung [9788-108] SPS10, [9788-51] S10  
 Chough, Denise M. [9787-46] SPSWed  
 Chowdhury, Varun [9784-3] S1  
 Chowdhury, Aritra [9791-28] SPSWed  
 Choyke, Peter [9784-89] SPS2, [9786-53] S11  
 Christensen, Soren [9783-32] S7  
 Christiansen, Thomas L. [9790-33] S7, [9790-4] S1  
 Christie, Jason D. [9786-8] S2, [9788-42] S9  
 Chtcheprov, Pavel A. [9783-222] SPS16  
 Chu, Tianshu [9785-75] SPS1  
 Chu, Yakui [9786-59] SPSMon

Chughtai, Aamer R. [9785-139] SPS6, [9785-2] S1  
 Chung, Alex [9787-45] SPSWed  
 Chung, Hyunkoo [9788-38] S8  
 Chung, Soyoung [9786-80] SPSMon  
 Chung, Yong Hyun [9783-195] SPS10  
 Chinen, Serkan [9784-117] SPS3  
 Çinar, Umut [9791-46] SPSWed  
 Ciompi, Francesco [9785-36] S7  
 Claassen, Daniel O. [9784-41] S9, [9784-98] SPS2  
**Clancy, Neil T.** [9786-44] S9  
**Clark, Darin P.** [9783-154] SPS7, [9783-156] SPS7, [9783-206] SPS12  
 Clark, Kal L. [9785-101] SPS3, [9785-30] S6  
 Clark, Matthew [9783-8] S2  
 Clarkson, Eric W. [9787-5] S2  
 Claus, Piet [9790-13] S3  
**Clavel, Alexandre** [9783-181] SPS9  
 Clements, Logan W. [9786-35] S7, [9786-37] S7  
 Clough, Anne V. 9788 Program Committee  
 Cockmartin, Lesley [9787-50] SPSWed, [9787-57] SPSWed  
 Codella, Noel [9791-16] S4  
 Cohan, Richard H. [9785-141] SPS7, [9785-37] S7, [9785-51] S10, [9785-59] S13  
 Coloiner, Julie [9784-129] SPS4, [9788-96] SPS8  
 Conant, Emily F. [9785-21] S4, [9785-69] SPS1  
 Cong, Lin [9785-135] SPS5  
 Conjeti, Sailesh [9784-39] S8  
 Conley, Rebekah H. [9786-35] S7, [9786-37] S7, [9786-70] SPSMon  
 Cook, James [9784-6] S2  
 Cook, Tessa S. 9789 Conference Chair, [9789-10] S3, [9789-21] S5  
 Cooke, Julie [9787-23] S1  
 Cool, Derek W. [9785-55] S12, [9786-54] S11  
 Coradi, Thomas [9783-34] S7  
 Cormode, David [9783-63] S12  
 Cornfeld, Daniel [9785-54] S12  
 Correcher, Carlos [9783-90] SPS1  
 Corso, Jason J. [9786-30] S6  
 Corte-Real, Miguel [9789-8] S2  
 Cosatto, Eric 9791 Program Committee  
 Costa, Marco [9788-104] SPS6  
 Cota, Martin R. [9788-50] SPS10  
 Creasman, Jennifer [9785-27] S6  
 Crosnier, Adeline [9785-41] S8  
 Crotty, Dominic [9787-9] S2  
 Cruz-Bastida, Juan Pablo [9783-116] SPS4  
 Cui, Longbiao [9789-14] S3  
**Cunningham, Ian A.** [9783-138] SPS5, [9783-141] SPS6, [9783-41] S8  
 Curran, Walter J. [9784-86] SPS2, [9786-72] SPSMon, [9786-78] SPSMon  
 Czarnek, Nicholas M. [9785-101] SPS3, [9785-30] S6  
 Czarnota, Gregory J. [9784-38] S8, [9790-6] S2

**D**

D'Haese, Pierre-François [9784-41] S9  
 D'Souza, Francis [9788-81] SPS6, [9788-82] SPS6  
 Daerr, Heiner [9783-204] SPS12, [9783-52] S10  
 Daga, Pankaj [9786-62] SPSMon  
 Dahdah, Nagib [9786-102] SPSMon  
 Dahdouh, Sonia [9784-18] S4  
 Dahmen, Uta [9791-13] S3  
 Dai, Gang [9789-32] S5  
 Daianu, Madelaine [9784-123] SPS4, [9784-36] S8  
 Damases, Christine N. [9787-48] SPSWed  
 Damon, Stephen M. [9784-51] S10, [9789-24] S5  
 Dance, David R. [9783-4] S1, [9783-6] S2, [9783-84] SPS1, [9787-23] S1  
**Dang, Hao** [9783-103] SPS2, [9783-26] S6  
 Dangji, Shusil [9786-101] SPSMon, [9786-75] SPSMon  
**Danielsson, Mats** 9783 Program Committee, 9783 S10 Session Chair, 9783 S12 Session Chair, [9783-7] S2, SC1129  
 Danudibrotto, Adriyana [9790-51] SPS3  
 Danudibrotto, Adriyana [9790-14] S3  
**Darbon, Anabela** [9783-181] SPS9  
 Dardzinski, Bernard J. [9788-50] SPS10  
 Darkner, Sune [9784-125] SPS4, [9784-5] S1  
 Daryanani, Aditya [9786-75] SPSMon  
**Das, Mini** 9783 Program Committee, 9783 S14 Session Chair, 9783 S5 Session Chair, [9783-21] S5  
 Dasgupta, Avijit [9785-127] SPS5  
 Dash, Jatindra Kumar [9785-107] SPS4  
 David, Anna L. [9786-62] SPSMon  
 Davis, Sylvie [9787-13] S3  
 Davis, Brian J. [9783-5] S1  
 Dawant, Benoit M. 9784 Program Committee, 9784 S3 Session Chair, [9784-41] S9, [9784-57] S12, [9786-21] S5, [9786-37] S7, [9786-7] S2  
 Dawson, Ted L. [9788-74] SPS4  
 Dawson, Valina L. [9788-74] SPS4  
 Day, Steven [9790-16] S3  
 de Bresser, Jeroen [9784-72] SPS1  
 de Bruijne, Marleen [9784 Program Committee, 9785 Program Committee  
 De Carlo, Francesco [9783-198] SPS11  
 De Giorgi, Iginio [9785-5] S1  
 de Jong, Henk [9784-96] SPS2  
 de Jong, Pim A. [9784-56] S11, [9784-69] SPS1, [9785-36] S7  
 de Leeuw, Frank-Erik [9785-47] S9  
 De Man, Bruno [9783-114] SPS4, [9783-122] SPS4  
 De Muinck Keizer, Daan M. [9785-125] SPS5  
 de Oliveira, Helder C. R. [9787-38] S8  
 de Ribaupierre, Sandrine 9786 Program Committee, [9790-27] S6  
 De Silva, Tharindu [9786-16] S3, [9786-9] S2  
 De Simone, Raffaele [9786-2] S1, [9786-45] S9



- de Vos, Bob D. [9784-4] S1, [9784-56] S11, [9784-69] SPS1, [9784-72] SPS1, [9785-36] S7
- de With, Peter H. N. [9785-46] S9, [9785-48] S9, [9786-12] S3
- de Zubicaray, Greig I. [9784-62] S12, [9788-73] SPS4
- Decoster, Robin [9787-54] SPWed
- DeGiorgi, Marco [9785-5] S1
- DeGrandchamp, Joseph [9788-36] S8
- Del Nido, Pedro J. [9784-136] SPS5
- Dellepiane, Silvana G. [9788-100] SPS10
- Demigha, Souad [9789-16] S4
- Demner-Fushman, Dina [9789-17] S4
- den Dekker, Arjan J. [9784-1] S1
- Deprest, Jan [9786-62] SPSMon
- Der Sarkissian, Henri** [9783-172] SPS7, [9787-13] S3
- Desal, Hubert [9787-13] S3
- Deserno, Thomas** [9784-34] S7, 9785 Program Committee, 9785 S1 Session Chair, [9785-8] S2, [9786-76] SPSMon, 9789 Program Committee, 9789 S2 Session Chair, [9789-20] S4, [9789-9] S2, SC086
- Deshpande, Ruchi R. [9789-12] S3
- DeSimone, Ariadne [9787-45] SPWed
- Desmet, An-Sofie [9788-9] S2
- Desrosiers, Christian [9784-75] SPS1, [9785-94] SPS3
- DeStefano, Zachary [9786-40] S8
- Devine, Jeremy [9785-91] SPS3
- Dey, Damini [9784-142] SPS6, [9784-4] S1
- Dhanantwari, Amar C. [9784-118] SPS3, [9784-135] SPS5, [9788-86] SPS7, [9788-89] SPS7
- Dhara, Ashis Kumar [9785-106] SPS4, [9785-16] S3
- D'hooge, Jan 9790 Program Committee, [9790-12] S3, [9790-13] S3, [9790-5] S1, [9790-51] SPS3
- Dhulekar, Nimit [9791-3] S1
- Dhurjaty, Sreeram [9783-95] SPS1
- Di Claudio, Gianluca [9788-8] S2
- Di Ianni, Tommaso** [9790-35] S7
- Diamant, Idit [9784-63] SPS1
- Diao, Andrew [9783-214] SPS15, [9783-76] S15
- Dickson, Dennis W. [9785-103] SPS3
- Dietrich, Olaf [9783-62] S12
- Diffey, Jennifer [9783-96] SPS1, [9783-97] SPS1
- Dighe, Manjiri [9788-52] SPS1
- Dijkstra, Jouke [9785-14] S3, [9786-5] S1
- Dillmann, Rüdiger [9784-61] S12, [9786-43] S9
- Dillon, Neal P. [9786-5] S10
- DiMaio, J. Michael [9785-130] SPS5
- Dimock, Ian [9784-100] SPS2
- Ding, Kai [9785-122] SPS5, [9785-29] S6
- Ding, Ming Yue** [9784-133] SPS5, [9784-141] SPS6, [9785-136] SPS6, [9785-137] SPS6, [9790-24] S5, [9790-28] S6, [9790-32] S7, [9790-54] SPS3, [9790-65] SPS7, [9790-66] SPS7, [9790-7] S2
- Ding, Yifu [9791-44] SPSWed
- Diprima, Tammy [9791-41] SPSWed
- Dirsch, Olaf [9791-13] S3
- Divel, Sarah E. [9783-32] S7
- Đlugaj, Martha [9785-84] SPS3
- Dmitriev, Konstantin [9784-83] SPS2
- Do, Richard K. [9784-67] SPS1
- Dogdas, Belma [9786-23] S5, [9786-71] SPSMon
- Dokter, Mark [9790-47] SPS3
- Domá, Aliaa [9789-9] S2
- Donaldson, Ian A. [9786-55] S11
- Dong, Chunhua [9784-104] SPS2
- Donikena, Nishanth Babu [9789-15] S3
- Donovan, Michael [9791-29] SPSWed
- Domer, James [9790-40] SPS1
- Dou, Tai [9786-22] S5
- Dougherty, Timothy M. [9788-41] S9
- Doyle, Scott 9791 Program Committee, 9791 S5 Session Chair, [9791-36] SPSWed
- Doyle, Marvin M. 9790 Program Committee
- Drake, James [9786-57] SPSMon
- Drangova, Maria 9783 Program Committee, 9783 S6 Session Chair, [9784-111] SPS3
- Dréau, Didier [9791-23] S5
- Drukker, Karen 9785 Program Committee, 9785 S4 Session Chair, [9785-27] S6
- Druktėinis, Jennifer S. [9785-27] S6, [9785-28] S6
- Dsouza, Adora M.** [9788-19] S5, [9788-20] S5, [9788-22] S5, [9788-67] SPS4
- D'Souza, David [9786-52] S11, [9790-17] S4
- Du, Haixiao [9788-46] S10
- Du, Sidan [9790-36] SPS1
- Du, Weiwei [9784-122] SPS4
- Dubra, Alfredo** [9785-45] S9, [9785-90] SPS3
- Duddalwar, Vinay [9788-96] SPS8
- Duffy, Edward B. [9786-65] SPSMon
- Dumont, Douglas M. [9790-1] S1
- Duncan, Elizabeth [9788-98] SPS10
- Duncan, James S. [9784-109] SPS3, [9785-54] S12
- Dunham, Simon I. [9788-34] S7
- Dunkerley, David A. P.** [9783-113] SPS4, [9783-64] S13
- Dunlap, Neal [9788-97] SPS9
- Duong, Luc [9786-102] SPSMon
- Duric, Neb** 9790 Conference Chair, 9790 S6 Session Chair, [9790-10] S2, [9790-11] S2, [9790-44] SPS2
- Durst, Roger [9783-130] SPS5
- Dustler, Magnus [9787-59] SPWed
- Dutta, Anirvan [9785-106] SPS4, [9785-16] S3
- Dvorák, Jiri [9788-56] SPS2
- Dweck, Marc R. [9784-142] SPS6
- Dwyer, George [9786-62] SPSMon
- E**
- Eacker, Stephen Matthew [9788-74] SPS4
- Eastwood, Kyle W. [9786-57] SPSMon
- Eaton-Rosen, Zach [9784-121] SPS4
- Ebrahimi, Mehran [9784-134] SPS5
- Eck, Brendan L. [9784-118] SPS3, [9784-135] SPS5, [9788-86] SPS7, [9788-89] SPS7
- Edic, Peter M. [9788-34] S7
- Edirisingham, Chandima [9786-52] S11
- Edmund, Jens M. [9784-42] S9
- Egger, Jan [9784-113] SPS3, [9787-52] SPWed, [9790-47] SPS3
- Eguchi, Kenji [9785-118] SPS5, [9788-44] S9
- Ehrenberg, Henry R. [9785-54] S12
- Ehrhardt, Jan [9784-110] SPS3
- Ehrlich, Eva E. [9784-34] S7
- Ehtemami, Anahid [9788-78] SPS5
- Eiben, Bjoern [9786-31] S7
- Eijkenboom, Joost J. F. A. [9788-11] S3
- Eisenhauer, Christian [9785-108] SPS4
- Ekhtiari, Hamed [9788-76] SPS5
- Ekpo, Ernest Usang [9787-21] S1
- Elangovan, Premkumar [9783-4] S1, [9783-6] S2, [9783-84] SPS1
- Elkerton, Sachi** [9791-15] S4
- Elleaume, Helene [9783-201] SPS11
- Ellinger, Lotta M. [9784-15] S4
- Elmer, Andreas [9788-79] SPS6
- El-Mohri, Youcef [9783-129] SPS5
- Elmore, Joann G. [9791-7] S2
- Elmore, Kimberly Denise [9788-34] S7
- Elson, Daniel S.** [9786-44] S9
- Emami Abarghouei, Shadi [9786-79] SPSMon
- Emaminejad, Nastaran [9785-49] S10
- Emelianov, Stanislav Y. 9790 Program Committee
- Engel, Jay [9786-33] S7, [9786-39] S8, [9786-92] SPSMon
- Engelhardt, Sandy [9786-2] S1, [9786-45] S9, [9789-22] S5
- Engholm, Mathias [9790-4] S1
- Erdmann, Sarah [9788-35] S8
- Eriksson, Markus K. [9783-107] SPS2
- Escalón, Joanna G. [9784-67] SPS1
- Escartin, Terenz R. [9783-138] SPS5, [9783-41] S8
- Escoto, Abelardo M. [9786-41] S8
- Esnault, Matthieu [9786-10] S2
- Espy, Michelle [9783-173] SPS8
- Estépar, Raúl San José [9790-14] S3
- Evans, Joshua D. [9783-36] S7
- Evans, Linton [9786-13] S3
- Evert, Matthias [9785-132] SPS5
- Exell, Trevor [9785-59] S13
- F**
- Fabbri, Daniel [9784-51] S10
- Fahmi, Rachid [9784-118] SPS3, [9784-135] SPS5, [9788-86] SPS7, [9788-89] SPS7
- Fahn, Bernhard [9786-100] SPSMon
- Fahrig, Rebecca** 9783 Program Committee, 9783 S13 Session Chair, [9783-19] S4
- Falcão, Alexandre X.** 9784 Program Committee
- Falтин, Peter [9785-108] SPS4
- Fan, Jiahua** [9787-41] S8, [9787-9] S2
- Fan, Jie [9788-68] SPS4
- Fan, Jingfan [9786-59] SPSMon
- Fan, Jun [9787-24] S1
- Fan, Liexiang [9790-52] SPS3
- Fan, Ming [9789-25] SPSMon, [9789-3] S1, [9789-32] S5, [9789-33] SPSMon
- Fan, Ming [9789-2] S1
- Fan, Wensheng [9785-130] SPS5
- Fan, Xiaoyao [9786-13] S3, [9786-81] SPSMon
- Fan, Yong [9788-57] SPS2
- Fang, Mengjie [9785-136] SPS6
- Fang, Xiaoyue [9790-65] SPS7
- Fang, Yuan [9783-42] S8
- Fangerau, Markus [9786-56] SPSMon
- Farahi, Faramarz [9791-23] S5
- Fard, Nassim [9784-53] S11
- Fares, Anas [9784-118] SPS3, [9784-135] SPS5, [9788-86] SPS7, [9788-89] SPS7
- Farhizadeh, Hamidreza [9785-52] S10, [9785-53] S10
- Farmazilian, Ali [9788-104] SPS6
- Faruque, Jessica [9787-20] S4
- Faskowitz, Joshua [9784-55] S11, [9784-62] S12, [9788-73] SPS4
- Fatemi, Mostafa 9790 Program Committee
- Fatyga, Mirek [9783-208] SPS13
- Favazza, Christopher P. [9783-79] S15
- Fayad, Zahi [9783-63] S12
- Fei, Baowei** 9784 Program Committee, 9784 S11 Session Chair, [9784-78] SPS1, 9786 Program Committee, 9786 S2 Session Chair, [9786-6] S2, [9788-37] S8, [9788-38] S8, [9790-40] SPS1, [9791-20] S4
- Fei, Jianjun [9791-45] SPSWed
- Feigin, Micha [9790-26] S6, [9790-64] SPS6
- Feiglin, David H. [9788-5] S1
- Feldkamp, Joseph R.** [9783-193] SPS10
- Feldman, Michael D. 9791 Program Committee, [9791-9] S2
- Feng, Jinchao [9788-28] S6
- Feng, Li [9788-32] S7
- Feng, Qianjin [9783-119] SPS4, [9783-151] SPS7
- Fenster, Aaron** 9784 Program Committee, 9784 S10 Session Chair, [9784-153] SPS6, [9784-60] S12, [9785-55] S12, [9786-19] S4, [9786-52] S11, [9786-54] S11, 9790 Program Committee, [9790-17] S4, [9790-27] S6
- Feragen, Aasa [9784-8] S2
- Fernandez, Gerardo [9791-29] SPSWed
- Ferretti, Roberta [9783-192] SPS10, [9788-100] SPS10
- Fessler, Jeffrey A. [9783-226] SPS16
- Feitita, Catalin 9785 Program Committee, 9785 S3 Session Chair, [9785-25] S5, [9785-41] S8, [9788-43] S9, [9788-45] S9
- Fetzer, Andreas [9786-2] S1, [9789-22] S5
- Fichtinger, Gabor 9786 Program Committee, 9786 S3 Session Chair, [9786-14] S3, [9786-15] S3, [9786-33] S7, [9786-39] S8, [9786-57] SPSMon, [9786-69] SPSMon, [9786-86] SPSMon, [9786-90] S6, [9786-92] SPSMon, [9786-96] SPSMon
- Fiebich, Martin** [9783-137] SPS5
- Fieglmann, Andreas [9783-15] S4
- Figl, Michael [9787-53] SPWed
- Fincke, Jonathan R. [9790-64] SPS6
- Fingerle, Alexander A. [9783-204] SPS12
- Firmin, David [9784-20] S5
- Fitzgerald, Paul F. [9783-122] SPS4
- Fitzpatrick, J. Michael [9786-51] S10
- Fleischer, Jason W. [9790-57] SPS5
- Fleischmann, Christof [9783-20] S4
- Fleming, Ronan M. T. [9788-9] S2
- Fletcher, Alison [9784-142] SPS6
- Fletcher, Joel G. [9783-215] SPS15, [9783-44] S9
- Fletcher, Preston Thomas [9784-120] SPS4
- Flohr, Thomas G. 9783 Conference Chair, 9783 S3 Session Chair, [9783-47] S9, [9783-49] S9, [9783-51] S10, [9783-62] S12, [9785-123] SPS5, SC987
- Foley, Mark J. [9790-22] S5
- Fong, Grant [9783-176] SPS9
- Foos, David H. [9783-103] SPS2, [9783-223] SPS16, [9783-26] S6
- Foran, David J. 9791 Program Committee
- Fortmeier, Dirk [9784-88] SPS2
- Foruzan, Amir Hossein [9784-104] SPS2
- Fotin, Sergei [9785-19] S4, [9785-32] S7
- Frakes, David H. [9784-37] S8
- Frangi, Alejandro F.** 9784 Program Committee, [9784-117] SPS3, [9784-27] S6, 9788 Program Committee, [9788-65] SPS3
- Franz, Alfred M. [9786-56] SPSMon, [9789-22] S5
- Franz, Astrid [9784-149] SPS6
- Fratte, Daniel [9788-78] SPS5
- Frayne, Richard [9785-95] SPS3
- Fredenberg, Erik [9783-7] S2
- Freeman, Matthew [9783-69] S13
- Freeman, Sabrina [9785-78] SPS2
- Freiman, Moti [9784-2] S1
- Freixenet, Jordi [9785-80] SPS2
- French, Andrew P. [9784-84] SPS2
- Freuchet, Erwan [9788-63] SPS3
- Freud, Nicolas [9783-142] SPS6
- Frey, Eric C.** [9787-5] S2
- Fritz, Franziska [9785-62] S13
- Fritz, Ulrike B. [9784-34] S7
- Fromageau, Jérémie 9790 Program Committee
- Fu, Bingmei [9788-68] SPS4
- Fu, Juzhong [9789-3] S1
- Fu, Maojing** [9788-3] S1
- Fu, Wanyi [9783-118] SPS4, [9783-120] SPS4
- Fujino, Yusuke [9788-104] SPS6
- Fujita, Hiroshi** 9785 Program Committee, 9785 S4 Session Chair, [9785-129] SPS5, [9785-70] SPS1, [9785-86] SPS3, [9785-93] SPS3, [9788-66] SPS4, [9790-37] SPS1
- Fujiwara, Michitaka [9785-105] SPS4
- Fukuda, Takaichi [9784-106] SPS3
- Fukuoka, Daisuke [9790-37] SPS1
- Fukuzawa, Masayuki** [9784-122] SPS4, [9790-39] SPS1
- Fung, Brandon [9784-38] S8
- Funk, Tobias [9783-64] S13
- Furenlied, Lars R. [9787-8] S2
- Furst, Jacob D. [9785-111] SPS4
- Furtado, Hugo C. [9784-154] SPS6, [9784-156] SPS6
- Furuie, Sérgio Shiguemi** [9790-48] SPS3
- Furukawa, Kazuhiro [9785-105] SPS4, [9786-48] S9
- G**
- Gabarda, Salvador [9787-38] S8
- Gabrani, Maria [9791-27] SPSWed
- Gabriel, Eric [9785-8] S2
- Gaed, Mena [9785-55] S12, [9786-19] S4, [9786-54] S11
- Gaede, Stewart [9786-34] S7
- Gale, Alastair G. 9787 Program Committee
- Gallas, Brandon D.** [9787-12] S3, 9791 Program Committee
- Gallego-Ortiz, Cristina [9784-46] S10
- Galons, Jean-Philippe [9787-8] S2
- Galstyan, Aram [9784-36] S8
- Galvis, Justin [9784-120] SPS4
- Gambaretto, Gloria [9788-7] S2
- Gandler, William [9784-89] SPS2, [9788-11] S3
- Gandomkar, Ziba [9787-40] S8
- Gang, Geca Jianan** [9783-33] S7, [9783-75] S15
- Gangeh, Mehrdad J. [9784-38] S8, [9790-6] S2
- Ganott, Marie A. [9787-46] SPWed
- Gao, Bo [9783-3] S1
- Gao, Kai [9783-9] S2
- Gao, Peng [9783-126] SPS4, [9783-184] SPS9
- Gao, Peng [9783-108] SPS2
- Gao, Xin [9789-29] SPSMon
- Gao, Xinpei** [9785-14] S3
- Gao, Yi [9784-17] S4, [9784-97] SPS2, [9791-21] S5, [9791-41] SPSWed
- Gao, Yurui [9784-127] SPS4
- Gaonkar, Bilwaj K. [9785-89] SPS3
- Garapati, Sankar S. [9785-51] S10
- Garcia, Eduardo G. [9788-62] SPS3
- Garcia, Rafael [9785-11] S2
- Garcia-Arteaga, Juan D. [9785-88] SPS3
- Garde, Ellen [9784-8] S2
- Garg, Amanmeet [9788-16] S4
- Garg, Mandeep Kumar [9785-106] SPS4, [9785-107] SPS4
- Gargesha, Madhusudhana [9788-104] SPS6
- Garrett, John W.** [9783-31] S6
- Garson, Alfred B. [9783-147] SPS6, [9783-177] SPS9
- Garvin, Mona K.** 9784 Program Committee, SC1026
- Gastouniotti, Aimilia [9785-21] S4, [9791-9] S2
- Gatenby, Christopher [9788-52] SPS1



- Gatenby, Robert A. [9785-113] SPS4, [9785-28] S6, [9785-52] S10  
 Gauer, Tobias [9783-38] S7  
 Gauvin, Gabrielle [9786-33] S7, [9786-39] S8, [9786-92] SPSMon  
 Gavelli, Frances T. [9788-11] S3  
 Gavrielides, Marios A. [9783-148] SPS6, [9783-77] S15, 9791 Program Committee  
 Gazinska, Patrycja [9791-4] S2  
**Ge, Yongshuai** [9783-22] S5, [9783-23] S5  
 Gee, James C. 9784 Program Committee, [9788-105] SPS2  
 Gehm, Michael E. [9783-214] SPS15, [9783-76] S15  
**Gehring, Amanda E.** [9783-173] SPS8  
 Geiger, Benjamin E. [9785-113] SPS4  
 Geiser, William R. [9787-36] S7  
 Geisler, Benjamin [9787-58] SPWed  
 Gelbart, Elad [9785-35] S7  
 Gemmar, Peter [9784-26] S6  
 Gemmeke, Hartmut E. [9790-8] S2, [9790-9] S2  
 Gendrin, Christelle [9784-154] SPS6  
 Georg, Dietmar [9784-154] SPS6, [9784-156] SPS6  
 Gerard, Maxime [9786-89] SPSMon  
 Gerard, Olivier [9790-12] S3, [9790-51] SPS3  
 Gerendas, Bianca S. [9784-139] SPS5, [9784-19] S5  
 Gerig, Guido 9784 Program Committee  
 Germano, Guido [9784-142] SPS6  
 Geva, Ofer [9785-12] S3, [9785-35] S7  
 Ghaboussi, Jamshid [9790-15] S3  
 Ghafoorian, Mohsen [9785-47] S9  
 Ghaforian, Soheil [9786-11] S2, [9786-23] S5, [9786-71] SPSMon  
 Ghaly, Michael [9787-5] S2  
 Ghamraoui, Bahaa [9783-70] S14, [9783-8] S2, [9788-1] S1  
 Ghani, Muhammad U. [9783-202] SPS11, [9783-230] SPS16  
 Ghate, Sujata V. [9787-6] S2  
 Ghavidel, Sahar [9785-55] S12, [9786-19] S4  
 Ghayour, Ali [9784-66] SPS1, [9788-70] SPS4  
 Ghielmi, Matteo [9783-192] SPS10  
 Gibson, Eli [9785-55] S12, [9786-19] S4, [9786-54] S11, [9786-55] S11  
 Gierach, Gretchen [9790-44] SPS2  
 Giesler, Paul [9786-76] SPSMon  
**Gifford, Howard C.** 9787 Program Committee, 9787 S6 Session Chair, [9787-28] S6  
**Giger, Maryellen L.** 9785 Program Committee, 9785 S11 Panel Member, 9785 S6 Session Chair, [9785-27] S6, [9785-67] SPS1, [9788-95] SPS8  
 Gilboa, Guy [9784-2] S1  
 Gilkeson, Robert C. [9783-144] SPS6, [9784-31] S7  
 Gill, Inderbir [9788-96] SPS8  
 Gillies, Duncan F. [9784-40] S8, [9784-79] SPS1  
 Gillies, Robert J. [9785-113] SPS4, [9785-28] S6, [9785-52] S10, [9787-14] S3, [9787-18] S4  
 Gilmore, Hannah L. [9791-5] S2  
 Gimi, Barjor 9788 Conference Chair, 9788 S10 Session Chair, 9788 S4 Session Chair, 9788 S5 Session Chair, 9788 S8 Session Chair, [9788-108] SPS10, [9788-51] S10  
 Ginley, Brandon [9791-14] S3  
 Giordano, Gerardo [9785-5] S1  
 Giraldo, Diana L. [9784-112] SPS3, [9785-88] SPS3  
**Girard, Fantin** [9784-50] S10  
 Given-Wilson, Rosalind M. [9787-23] S1  
 Glaister, Jeffrey [9784-124] SPS4, [9784-126] SPS4  
 Glass, John O. [9788-98] SPS10  
**Glick, Stephen J.** 9783 Program Committee, 9783 S10 Session Chair, [9783-214] SPS15, [9783-78] S15, [9783-80] S15, [9783-83] SPS1  
 Glocker, Benjamin 9784 Program Committee  
 Glossop, Neil [9786-53] S11  
 Gobbi, David [9785-95] SPS3  
 Goetz, Michael [9784-53] S11, [9785-62] S13  
 Goh, Sheng-Yang M. [9789-1] S1  
 Gokhale, Aniruddha [9789-24] S5  
 Gokozan, Hamza Numan [9791-8] S2  
 Goksel, Behiye [9791-8] S2  
 Gold, Garry [9783-19] S4  
 Goldan, Amir H. [9783-131] SPS5, [9783-40] S8  
 Goldbaum, Michael H. [9784-130] SPS5  
 Goldberg, Kenneth Y. [9786-49] S10  
 Goldberger, Jacob [9784-63] SPS1  
**Goldgof, Dmitry B.** [9785-113] SPS4, [9785-28] S6, [9785-52] S10, [9785-53] S10, [9791-35] SPSWed  
 Goldin, Jonathan G. [9785-134] SPS5  
 Goldstein, Rita [9788-23] S5  
 Gombert, Alexander [9789-9] S2  
 Gómez, José A. [9785-55] S12, [9786-19] S4, [9786-54] S11  
 Gomez, Juan [9783-90] SPS1  
 Gomez-Cardona, Daniel [9783-116] SPS4  
 Goncalves, Jorge [9784-26] S6  
 Gong, Changfei [9783-119] SPS4, [9783-151] SPS7  
 Gong, Ping [9790-70] SPS7  
 Gong, Qi [9783-77] S15  
 González Ballester, Miguel Angel 9784 Program Committee, 9784 S4 Session Chair, [9784-101] SPS2, [9784-28] S6  
 Goodstitt, Mitchell M. [9783-118] SPS4  
 Gooyla, Ali [9784-117] SPS3, [9784-27] S6  
 Görtler, Jochen [9786-43] S9  
 Goshen, Liran [9784-2] S1  
 Goto, Hidemi [9785-105] SPS4, [9786-48] S9  
 Grabe, Niels [9791-2] S1  
 Graf, Norbert [9784-99] SPS2  
 Grafe, Claudia [9785-132] SPS5  
 Graff, Christian G. [9783-10] S2  
 Granna, Josephine [9786-50] S10  
 Grant, Katharine L. SC987  
 Grass, Michael 9783 Program Committee, 9783 S9 Session Chair  
 Graviss, Edward A. [9791-19] S4  
 Greenberg, Joel A. [9783-210] SPS14, [9783-211] SPS14, [9783-72] S14, [9783-73] S14, [9783-74] S14  
 Greenleaf, James F. 9790 Program Committee  
 Greenspan, Hayit 9784 Program Committee, 9784 S8 Session Chair, [9784-63] SPS1, [9784-9] S2, 9785 Program Committee, 9785 S7 Session Chair, [9785-12] S3, [9785-35] S7  
 Grenier, Philippe A. [9788-45] S9  
 Grenier, Sébastien [9784-50] S10  
 Grevera, George J. 9786 Program Committee, 9786 S8 Session Chair, [9786-83] SPSMon  
 Grimm, Lars J. [9787-6] S2  
 Grisan, Enrico [9788-7] S2, [9788-8] S2  
 Grönberg, Fredrik SC1129  
 Grosskopf, Stefan [9785-1] S1  
 Gröttinger, Carsten [9788-35] S8  
 Grunau, Ruth Eckstein [9788-16] S4  
 Grupp, Robert B. [9786-10] S2  
 Gu, Peng [9790-36] SPS1  
 Gu, Xianfeng [9785-140] SPS7  
 Guan, Cuntai [9788-106] SPS4  
**Guan, Huifeng** [9783-147] SPS6, [9783-177] SPS9  
 Guan, Yubao [9785-49] S10  
 Gube, Monika [9785-108] SPS4  
 Gubern-Mérida, Albert [9785-20] S4, [9785-22] S4  
 Guédon, Jean-Pierre V. [9787-13] S3, [9788-63] SPS3  
 Guillaud, Martial [9791-17] SPSWed, [9791-37] SPSWed  
 Gunay, Gokhan [9784-58] S12  
 Gunsten, Sean [9783-177] SPS9  
 Guo, Hua [9790-65] SPS7  
 Guo, Jingyun [9784-76] SPS1  
 Guo, Junfeng [9788-41] S9  
 Guo, Liang [9784-97] SPS2  
 Guo, Rongrong [9784-78] SPS1, [9786-6] S2  
 Guo, Ting [9784-16] S4  
 Guo, Wei [9785-135] SPS5, [9788-64] SPS3  
 Guo, Xiaoyu [9790-55] SPS4, [9790-56] SPS4  
 Guo, Zijia [9783-100] SPS2  
 Guo, Zjia [9787-37] S8  
 Gupta, Ajay [9785-112] SPS4  
 Gur, David [9787-46] SPWed  
**Gurcan, Metin N.** [9785-10] S2, 9791 Conference Chair, 9791 S1 Session Chair, [9791-10] S3, [9791-6] S2, [9791-8] S2  
 Gürsoy, Doga [9783-198] SPS11  
 Gustafson, Steven M. [9791-28] SPSWed  
 Gutenko, Ievgeniia [9784-83] SPS2, [9785-140] SPS7  
 Gutjahr, Raif [9783-51] S10, [9783-62] S12  
 Gutman, Boris A. [9784-36] S8  
 Ha, Luu Manh [9784-58] S12  
 Ha, Sungsoo [9783-110] SPS3, [9783-111] SPS3, SC829  
 Haak, Daniel [9789-20] S4, [9789-9] S2  
 Haas, Benjamin [9783-34] S7  
 Habart, David [9784-115] SPS3, [9788-56] SPS2  
 Hachi, Siham [9788-9] S2  
 Hacihaliloglu, Ilker [9785-120] SPS5  
 Hadizad, Farnoosh [9790-6] S2  
**Hadjikis, Lubomir M.** 9785 Program Committee, 9785 S5 Session Chair, [9785-139] SPS6, [9785-141] SPS7, [9785-2] S1, [9785-33] S7, [9785-37] S7, [9785-51] S10, [9785-59] S13, [9785-65] SPS1, [9785-74] SPS1  
 Hadjipanteli, Andria [9783-4] S1  
 Had'zija, Mirko [9791-24] S5  
 Haegelen, Claire [9786-29] S6  
 Haerlach, Torsten [9785-121] SPS5  
 Hafezi, Mohammadreza Reza [9784-53] S11  
 Hafzalla, George [9784-62] S12  
 Hager, Gregory D. [9784-12] S3, [9784-30] S7, [9784-43] S9  
 Hahmann, Ferdinand [9785-8] S2  
 Hahn, Andreas [9783-137] SPS5  
 Hahn, Andreas [9783-18] S4, [9783-30] S6  
**Hahn, Horst K.** [9784-3] S1, 9785 Program Committee, 9785 S5 Session Chair, [9785-60] S13, [9791-13] S3, [9791-48] SPSWed  
 Hahn, Juliane [9783-49] S9  
 Hahn, Katharin [9787-37] S8  
 Hahn, Katharina [9783-152] SPS7, [9783-205] SPS12, [9783-51] S10, [9783-54] S10, [9783-62] S12  
 Haines, Todd J. [9783-173] SPS8  
 Hajdok, George [9790-17] S4  
 Hakim, Christiane M. [9787-46] SPSWed  
 Halam, Nadia [9788-1] S1  
 Halawish, Ahmed [9783-205] SPS12, [9783-54] S10  
 Haldankar, Hrishikesh [9785-19] S4, [9785-32] S7  
 Hall, Lawrence O. [9785-113] SPS4, [9785-28] S6, [9785-52] S10, [9785-53] S10, [9791-35] SPSWed  
**Halling-Brown, Mark D.** [9787-23] S1, [9789-18] S4  
 Hallmann, Sandy [9788-35] S8  
 Halter, Ryan J. [9788-84] SPS7  
 Hamaguchi, Takashi [9783-149] SPS6  
 Hamarneh, Ghassan 9784 Program Committee  
 Hamill, Ian S. [9788-43] S9  
 Hammond, Tracy [9787-19] S4  
 Han, Hao [9783-157] SPS7, [9783-160] SPS7, [9785-56] S12  
 Han, Minah [9787-42] S8  
 Han, Runze [9783-177] SPS9  
 Han, Xian-Hua [9784-104] SPS2  
 Hanaoka, Shouhei [9785-100] SPS3  
 Handels, Heinz [9784-110] SPS3, [9784-88] SPS2  
 Haneda, Kiyofumi [9783-209] SPS13  
 Hann, Alexander [9790-47] SPS3  
 Hansen, Christian [9785-60] S13  
 Hansen, Kristoffer Lindskov [9790-2] S1  
 Hansen, Rose [9789-6] S2  
 Hansis, Eberhard [9784-71] SPS1  
 Hanson, Dennis P. [9785-103] SPS3, [9786-94] SPSMon  
**Hanson, Kenneth** [9783-9] S2, WS776  
 Hara, Takeshi [9785-129] SPS5, [9785-70] SPS1, [9788-66] SPS4, [9790-37] SPS1  
 Harder, Nathalie [9784-35] S8  
 Harding, Simon P. [9785-44] S9, [9785-87] SPS3  
 Hariharan, Harishwaran [9790-62] SPS6  
**Harish, Vinyas** [9786-92] SPSMon  
 Harman, Allison [9783-2] S1  
 Harms, Joe [9783-143] SPS6  
**Harrigan, Robert L.** [9783-55] S11, [9784-41] S9, [9784-51] S10  
 Harris, Emma J. 9790 Program Committee, [9790-22] S5  
 Harrison, Louis B. [9785-53] S10  
 Harrison, Melanie J. [9785-114] SPS4, [9785-117] SPS4  
 Harsha, Nagam Chaithan [9785-16] S3  
 Hartman, Allison [9783-222] SPS16, [9783-223] SPS16  
 Hartman, Douglas J. [9791-10] S3  
 Hartov, Alex [9786-81] SPSMon  
 Hashemi, SayedMasoud [9783-107] SPS2  
 Hashtrudi-Zaad, Keyvan [9786-86] SPSMon  
 Hassan, Mehadi [9783-73] S14  
 Hasse, Katelyn [9784-108] SPS3, [9786-32] S7  
 Hata, Nobuhiko [9786-27] S6  
 Hatanaka, Yuji [9785-86] SPS3, [9785-93] SPS3  
 Hatt, Charles R. [9783-113] SPS4, [9786-3] S1  
 Hatt, Mathieu [9785-31] S6  
 Hauke, Christian [9783-196] SPS11, [9783-203] SPS11, [9783-25] S5  
 Hawkes, David J. 9786 Program Committee, 9786 S3 Session Chair, [9786-31] S7, [9791-4] S2  
 Hawkins, Samuel H. [9785-113] SPS4  
 Hayashi, Naoto [9785-100] SPS3  
 Hayashi, Yuichiro [9785-131] SPS5  
**Haygood, Tamara Miner** [9787-36] S7  
 Haynor, David R. 9784 Program Committee, 9786 Program Committee, 9786 S2 Session Chair  
 Hazemander, Jean-Louis [9783-86] SPS1  
 He, Fei [9786-60] SPSMon  
 He, Huiuang [9785-98] SPS3, [9785-99] SPS3  
 He, Ji [9783-151] SPS7  
 He, Qiong [9790-58] SPS5  
 He, Wei [9786-60] SPSMon  
 He, Xiaoling [9790-28] S6  
 He, Xin [9787-26] S6, [9787-29] S6  
 He, Yi [9783-183] SPS9  
**He, Yufan** [9788-105] SPS2  
**He, Zhihua** [9784-23] S5  
 Heard, Rob [9787-15] S4  
 Heath, Michael D. [9783-223] SPS16  
 Heckel, Frank [9787-58] SPWed  
 Heffernan, Emily [9786-33] S7  
 Heim, Daniel [9791-31] SPSWed  
 Heim, Eric [9784-53] S11, [9786-56] SPSMon  
 Heimann, Tobias 9784 Program Committee  
 Hellwich, Olaf [9791-31] SPSWed  
**Helmer, Karl** [9788-108] SPS10, [9788-51] S10  
 Helvie, Mark A. [9783-33] S7, [9785-65] SPS1, [9785-74] SPS1  
 Hemmsen, Martin Christian 9790 Program Committee, [9790-19] S4, [9790-34] S7, [9790-35] S7  
 Hennemuth, Anja B. [9784-3] S1, [9788-32] S7  
 Henning, Andre [9783-205] SPS12, [9783-54] S10  
 Henrich, Julia [9790-9] S2  
 Henzler, Thomas [9783-234] SPS4  
 Hernandez, Andrew M. [9783-218] SPS16  
 Hernandez, Edgar A. [9790-59] SPS5  
 Herr, Hugh M. [9790-26] S6  
 Herler, Andreas [9786-76] SPSMon  
 Hertel, Frank [9784-26] S6  
 Hertz, Hans M. [9783-67] S13  
 Heskes, Tom [9785-47] S9  
 Hess, Margaret A. [9786-57] SPSMon  
 Heuveline, Vincent [9783-190] SPS10, [9784-92] SPS2, [9786-2] S1  
 Heyde, Brecht 9786 S4 Session Chair, 9790 Conference Chair, 9790 S3 Session Chair, 9790 S4 Session Chair, [9790-13] S3, [9790-5] S1  
 Hiemenz Holton, Leslie [9786-94] SPSMon  
**Higgins, William E.** [9784-144] SPS6, 9786 Program Committee, 9786 S9 Session Chair, [9786-46] S9, [9786-87] SPSMon  
 Hilderbrand, David 9789 SWK7 Session Chair  
 Hill, Jason E. [9784-137] SPS5, [9784-90] SPS2  
 Hill, Melissa L. [9791-12] S3  
 Hillis, Stephen L. 9787 Program Committee, [9787-32] S7, SC1127  
 Hindricks, Gerhard [9788-90] SPS7  
 Hines, Catherine [9786-23] S5, [9786-71] SPSMon  
 Hipwell, John H. [9786-31] S7, [9791-4] S2  
 Hirayama, Shunta [9784-14] S3  
 Hironaka, Toru [9785-57] S12, [9785-77] SPS2, [9785-82] SPS2  
 Hirooka, Yoshiaki [9786-48] S9  
 Hirotsada, Yamamoto [9788-104] SPS6  
 Hoegen, Philipp [9784-44] S9  
**Hoerig, Cameron** [9790-15] S3  
**Hoeschen, Christoph** 9783 Program Committee, 9783 S11 Session Chair, 9783 S7 Session Chair, [9783-81] SPS1  
 Hoffman, Eric A. [9788-41] S9  
 Hoffman, John M. [9785-15] S3, [9787-3] S5  
 Hoffmeister, Jeffrey [9785-19] S4, [9785-32] S7  
 Hofmann, Christian [9783-38] S7

Hofmann, Martin [9788-30] S7  
 Hofmann, Michael [9790-47] SPS3  
 Hofmann, Philipp [9785-123] SPS5  
**Holbek, Simon** [9790-2] S1, [9790-4] S1  
 Holden, Matthew [9786-39] S8  
 Holland, Katharina [9785-17] S4  
 Hollingsworth, Alan B. [9785-26] S6  
**Holmes, David R.** [9783-44] S9, [9785-103] SPS3, 9786 Program Committee, 9786 S1 Session Chair, [9786-94] SPSMon  
 Holmgren, Andrew [9783-73] S14  
 Homeyer, André [9791-48] SPSWed  
 Honarmand, Amir [9784-3] S1  
 Hong, Helen [9785-126] SPS5, [9786-80] SPSMon  
 Hong, Jia Mei [9791-30] SPSWed  
 Hong, Yi [9788-81] SPS6, [9788-82] SPS6  
 Honma, Hirotochi [9785-13] S3  
 Hoover, Douglas A. [9786-52] S11  
 Hopp, Torsten [9784-132] SPS5, 9790 S2 Session Chair, [9790-8] S2, [9790-9] S2  
 Hori, Masatoshi [9784-14] S3  
 Hori, Steven C. Symposium Chair, 9789 Program Committee, [9789-21] S5  
**Horn, Florian** [9783-196] SPS11, [9783-203] SPS11, [9783-25] S5  
 Hosoya, Kazuhiko [9788-66] SPS4  
 Hosseini-Zadeh, Gholam-Ali [9788-76] SPS5  
 Hovda, David [9785-89] SPS3  
 Howison, Christine [9788-40] S8  
 Hoyuelos, Carmen S. [9783-198] SPS11  
**Hrinivich, William T.** [9786-52] S11  
 Hristov, Dmitre [9786-85] SPSMon  
 Hsieh, Chia-Chi [9788-48] S10  
**Hsieh, Jiang** [9783-116] SPS4, [9783-48] S9  
 Hsieh, Meng-Kang [9785-21] S4  
 Hsieh, Scott S. [9783-17] S4, [9783-19] S4, [9783-46] S9  
 Hu, Haibo [9789-4] S1  
 Hu, Nan [9787-11] S3  
 Hu, Xiao [9788-21] S5  
 Hu, Yaoxiu [9784-95] SPS2  
 Hu, Yifan [9785-56] S12  
 Hu, Yipeng [9786-55] S11  
 Hu, Zhiqiang [9783-57] S11  
 Hua, Xue [9784-36] S8  
 Huang, Hao [9788-46] S10  
 Huang, Jing [9783-119] SPS4, [9783-151] SPS7  
 Huang, Lianjie [9783-186] SPS9, [9783-9] S2, [9790-41] SPS2, [9790-60] SPS5, [9790-68] SPS7  
 Huang, Lidong [9785-63] S13, [9786-74] SPSMon  
 Huang, Su [9788-106] SPS4  
 Huang, Weimin [9788-106] SPS4  
 Huang, Xia [9785-116] SPS4, [9788-54] SPS2  
 Huang, Yuxia [9784-64] SPS1  
 Hudson, Kathleen [9787-19] S4

Hudson, Robert H. E. [9788-39] S8  
 Hufnagl, Peter [9791-31] SPSWed  
 Hughes, Amy [9790-16] S3  
 Huizinga, Wyke [9788-17] S4  
 Hulshof, Maarten C. C. M. [9786-95] SPSMon  
 Humm, John L. [9788-5] S1  
**Hummel, Johann** [9787-53] SPSWed  
 Hunter, Andrew [9784-80] SPS1  
 Huo, Yuankai [9784-13] S3  
 Husch, Andreas [9784-26] S6  
 Hwang, Darryl Hwa [9788-96] SPS8  
**Hwang, Dosik** [9783-112] SPS3  
 Hwang, Sangheum [9785-104] SPS4  
 Hwu, Yeukuang [9783-166] SPS7

## I

Iannessi, Antoine [9789-19] S4  
**Iftekharuddin, Khan** 9785 Program Committee, 9785 S9 Session Chair, [9785-102] SPS3  
 Ihori, Akiko [9783-85] SPS1, [9783-91] SPS1  
 Ikeda, Teiichiro [9790-38] SPS1, [9790-71] SPS7  
 Ikejimba, Lynda C. [9783-78] S15, [9783-80] S15  
 Ikeno, Hiroyasu [9784-122] SPS4  
 Ikram, Arfan M. [9788-17] S4  
 Illies, Till [9786-73] SPSMon  
 Imani, Farhad [9785-55] S12, [9786-19] S4  
 Imoto, Haruka [9790-43] SPS2  
 Imran, Abdullah-Al-Zubaer [9783-93] SPS1  
 Imre Sarvari, Sebastian [9790-12] S3  
 Inoue, Jiro [9784-111] SPS3  
 Insana, Michael F. [9790-15] S3, [9790-23] S5  
**Intes, Xavier** 9788 Program Committee, [9788-27] S6  
 Intrator, Miranda H. [9783-9] S2  
**Ionita, Ciprian N.** [9783-128] SPS5, [9783-133] SPS5, [9783-66] S13, [9788-2] S1, [9788-88] SPS7, [9789-6] S2, [9789-7] S2  
 Irimia, Andrei [9789-1] S1  
 I?gum, Ivana 9784 Program Committee, 9784 S4 Session Chair, [9784-4] S1, [9784-56] S11, [9784-69] SPS1, [9785-36] S7  
 Ishida, Kyoko [9785-93] SPS3  
 Ishida, Takayuki [9785-77] SPS2  
 Ishihara, Chizue [9790-38] SPS1, [9790-71] SPS7  
 Ishii, Masaru [9784-12] S3, [9784-30] S7, [9784-43] S9  
 Iszatt, Justin [9786-44] S9  
 Ittrich, Harald [9788-30] S7  
 Iwabuchi, Mizuki [9784-122] SPS4  
 Huang, Weimin [9785-13] S2  
 Iyer, Krishna S. [9788-41] S9  
 Iyer, Vijay [9789-6] S2  
 Izzard, Ryan [9786-65] SPSMon  
 Izzo, Richard L. [9789-6] S2

## J

Jackson, Edward F. [9783-500] SPL  
 Jackson, Jennifer [9788-11] S3  
 Jacobs, Damien [9784-128] SPS4  
 Jacobs, Russell E. [9784-123] SPS4  
 Jacobson, Francine L. [9787-1] S5  
 Jaeger, Michael 9790 Program Committee  
 Jaeger, Stefan R. [9785-42] S8  
 Jafari, Houman [9783-3] S1  
 Jago, James [9785-61] S13  
 Jahanshad, Neda [9784-62] S12, [9788-73] SPS4  
 Jahanshad, Neda [9784-36] S8, [9788-18] S4  
 Jain, Amit [9783-101] SPS2, [9783-128] SPS5, [9783-221] SPS16, [9783-66] S13  
 Jaiswal, Sunil [9783-110] SPS3  
 Jakovljevic, Marko 9790 S7 Session Chair, [9790-31] S7  
 Jang, Dong-Hyuk [9783-225] SPS16  
 Jang, Gun Hyuk [9788-107] SPS6, [9788-29] S6  
 Jang, Taekjin [9789-5] S2  
 Jani, Ashesh B. [9784-86] SPS2, [9786-72] SPSMon, [9786-78] SPSMon  
 Jani, Shraddhey [9784-134] SPS5  
**Janni, Pierre** 9786 Program Committee, 9786 S7 Session Chair, [9786-29] S6, [9786-97] SPSMon  
 Janowczyk, Andrew [9791-5] S2  
 Janse, Mark H.A. [9785-48] S9  
 Janss, Armin 9789 SWK7 Panel Member  
 Jao, Jo-Chi [9788-48] S10  
 Jayaratne, Uditha L. [9786-42] S8  
 Jedynek, Bruno M. [9784-24] S6, [9785-97] SPS3, [9788-24] S6  
 Jefimovs, Konstantins [9783-71] S14  
 Jennane, Rachid [9788-13] S3  
 Jensen, Henrik [9790-35] S7  
 Jensen, Jonas M. [9790-34] S7  
**Jensen, Jorgen Arendt** 9790 Program Committee, 9790 S7 Session Chair, [9790-18] S4, [9790-19] S4, [9790-2] S1, [9790-3] S1, [9790-33] S7, [9790-34] S7, [9790-35] S7, [9790-4] S1  
 Jeon, Hosang [9783-125] SPS4, [9783-136] SPS5, [9783-140] SPS6, [9783-228] SPS16, [9783-88] SPS1  
 Jeon, Pil-Hyun [9783-225] SPS16  
 Jeon, Tina [9788-46] S10  
 Jeong, Jaek [9783-180] SPS9  
 Jerebko, Anna K. [9783-15] S4  
 Ji, Songbai [9786-13] S3, [9786-81] SPSMon  
 Jia, Kebin [9788-28] S6  
 Jiang, Guodong [9789-25] SPSMon  
**Jiang, Hao** [9783-130] SPS5  
 Jiang, Huiqin [9784-131] SPS5  
 Jiang, Huiyan [9784-104] SPS2  
 Jiang, Luan [9785-138] SPS6  
 Jiang, Mingze [9785-108] SPS4  
 Jiang, Rong E. [9790-40] SPS1  
 Jiang, Xueqing [9784-103] SPS2, [9788-60] SPS2  
 Jiang, Yuhao [9786-98] SPSMon

Jiang, Zhengang [9786-60] SPSMon  
 Jin, Dakai [9788-41] S9  
**Jin, Peng** [9786-95] SPSMon  
 Jin, Yannan [9783-114] SPS4  
 Jo, Byungdu [9783-207] SPS12, [9783-89] SPS1  
 Jo, Hyun Hee [9788-85] SPS7  
**Job, Isaias D.** [9783-132] SPS5, [9783-135] SPS5  
 Joe, Bonnie [9785-27] S6  
 Jog, Amod [9784-33] S7  
 Johnen, Wibke [9786-56] SPSMon  
 Johnson, Carol [9785-50] S10  
 Johnson, Colena [9786-23] S5, [9786-71] SPSMon  
 Johnson, G. Allan [9784-6] S2  
 Johnson, Hans J. [9784-66] SPS1, [9788-70] SPS4, SC1182  
 Johnson, Karen S. [9787-6] S2  
 Johnson, Rebecca L. [9788-96] SPS8  
 Johnson, Susan [9786-99] SPSMon  
 Johnsson, Ase Allansdotter [9787-2] S5  
 Jones, Ian P. [9788-43] S9  
 Jones, Kyle [9788-40] S8  
 Jones, Terry [9783-12] S3  
**Jorgensen, Steven M.** [9783-54] S10  
 Joshi, Nikhil [9784-142] SPS6  
**Joshi, Vinayak** [9785-44] S9, [9785-87] SPS3  
 Jost, Gregor [9783-51] S10  
 Jung, Caroline [9788-30] S7  
 Jung, Ji Eun [9783-167] SPS7  
 Jung, Jin Ho [9784-114] SPS3

## K

Kaar, Marcus [9787-53] SPSWed  
 Kabus, Sven [9786-31] S7  
 Kachelrieß, Marc 9783 Program Committee, 9783 S6 Session Chair, [9783-18] S4, [9783-20] S4, [9783-234] SPS4, [9783-30] S6, [9783-49] S9  
 Kadoury, Samuel [9786-89] SPSMon, [9786-91] SPSMon  
 Kaercher, Joerg [9783-130] SPS5  
 Kaffenberger, Benjamin [9785-10] S2  
 Kagajo, Mitsuru [9784-93] SPS2  
 Kaganovsky, Yan [9783-73] S14  
 Kagiias, Matias E. [9783-24] S5, [9783-71] S14  
 Kaila, Gaurav [9786-5] S1  
 Kainz, Bernhard [9790-47] SPS3  
 Kajdacsy-Balla, Andre [9791-47] SPSWed  
 Kale, Mandar [9785-107] SPS4  
 Kalpathy-Cramer, Jayashree [9783-217] SPS15  
 Kalra, Mannudeep K. [9783-114] SPS4  
 Kamiya, Naoki [9785-129] SPS5  
 Kanagasangam, Yogi [9785-85] SPS3  
 Kanberoglu, Berkay [9784-37] S8  
 Kandukuri, Jayanth [9788-81] SPS6, [9788-82] SPS6  
 Kaneko, Masahiro [9785-118] SPS5, [9788-44] S9

Kang, Hyun Jae [9786-18] S4  
 Kang, Jeeun [9790-67] SPS7  
 Kang, Jihoon [9783-189] SPS10  
 Kang, Joo Hyun [9783-195] SPS10  
 Kang, Kumsook [9786-60] SPSMon  
 Kano, Takuya [9785-70] SPS1  
 Kansal, Kalyani [9784-24] S6, [9785-97] SPS3  
 Kanti Mandal, Koushik [9786-91] SPSMon  
 Kao, Chien-Min [9783-58] S11  
**Kapadia, Anuj J.** [9783-176] SPS9, [9783-210] SPS14, [9783-211] SPS14, [9783-72] S14, [9783-74] S14  
 Kappler, Steffen G. [9783-205] SPS12, [9783-50] S10, [9783-51] S10, [9783-54] S10, [9783-59] S12, [9783-62] S12  
 Karam, Irene [9785-91] SPS3  
 Karami, Elham [9786-34] S7  
 Karck, Matthias [9786-45] S9  
 Karim, Karim S. 9783 Program Committee, 9783 S8 Session Chair, [9783-128] SPS5, [9783-141] SPS6, [9783-41] S8  
 Karim, Rashed [9786-100] SPSMon  
 Karimi, Davood [9784-21] S5, [9784-22] S5  
 Karssemeijer, Nico 9785 Program Committee, 9785 S10 Session Chair, [9785-17] S4, [9785-20] S4, [9785-22] S4  
 Kasenbrun, Niklas [9784-125] SPS4, [9784-8] S2  
**Kashyap, Raman** [9786-91] SPSMon  
 Kassam, Zahra [9785-55] S12  
 Katafuchi, Tetsuro [9788-66] SPS4  
 Katic, Darko [9789-22] S5  
 Kato, Katsuya [9785-109] SPS4  
 Kato, Misa [9783-85] SPS1, [9783-91] SPS1  
 Kato, Takahisa [9786-27] S6  
 Katouzian, Amin [9784-39] S8  
 Kauczor, Hans-Ulrich [9784-44] S9  
 Kauffmann, Claude [9788-59] SPS2  
 Kaufman, Arie [9784-107] SPS3, [9784-83] SPS2, [9785-140] SPS7, [9785-76] SPS2, [9786-64] SPSMon, [9788-69] SPS4  
 Kaul, Michael G. [9788-30] S7  
 Kavalak, Conrad [9784-50] S10  
 Kawamoto, Satomi [9783-33] S7  
 Kawashima, Hiroki [9783-149] SPS6  
 Kawata, Yoshiki [9785-109] SPS4, [9785-118] SPS5, [9788-44] S9  
 Kazemi, Leila [9785-27] S6  
 Kazerooni, Ella A. [9783-118] SPS4, [9785-139] SPS6, [9785-2] S1  
 Keegan, Jennifer [9784-20] S5  
 Keller, Brad M. [9785-21] S4, [9785-69] SPS1, [9791-9] S2  
 Kelly, Amy E. [9787-46] SPSWed  
 Kemp, Bradley J. [9785-103] SPS3  
 Kempston, Michael [9786-15] S3, [9786-90] S6  
 Kendall, Giles [9784-121] SPS4  
 Kennedy, Brendan [9785-111] SPS4  
 Kenngott, Hannes [9784-61] S12, [9786-43] S9, [9786-44] S9, [9789-22] S5  
 Kerlikowske, Karla [9785-27] S6

Kessel, Kerstin A. [9789-12] S3  
 Keszei, András [9786-76] SPSMon  
**Ketcha, Michael D.** [9786-9] S2  
 Keyes, Mira [9791-37] SPSWed  
 Khadka, Niranjan [9788-68] SPS4  
 Khallaghi, Siavash [9785-55] S12, [9786-19] S4  
 Khan, Ali R. [9784-16] S4, [9786-84] SPSMon  
 Khan, Faisal [9791-29] SPSWed, [9791-43] SPSWed  
 Khandelwal, Niranjan [9785-106] SPS4, [9785-107] SPS4, [9785-16] S3  
 Khanna, Akhil Jay [9786-16] S3  
 Khobragade, Parag [9787-9] S2  
 Khojaste, Amir [9785-55] S12, [9786-19] S4  
 Kiess, Ana P. [9786-24] S5  
 Kilgus, Thomas [9786-56] SPSMon  
 Kim, Changhan [9783-105] SPS2  
 Kim, Daechwon [9783-140] SPS6  
 Kim, David H. 9790 Program Committee  
**Kim, Dohyeon** [9783-207] SPS12, [9783-89] SPS1  
**Kim, Dong Sik** [9783-134] SPS5  
 Kim, Dong Woon [9783-136] SPS5, [9783-139] SPS5, [9783-140] SPS6, [9783-228] SPS16, [9783-88] SPS1  
**Kim, Edward** [9789-8] S2  
 Kim, Eun [9783-134] SPS5  
 Kim, Hee-Jin [9785-104] SPS4  
**Kim, Hee-Joung** 9783 Program Committee, 9783 S15 Session Chair, [9783-106] SPS2, [9783-207] SPS12, [9783-224] SPS16, [9783-225] SPS16, [9783-229] SPS16, [9783-89] SPS1, [9783-94] SPS1  
**Kim, Ho Kyung** [9783-125] SPS4, [9783-136] SPS5, [9783-139] SPS5, [9783-140] SPS6, [9783-228] SPS16, [9783-88] SPS1  
**Kim, Hyeonjin** [9783-126] SPS5  
 Kim, Hyeon A. [9785-126] SPS5  
 Kim, Hyo-Eun [9785-104] SPS4  
 Kim, Hyeon [9785-110] SPS4  
 Kim, Hyun J. Grace [9785-15] S3  
 Kim, Hyunki [9791-33] SPSWed  
 Kim, Jin Woo [9783-125] SPS4  
 Kim, JongHyo 9786 Program Committee  
 Kim, Joo Y. [9785-53] S10  
 Kim, Jooin [9786-80] SPSMon  
 Kim, Junmo [9785-126] SPS5  
 Kim, Junwoo [9783-136] SPS5, [9783-139] SPS5, [9783-140] SPS6, [9783-228] SPS16  
 Kim, Kyeong Min [9783-195] SPS10  
 Kim, Lauren Marie [9785-58] S12, [9787-20] S4  
 Kim, Min [9790-67] SPS7  
 Kim, MinWoo [9790-23] S5  
 Kim, Namho [9783-218] SPS16  
**Kim, Namguk** [9789-5] S2  
 Kim, Regina E. Y. [9784-66] SPS1  
 Kim, Se Hyung [9785-57] S12  
 Kim, Seung Ho [9783-140] SPS6

- Kim, Seung Hoon [9783-180] SPS9  
 Kim, Seungsoo [9790-52] SPS3  
 Kim, Sun Hyung [9784-10] S3  
**Kim, Taeho** [9784-65] SPS1, [9785-124] SPS5  
 Kim, Ted Myeongsoo [9783-227] SPS16  
 Kim, Woonjin [9789-21] S5  
 Kim, Ye-seul [9783-106] SPS2, [9783-224] SPS16, [9783-229] SPS16, [9783-94] SPS1  
 Kim, Younsu [9790-55] SPS4, [9790-56] SPS4  
 Kim, Yunjung [9788-52] SPS1  
 Kimpe, Tom R. L. [9787-33] S7, 9791 Program Committee  
 King, Darlene [9785-130] SPS5  
 Kirsch, David G. [9788-31] S7  
 Kishimoto, Jessica [9790-27] S6  
 Kishimoto, Takumi [9785-109] SPS4  
 Kitamoto, Asanobu [9784-40] S8  
 Kitasaka, Takayuki [9784-87] SPS2, [9785-105] SPS4, [9785-13] S3, [9785-131] SPS5, [9786-48] S9  
 Kitslaar, Pieter [9785-14] S3, [9786-5] S1  
 Kitsunozuka, Yoshiki [9790-39] SPS1  
 Kjer, Hans M. [9784-101] SPS2, [9784-28] S6  
 Klein, Stefan 9784 Program Committee, 9784 S12 Session Chair, [9784-58] S12, [9788-17] S4  
 Kleinszig, Gerhard [9786-16] S3, [9786-9] S2  
 Kleparnik, Petr [9788-14] S3  
**Klima, Ondrej** [9788-14] S3  
 Klinder, Tobias [9784-45] S9, [9785-38] S8  
 Klotz, Ernst [9783-234] SPS4  
 Knaup, Michael [9783-20] S4  
 Knez, Dejan [9784-116] SPS3  
 Knoll, Max [9784-53] S11  
 Knopp, Tobias [9788-30] S7  
 Kobayashi, Masanao [9783-149] SPS6  
**Kodera, Yoshie** [9783-85] SPS1, [9783-91] SPS1  
 Kodibagkar, Vikram D. 9788 Program Committee  
 Koell, Marco [9785-62] S13  
 Kofler, James M. [9783-79] S15  
 Kogan, Ilya [9785-35] S7  
 Kohan, Zohreh [9788-102] SPS10  
 Kohlhase, Naja [9785-77] SPS2  
 Kojima, Takeshi [9783-168] SPS7, [9783-171] SPS7  
 Kolb, Silvio [9786-45] S9  
 Koliatsos, Vassili E. [9783-103] SPS2, [9783-26] S6  
**Kolios, Michael C.** [9790-70] SPS7  
 Kondle, Sirisha [9790-59] SPS5  
 Kondo, Hiroaki [9786-48] S9  
 Konen, Eli [9785-12] S3, [9785-4] S1  
 Konieczek, Martin [9783-129] SPS5  
 Kontos, Despina 9783 Conference Chair, 9783 S3 Session Chair, 9783 SWK1 Workshop Chair, [9785-21] S4, [9785-69] SPS1, [9791-9] S2  
 Koo, Chi Wan [9783-215] SPS15  
 Kopp, Felix K. [9788-62] SPS3  
 Kopriva, Ivica [9791-24] S5  
 Korbelik, Jagoda [9791-17] SPSWed, [9791-37] SPSWed  
 Kording, Fabian [9786-73] SPSMon  
 Kores, Robert [9784-105] SPS2  
 Koropatnick, James [9788-39] S8  
 Kosecka, Jana [9790-62] SPS6  
 Koshida, Kichiro [9783-149] SPS6  
 Kost, Henning [9791-48] SPSWed  
 Kosugi, Shinichi [9786-10] S2  
 Kothawala, Ali Arshad Aameer [9790-49] SPS3  
 Kovacs, Michael S. [9788-39] S8  
 Kovacs, William [9785-6] S2  
 Kovancs, Panu E. [9791-34] SPSWed  
 Kovarnik, Tomas [9788-33] S7  
 Koziolok, Eva Jolante [9788-35] S8  
 Krappe, Sebastian [9785-121] SPS5, [9785-81] SPS2  
 Kratzke, Jonas [9783-190] SPS10  
 Kraus, Thomas [9785-108] SPS4  
 Krauss, Bernhard [9783-51] S10, [9785-123] SPS5  
 Kretzek, Ernst [9790-8] S2, [9790-9] S2  
 Krings, Gregor [9785-27] S6  
 Krol, Andrzej 9788 Conference Chair, 9788 S1 Session Chair, [9788-5] S1  
 Krüger, Julia [9784-110] SPS3  
**Krupinski, Elizabeth A.** 9787 Program Committee, [9787-16] S4, [9787-25] S1, [9787-45] SPSWed, 9791 Program Committee, 9791 SPSWed Session Chair, WS757  
 Kuenzler, Thomas [9784-154] SPS6  
 Kuhlengel, Trevor [9786-87] SPSMon  
 Kuhlmann, Koert [9786-93] SPSMon  
**Kuijif, Hugo J.** [9784-72] SPS1  
 Kulikowski, Casimir A. [9791-43] SPSWed  
 Kumar, Prafulla [9785-106] SPS4  
 Kumar, Shalki [9790-31] S7  
 Kuntz, Jan [9783-20] S4  
 Kuo, Lily [9790-31] S7  
 Kuo, Phil [9788-94] SPS8  
 Kupelian, Patrick [9786-22] S5  
 Kupinski, Matthew A. 9787 Conference Chair, 9787 S5 Session Chair, 9787 SWK5 Session Chair, [9787-41] S8  
**Kupinski, Meredith K.** [9787-5] S2  
 Kurazume, Ryo [9784-106] SPS3  
 Kurc, Tahsin [9791-21] S5, [9791-41] SPSWed  
 Kusumoto, Masahiko [9785-118] SPS5, [9788-44] S9  
 Kuttén, Kwame S. [9788-74] SPS4  
 Kuzo, Ronald S. [9783-215] SPS15  
 Kwak, Jeong Hwan [9783-180] SPS9  
 Kwak, Shin Hye [9783-195] SPS10  
**Kwartowitz, David M.** 9786 Program Committee, 9786 S6 Session Chair, [9786-65] SPSMon, [9790-61] SPS6  
 Kwon, Young Joon [9783-1] S1, [9783-11] S2  
 Kybic, Jan [9784-115] SPS3, [9788-56] SPS2
- L**
- Labadie, Robert F. [9786-7] S2  
 Labyed, Yassin [9790-52] SPS3  
 Lacefield, James C. [9790-30] S7  
 Lachner, Sebastian [9783-196] SPS11, [9783-203] SPS11, [9783-25] S5  
 Laganis, Philip E. [9783-3] S1  
 Lakshmanan, Manu N. [9783-210] SPS14, [9783-211] SPS14, [9783-72] S14, [9783-74] S14  
 Lamash, Yechiel [9784-2] S1  
 Lambert, Jack W. [9783-145] SPS6  
 Lamoureux, Ecosse [9785-96] SPS3  
**Landman, Bennett A.** [9783-55] S11, 9784 Program Committee, 9784 S2 Session Chair, [9784-127] SPS4, [9784-13] S3, [9784-29] S6, [9784-41] S9, [9784-51] S10, [9784-59] S12, [9784-73] SPS1, [9784-98] SPS2, [9789-24] S5  
 Lane, John I. [9783-54] S10  
 Lang, Andrew [9784-32] S7, [9784-47] S10  
 Langdon-Embry, Liana [9784-67] SPS1  
 Langrock, Curtis P. [9789-100] S1A  
 Langs, Georg [9784-139] SPS5, [9784-19] S5  
 Lanning, Justin [9790-45] SPS3  
 Lansberg, Maarten G. [9783-32] S7  
 Lao, Yi [9788-96] SPS8  
 Larsson, Daniel H. [9783-67] S13  
 Larsson, Jakob C. [9783-67] S13  
 Lasso, Andras [9786-14] S3, [9786-33] S7, [9786-39] S8, [9786-57] SPSMon, [9786-69] SPSMon, [9786-86] SPSMon, [9786-92] SPSMon, [9786-96] SPSMon  
 Latour, Lawrence [9788-50] SPS10  
 Lau, Kristen C. [9783-11] S2  
 Lauritsch, Guenter [9783-100] SPS2  
**Laue, Francois B.** [9784-119] SPS4  
 Lavini, Cristina [9784-148] SPS6  
 Law, Ian [9784-48] S10  
**Law, Maria Y.** 9789 Program Committee, 9789 S3 Session Chair  
 Law, Zhe Kang [9788-75] SPS4  
 Lay, Nathan [9785-58] S12, [9785-78] SPS2  
 Lazary, Aron [9788-65] SPS3  
 Le Reste, Pierre-Jean [9785-31] S6  
 Le Teurnier, Yves [9787-13] S3  
 Leblond, Antoine [9788-59] SPS2  
 Lederer, David J. [9786-8] S2, [9788-42] S9  
 Lee, Changwoo [9787-30] S6  
 Lee, Christopher P. [9784-59] S12  
 Lee, David S. C. [9790-27] S6  
 Lee, Dong Yeon [9785-124] SPS5  
**Lee, Dong-Hoon** [9783-106] SPS2, [9783-224] SPS16, [9783-229] SPS16, [9783-94] SPS1  
 Lee, Gary [9791-30] SPSWed  
 Lee, George [9791-25] S4  
 Lee, Gunho [9790-67] SPS7  
**Lee, Haeng-Hwa** [9783-106] SPS2, [9783-224] SPS16, [9783-229] SPS16, [9783-94] SPS1  
**Lee, Han Sang** [9785-126] SPS5  
 Lee, Hoyeon [9783-105] SPS2  
 Lee, JooHWi [9784-10] S3, [9784-25] S6  
**Lee, Juhun** [9787-4] S2  
 Lee, Junghoon [9786-20] S5, [9786-24] S5  
 Lee, Keon Yong [9788-107] SPS6, [9788-29] S6, [9788-53] SPS1  
 Lee, Kwan Hyi [9788-107] SPS6, [9788-29] S6, [9788-53] SPS1  
 Lee, Okkyun [9783-109] SPS3, [9783-59] S12  
**Lee, Soo-Jin** [9783-165] SPS7, [9783-167] SPS7  
 Lee, Ting-Yim [9786-34] S7, [9788-39] S8  
 Lee, Warwick B. [9787-15] S4, [9787-32] S7, [9787-34] S7, [9787-35] S7  
 Lee, Wonmean [9790-36] SPS1  
 Lee, Young [9783-107] SPS2  
 Lee, Yueh Z. [9783-2] S1, [9783-222] SPS16, [9783-223] SPS16, [9783-3] S1  
 Lefèvre, Christophe [9788-43] S9  
 Lehmann, Helge [9786-99] SPSMon  
 Lei, Tianhu 9784 Program Committee, SC1184  
 Leiner, Tim [9784-4] S1  
 Leistriz, Lutz [9788-20] S5  
 Lelieveldt, Boudewijn 9784 Program Committee, [9785-14] S3, [9786-5] S1  
 Lell, Michael [9783-30] S6  
 Lemaitre, Guillaume [9785-11] S2, [9785-80] SPS2  
 Leming, Matthew J. [9788-101] SPS10  
 Lemke, Heinz U. 9785 SWK7 Session Chair, 9789 Program Committee, 9789 SWK7 Workshop Chair  
 Lenarz, Thomas [9786-50] S10  
**Leng, Shuai** [9783-205] SPS12, [9783-215] SPS15, [9783-37] S7, [9783-44] S9, [9783-50] S10, [9783-54] S10, [9783-79] S15  
 Leo, Patrick [9791-25] S4  
 Leon, Cecilia [9788-105] SPS2  
 Leonard, Simon [9784-12] S3, [9784-30] S7, [9784-43] S9  
 Leong, Rupert W. L. [9788-8] S2  
 Leporé, Natasha [9784-129] SPS4, [9788-96] SPS8  
 Lerner, Alex [9789-13] S3  
**Lessmann, Nikolas** [9785-36] S7  
 Letang, Jean Michel [9783-142] SPS6  
 Létang, Jean-Michel [9783-181] SPS9  
 Leung, Eric [9790-17] S4  
 Leung, Kelvin [9784-5] S1  
 Léveillée, Sébastien [9783-40] S8  
 Levenson, Richard M. [9787-16] S4, 9791 Program Committee  
 Levenston, Marc [9783-19] S4  
 Leveridge, Michael [9785-55] S12, [9786-19] S4  
 Levi, Jacob [9784-118] SPS3, [9784-135] SPS5, [9788-86] SPS7, [9788-89] SPS7  
 Levin, David L. [9783-215] SPS15, [9783-54] S10  
 Levinson, Reuven [9783-33] S7  
 Lewallen, Susan [9785-44] S9, [9785-87] SPS3  
 Lewis, Sarah J. [9787-15] S4, [9787-17] S4, [9787-35] S7  
 Lézoray, Olivier 9791 Program Committee  
 Li, Baojuan [9788-47] S10, [9788-49] S10, [9789-14] S3  
 Li, Bin [9783-163] SPS7  
 Li, Changqing 9788 Program Committee, [9788-25] S6, [9788-26] S6, [9788-91] SPS8  
**Li, Chia-Chen** [9785-115] SPS4  
 Li, Chunfang [9790-28] S6  
**Li, Chungiang** [9788-54] SPS2  
 Li, Chunyu [9790-24] S5, [9790-32] S7, [9790-66] SPS7  
**Li, Cuiping** [9790-11] S2  
 Li, Fiona [9788-39] S8  
 Li, Guang [9783-98] SPS2  
 Li, Hui [9785-67] SPS1  
 Li, Kang [9786-11] S2  
 Li, Ke [9783-116] SPS4, [9783-22] S5, [9783-23] S5, [9783-35] S7, [9783-48] S9  
 Li, Ke [9784-52] S11  
 Li, Liang [9788-47] S10, [9788-49] S10, [9789-14] S3  
 Li, Lihua [9788-72] SPS4, [9789-2] S1, [9789-25] SPSMon, [9789-3] S1, [9789-32] S5, [9789-33] SPSMon  
 Li, Lin [9784-151] SPS6  
 Li, Ming [9786-40] S8  
 Li, Ping-Hui [9783-170] SPS7  
 Li, Qian [9787-14] S3, [9787-18] S4  
 Li, Qiang [9785-135] SPS5, [9785-138] SPS6, [9788-64] SPS3  
 Li, Qin [9783-148] SPS6, [9783-77] S15  
 Li, Senhu [9786-82] SPSMon  
 Li, Shuo [9785-70] SPS1  
 Li, Tao [9790-54] SPS3  
 Li, Tianhong [9786-58] SPSMon  
 Li, Weizhi [9785-130] SPS5  
 Li, Xu [9790-66] SPS7  
 Li, Xu [9790-32] S7  
 Li, Yanfang [9786-60] SPSMon  
 Li, Ying [9790-70] SPS7  
**Li, Yinsheng** [9783-27] S6, [9783-28] S6, [9783-31] S6, [9783-48] S9  
 Li, Yiyong [9790-54] SPS3  
 Li, Yuemeng [9788-86] SPS7  
 Li, Yuhua [9783-202] SPS11  
 Li, Zhang [9784-148] SPS6  
 Li, Zheng [9785-122] SPS5  
 Li, Zhongyuan [9783-98] SPS2  
 Li, Zhoubo [9783-205] SPS12, [9783-50] S10, [9783-54] S10  
 Liang, Albert K. [9783-129] SPS5  
**Liang, Jerome** [9783-119] SPS4, [9783-151] SPS7, [9783-157] SPS7, [9783-159] SPS7, [9783-160] SPS7, [9785-56] S12  
 Liang, Liang [9784-109] SPS3  
 Liang, Xin [9784-68] SPS1  
 Liang, Zhi-Pei [9788-3] S1  
 Liao, Qimei [9783-108] SPS2, [9783-126] SPS4  
 Liao, Wei [9784-44] S9  
 Lieberman, Sivan [9785-12] S3  
 Likar, Bo?Tjan [9784-105] SPS2, [9784-116] SPS3  
 Lim, Mikhiel [9785-120] SPS5  
 Limperopoulos, Catherine [9784-18] S4  
 Lin, Binbin [9784-55] S11  
 Lin, Cong [9788-64] SPS3  
 Lin, Hongxiang [9790-43] SPS2  
 Lin, Lanfen [9784-104] SPS2  
 Lin, Wilson [9785-42] S8  
 Lin, Xiao [9791-45] SPSWed  
 Lin, Youzuo [9783-186] SPS9, [9783-9] S2  
 Linder, Bence [9786-57] SPSMon  
 Linder, Nina [9791-34] SPSWed, [9791-39] SPSWed  
 Lindsok Hansen, Kristoffer [9790-19] S4  
 Ling, Haibin [9784-68] SPS1, [9788-13] S3  
 Ling, Shan [9785-138] SPS6  
 Ling, Tonghui [9789-26] SPSMon, [9789-28] SPSMon, [9789-30] SPSMon  
 Lingurar, Marius G. 9784 Program Committee, 9784 S1 Session Chair, 9785 Program Committee, [9785-39] S8, [9785-61] S13  
 Linsen, Lars [9784-3] S1  
 Linde, Cristian A. 9786 Program Committee, 9786 S6 Session Chair, [9786-101] SPSMon, [9786-75] SPSMon, [9788-10] S3, [9790-16] S3  
 Liptrot, Matthew G. [9784-119] SPS4, [9784-8] S2  
 Litjens, Geert J. S. [9791-2] S1  
 Littrup, Peter J. [9790-44] SPS2  
 Liu, Brent J. 9789 Program Committee, 9789 S4 Session Chair, [9789-12] S3, [9789-13] S3, [9789-23] S5, [9789-27] SPSMon, [9789-29] SPSMon, [9789-31] SPSMon  
 Liu, Cheng-Pei [9785-115] SPS4  
 Liu, Chia-Ying [9785-6] S2  
**Liu, Hong** [9783-202] SPS11, [9783-230] SPS16, [9785-122] SPS5, [9785-26] S6, [9785-29] S6, [9785-71] SPS1, [9785-72] SPS1, [9790-20] S5  
 Liu, Hui [9788-105] SPS2  
 Liu, Jiamin [9785-58] S12  
 Liu, Jianfei [9785-45] S9, [9785-90] SPS3  
 Liu, Jie [9787-24] S1  
 Liu, Jing [9790-58] SPS5  
 Liu, Joseph [9789-13] S3  
 Liu, Kela [9791-12] S3  
 Liu, Langlechang [9783-39] S8  
 Liu, Luoluo [9784-124] SPS4  
 Liu, Shuang [9785-128] SPS5  
 Liu, Simon [9790-6] S2  
 Liu, Songtao [9783-148] SPS6  
 Liu, Tian [9784-86] SPS2, [9786-72] SPSMon, [9786-78] SPSMon  
 Liu, Weiguo [9788-21] S5  
 Liu, Wen Lei [9783-108] SPS2, [9783-126] SPS4  
 Liu, William [9791-21] S5  
 Liu, Xiabi [9784-78] SPS1, [9786-6] S2  
 Liu, Yan [9783-159] SPS7, [9783-160] SPS7  
 Liu, Yang [9785-64] S13, [9788-47] S10, [9788-49] S10



- Liu, Yijun [9788-21] S5  
Liu, Ying [9787-18] S4  
Liu, Ying [9787-14] S3  
Liu, Yiqiao [9788-93] SPS8  
Liu, Yu [9788-55] SPS2  
Liu, Yuan [9784-57] S12  
Liu, Yue [9785-98] SPS3, [9785-99] SPS3  
Liu, Yumin [9784-131] SPS5  
Lladó, Xavier [9784-94] SPS2  
**Lo, Joseph Y.** [9783] Conference  
CoChair, 9783 S1 Session Chair,  
[9783-214] SPS15, [9783-76] S15,  
[9783-78] S15, [9783-80] S15, [9783-82] SPS1, [9787-6] S2  
Lo, Pechin [9785-134] SPS5, [9785-15] S3  
Lodge, Kenneth [9786-23] S5  
Loew, Murray H. 9784 Program  
Committee, 9784 S8 Session Chair  
Lohmann, Sebastian [9791-31] SPSWed  
Lollis, Stuart S. [9786-13] S3  
Lomako, Andrew A. [9783-43] S8  
Long, Christopher [9784-6] S2  
Long, Liling [9789-29] SPSMon  
Long, Rodney [9787-20] S4, [9789-17] S4  
Long, Zhiying [9784-64] SPS1  
Looi, Thomas [9786-57] SPSMon  
Looney, Padraig T. [9783-4] S1, [9787-23] S1  
Looper, Jared [9785-114] SPS4, [9785-117] SPS4  
Lopez Maurino, Sebastian [9783-141] SPS6  
Lopez, John J. [9788-33] S7  
Loranger, Sébastien [9786-91] SPSMon  
Lorenz, Cristian 9784 Program  
Committee, 9784 S6 Session Chair,  
[9784-45] S9, [9784-54] S11, [9784-71] SPS1, [9786-31] S7  
Lösel, Philipp [9784-92] SPS2  
Lotofio, Roberto A. [9785-95] SPS3  
Lou, Cuijuan [9790-7] S2  
Louie, Alexander V. [9785-50] S10  
Louie, Ryan [9789-23] S5, [9789-29] SPSMon  
Lovric, Goran [9783-68] S13  
Lowe, Val J. [9785-103] SPS3  
Lowekamp, Bradley SC1182  
Lowery, Maevae A. [9784-67] SPS1  
Lu, Guolan [9788-37] S8, [9788-38] S8, [9791-20] S4  
Lu, Hongbing [9783-108] SPS2, [9783-126] SPS4, [9785-64] S13, [9788-47] S10, [9788-49] S10, [9789-14] S3  
Lu, Jen-Tang [9790-57] SPS5  
Lu, Jianping [9783-2] S1, [9783-222] SPS16, [9783-223] SPS16, [9783-3] S1  
Lu, Le [9784-89] SPS2, [9785-112] SPS4, [9785-24] S5, [9785-58] S12  
Lu, Lijun [9783-119] SPS4, [9783-151] SPS7  
Lu, Minghui [9783-39] S8  
Lu, Yang [9785-130] SPS5  
Lu, Yao [9783-158] SPS7  
Lu, Yingli [9784-46] S10  
Lu, Zhongkang [9788-106] SPS4  
Lubbers, Laura S. [9786-23] S5, [9786-71] SPSMon  
Lucumi Moreno, Edinson [9788-9] S2  
Lüddemann, Tobias [9784-113] SPS3  
Ludwig, Veronika [9783-196] SPS11, [9783-203] SPS11, [9783-25] S5  
Luengo Muntion, Imanol [9784-84] SPS2  
Lukyanchenko, Olga [9787-36] S7  
Lundin, Johan [9791-34] SPSWed, [9791-39] SPSWed  
Lundström, Ulf [9783-67] S13  
Lunter, Dominique [9788-80] SPS6  
**Luo, Jianwen** [9790-58] SPS5  
Luo, Ming [9786-58] SPSMon  
Luo, Shouhua [9783-98] SPS2  
Luo, Xiongbiao [9786-25] S6, [9786-47] S9  
Luo, Yifu [9784-51] S10  
Luo, Yongkang [9785-136] SPS6, [9785-137] SPS6  
Lux, Mathias [9786-66] SPSMon  
Luyt, Leonard G. [9788-39] S8  
Lyu, Ilwoo [9784-10] S3, [9784-25] S6  
Lyu, Qingwen [9783-163] SPS7
- M**
- Ma, Burton [9786-77] SPSMon  
**Ma, Chi** [9783-215] SPS15  
Ma, Jianhua [9783-119] SPS4, [9783-151] SPS7, [9783-163] SPS7  
Ma, Jingchen [9789-4] S1  
Ma, Kevin C. [9789-13] S3  
Ma, Ling [9784-78] SPS1, [9786-6] S2  
Ma, Ling [9784-131] SPS5  
Ma, Lorraine [9784-134] SPS5  
Ma, Shaodong [9786-59] SPSMon  
Ma, Xiangyuan [9783-158] SPS7  
**MacAulay, Calum E.** [9791-17] SPSWed, [9791-37] SPSWed  
Macchi, Aldo [9783-192] SPS10  
MacCormick, Ian [9785-44] S9, [9785-87] SPS3  
Mackenzie, Alistair [9783-4] S1  
MacLaren, Judy M. [9788-50] SPS10  
**Macq, Benoît M.** [9784-128] SPS4  
Macyszyn, Luke [9785-89] SPS3  
Madabhushi, Anant 9791 Conference  
Chair, 9791 S1 Session Chair, [9791-25] S4, [9791-5] S2  
Madsen, Sarah [9784-36] S8  
Maeder, Anthony J. 9787 Program  
Committee  
Maerz, Ken [9784-53] S11  
Maes, Frederik 9784 Program Committee  
Maev, Roman G. 9790 Program  
Committee  
Magee, Derek R. 9791 Program  
Committee  
Lu, Le [9784-89] SPS2, [9785-112] SPS4, [9785-24] S5, [9785-58] S12  
Lu, Lijun [9783-119] SPS4, [9783-151] SPS7  
Lu, Minghui [9783-39] S8  
Lu, Yang [9785-130] SPS5  
Lu, Yao [9783-158] SPS7  
Lu, Yingli [9784-46] S10  
Lu, Zhongkang [9788-106] SPS4  
Lubbers, Laura S. [9786-23] S5, [9786-71] SPSMon  
Lucumi Moreno, Edinson [9788-9] S2  
Lüddemann, Tobias [9784-113] SPS3  
Ludwig, Veronika [9783-196] SPS11, [9783-203] SPS11, [9783-25] S5  
Luengo Muntion, Imanol [9784-84] SPS2  
Lukyanchenko, Olga [9787-36] S7  
Lundin, Johan [9791-34] SPSWed, [9791-39] SPSWed  
Lundström, Ulf [9783-67] S13  
Lunter, Dominique [9788-80] SPS6  
**Luo, Jianwen** [9790-58] SPS5  
Luo, Ming [9786-58] SPSMon  
Luo, Shouhua [9783-98] SPS2  
Luo, Xiongbiao [9786-25] S6, [9786-47] S9  
Luo, Yifu [9784-51] S10  
Luo, Yongkang [9785-136] SPS6, [9785-137] SPS6  
Lux, Mathias [9786-66] SPSMon  
Luyt, Leonard G. [9788-39] S8  
Lyu, Ilwoo [9784-10] S3, [9784-25] S6  
Lyu, Qingwen [9783-163] SPS7
- Maier, Andreas K. [9783-19] S4  
Maier-Hein, Klaus H. [9784-53] S11, [9785-62] S13  
Maier-Hein, Lena [9784-53] S11, 9786  
Program Committee, 9786 S5 Session  
Chair, [9786-44] S9, [9786-56] SPSMon, [9789-22] S5  
Mainprize, James G. [9791-12] S3  
Majdani, Omid [9786-50] S10  
**Makeev, Andrey V.** [9783-78] S15, [9783-83] SPS1  
Malalla, Nuhad Abdulwahed Younis [9783-231] SPS16, [9783-232] SPS16  
Maleshkova, Maria [9786-2] S1, [9789-22] S5  
Mali, Willem P. Th. M. [9784-56] S11, [9785-36] S7  
Malkov, Sergej [9785-27] S6  
Mallah, Maen [9791-32] SPSWed  
Malrain, Cecile [9786-29] S6  
**Mandal, Krishna C.** [9788-5] S1  
**Manduca, Armando** 9788 Program  
Committee, 9788 S2 Session Chair,  
9788 S7 Session Chair  
Manickam, Kavitha [9790-53] SPS3  
Mann, Ritse M. [9785-17] S4, [9785-20] S4, [9785-22] S4  
**Manning, David J.** [9787-22] S1  
Mansoor, Awais [9785-39] S8  
Mansour, Omar [9790-30] S7  
Månsson, Lars G. [9787-2] S5  
Mao, Hui [9784-86] SPS2, [9786-72] SPSMon, [9786-78] SPSMon  
Maraj, Tishan [9785-3] S1  
Marami, Bahram [9786-79] SPSMon  
Marcan, Marija [9788-12] S3  
Marchesseau, Stephanie [9784-81] SPS1  
Marcomini, Karem D. [9784-77] SPS1, [9787-49] SPSWed  
Marin, Daniele [9783-213] SPS15  
**Markey, Mia K.** [9787-27] S6  
Markl, Michael [9784-3] S1  
Marlow, Neil [9784-121] SPS4  
**Marreiros, Filipe M.** [9786-36] S7  
Marshall, Nicholas W. [9783-92] SPS1, [9787-57] SPSWed  
**Martel, Anne L.** [9784-46] S10, [9785-91] SPS3, 9791 Program  
Committee, 9791 S3 Session Chair,  
[9791-38] SPSWed  
Marti, Robert [9785-80] SPS2  
Martin, Caitlin [9784-109] SPS3  
Martin, Diego R. [9787-8] S2  
Martin, Neil [9785-89] SPS3  
Martin, Peter R. [9786-54] S11  
Martineau, Paul A. [9790-50] SPS3  
**Martyn, Michael** [9790-22] S5  
März, Ken [9789-22] S5  
Marzani, Franck [9785-11] S2  
Massich, Joan [9785-11] S2, [9785-80] SPS2  
Massion, Pierre P. [9787-18] S4  
Massone, Anna Maria [9784-74] SPS1  
Master, Viraj [9786-6] S2  
Mastmeyer, Andre [9784-88] SPS2  
Masuzawa, Hiroshi [9790-38] SPS1, [9790-71] SPS7
- Matasar, Matt [9791-16] S4  
Mateus, Diana 9784 Program Committee  
**Mather, Melissa L.** [9788-83] SPS6  
Matheus, Bruno R. [9784-77] SPS1  
Mathews, Aswin John [9783-33] S7  
Matlock, Kevin [9784-90] SPS2  
Matsubara, Kosuke [9783-149] SPS6  
Matsuhiro, Mikio [9785-109] SPS4, [9785-118] SPS5  
Matsumoto, Yoichiro [9790-43] SPS2  
Matsusako, Masaki [9788-66] SPS4  
Mattone, Sarah A. [9785-50] S10  
Mawn, Louise A. [9783-55] S11, [9784-51] S10  
May, Stefan [9784-70] SPS1  
Mayer, Arnaldo [9785-4] S1  
Mayer, Benjamin [9786-44] S9  
Mayer, Philipp [9785-62] S13  
Mazurowski, Maciej A. [9785-101] SPS3, [9785-30] S6, 9787 Program  
Committee, 9787 S8 Session Chair,  
[9787-6] S2  
McAleavey, Stephen A. 9790 Program  
Committee  
**McAuliffe, Matthew J.** [9784-89] SPS2, [9788-11] S3  
McBrayer, Kepra [9786-7] S2  
**McCall, Brian P.** [9791-19] S4  
McCall, Shannon J. [9783-211] SPS14  
McCollough, Cynthia H. [9783-205] SPS12, [9783-215] SPS15, [9783-37] S7, [9783-44] S9, [9783-50] S10, [9783-54] S10, [9783-79] S15  
McCormick, Matthew M. SC1182  
McCreey, Evan S. [9784-89] SPS2, [9788-11] S3  
McEntee, Mark F. [9783-96] SPS1, 9787  
Program Committee, [9787-21] S1, [9787-48] SPSWed  
Mckown, Susan [9788-52] SPS1  
McLeod, A. Jonathan [9786-25] S6, [9786-47] S9  
McMahon, Katie L. [9784-62] S12, [9788-73] SPS4  
McMillan, Kyle [9787-3] S5  
McNitt-Gray, Michael F. [9785-15] S3, [9787-3] S5  
Mechlem, Korbinian [9783-13] S3  
Megalookonomou, Vasilis [9788-13] S3  
Mehanna, Emile [9788-104] SPS6  
Mehrabi, Arianeb [9784-53] S11  
Mehre, Shrikant Arvind [9785-16] S3  
**Mehrmohammadi, Mohammad**  
9790 Program Committee, 9790 S5  
Session Chair, [9790-59] SPS5  
Mei, Kai [9783-13] S3, [9788-62] SPS3  
Meijering, Erik 9791 Program Committee  
Meinzer, Hans-Peter [9786-45] S9, [9789-22] S5  
Melbourne, Andrew [9784-121] SPS4  
**Mello-Thoms, Claudia R.** [9783-97] SPS1, 9787 Program Committee,  
9787 S4 Session Chair, [9787-17] S4,  
[9787-21] S1, [9787-35] S7, [9787-40] S8, [9787-48] SPSWed  
**Mendez, Kayla R.** [9785-67] SPS1  
Mendel, Jacob A. [9783-173] SPS8  
Meng, Hui [9786-30] S6
- Meng, Qier [9784-87] SPS2  
Menon, Prahlad G. [9784-155] SPS6, [9784-95] SPS2, [9788-90] SPS7  
Mensah, Serge 9790 Program Committee  
Menze, Bjoern H. [9784-42] S9, [9785-1] S1  
Mercan, Caner [9791-7] S2  
Mercan, Ezgi [9791-7] S2  
Merhof, Dorit [9785-108] SPS4  
Meriaudeau, Fabrice 9785 Program  
Committee, 9785 S11 Panel Member,  
9785 S9 Session Chair, [9785-11] S2,  
[9785-80] SPS2, [9785-96] SPS3  
Merrill, Frank E. [9783-69] S13  
Mertelmeier, Thomas [9783-15] S4  
Mertzandou, Thomy [9791-4] S2  
Meszoely, Ingrid M. [9786-70] SPSMon  
Metaxas, Dimitris N. [9786-11] S2  
**Metzger, Andrew J.** [9788-71] SPS4  
Metzger, Jasmin [9789-22] S5  
Meyer, Carsten [9785-8] S2  
Meyer-Baese, Anke [9785-80] SPS2, [9788-78] SPS5  
Mezher, Adam [9784-120] SPS4, [9784-36] S6  
Mi, Yongwei [9790-54] SPS3  
Miao, Yu [9786-60] SPSMon  
Michalkiewicz, Mateusz [9784-5] S1  
Michel, Thilo [9783-196] SPS11, [9783-203] SPS11, [9783-25] S5  
Michener, Maria [9786-71] SPSMon  
Michielens, Koen [9787-57] SPSWed  
Midy, Abhishek [9785-68] SPS1  
Miga, Michael I. 9786 Program  
Committee, 9786 S7 Session Chair,  
[9786-35] S7, [9786-37] S7, [9786-70] SPSMon  
Miki, Soichiro [9785-100] SPS3  
Milea, Dan [9785-96] SPS3  
Miller, David J. [9791-44] SPSWed  
Miller, James J. [9783-43] S8  
Miller, Linzey [9788-10] S3  
Miller, Michael I. [9788-74] SPS4  
Miller, Steven [9788-16] S4  
Min, James K. [9788-34] S7  
Min, Yugang [9784-108] SPS3, [9786-22] S5  
Minami, Kohichi [9783-185] SPS9  
Mirea, Oana [9790-51] SPS3  
Mireault, Al [9790-26] S6  
Miri, Mohammad Saleh [9788-70] SPS4  
Mirov, Ilya S. [9788-58] SPS2  
Mirza, Sohail [9786-13] S3  
Mirzaei, Hadis [9788-8] S2  
Misawa, Kazunari [9785-105] SPS4, [9785-131] SPS5  
Mishra, Virendra R. [9788-46] S10  
Mistretta, Charles A. [9783-5] S1, [9784-82] SPS2, [9786-38] S8  
Mitchell, Jason E. [9786-51] S10  
Mitra, Abhishek [9788-85] SPS7  
Mitra, Sunanda D. 9784 Program  
Committee, [9784-137] SPS5, [9784-90] SPS2  
Mittal, Shachi [9791-40] SPSWed, [9791-42] SPSWed  
Miyagi, Yasushi [9784-106] SPS3  
Miyahara, Ryoji [9786-48] S9  
Miyachi, Shoko [9784-106] SPS3
- Mo, Weirong [9785-130] SPS5  
Moding, Everett [9788-31] S7  
Moeninghoff, Christoph [9785-84] SPS3  
Moeskops, Pim [9784-72] SPS1  
Moesner, Lars N. [9790-4] S1  
Mohan, Suyash [9789-10] S3  
Mohar, Janez [9784-116] SPS3  
Mohiaddin, Raad H. [9784-20] S5  
Mohr, Brian [9784-147] SPS6  
Moir, David C. [9783-173] SPS8  
Mokso, Raimund [9783-68] S13  
Mol, Harrie [9787-54] SPSWed  
Moliner, Laura [9783-90] SPS1  
Møller Sørensen, Hasse [9790-19] S4  
Molohollo, Malid [9784-45] S9  
Molnar, David [9787-2] S5  
Molthen, Robert C. 9788 Program  
Committee, 9788 S1 Session Chair,  
9788 S2 Session Chair, 9788 S3  
Session Chair, 9788 S7 Session Chair,  
9788 S9 Session Chair  
Monaco, James P. 9791 Program  
Committee  
Monge, Frederic [9786-97] SPSMon  
Montgomery, Katelyn [9790-11] S2  
Montgomery, Tamara O. [9786-71] SPSMon  
Montreuil, Jacques [9786-52] S11  
Moody, Alan [9785-3] S1  
Moore, John T. [9786-1] S1, [9786-42] S8  
Moore, Kathleen [9785-122] SPS5  
Moore, William [9783-159] SPS7, [9783-160] SPS7  
Moradi, Mehdi 9791 Program Committee,  
[9791-16] S4  
More, Kathleen [9785-29] S6  
Morel, Olivier [9785-11] S2  
**Morgan, Stephen P.** [9788-83] SPS6  
Mori, Kensaku 9784 Program Committee,  
9784 S7 Session Chair, [9784-87] SPS2, [9784-93] SPS2, 9785 Program  
Committee, 9785 S13 Session Chair,  
[9785-105] SPS4, [9785-13] S3,  
[9785-131] SPS5, 9786 Program  
Committee, [9786-48] S9, [9786-60] SPSMon  
Mori, Masaki [9785-13] S3  
Mori, Susumu [9788-108] SPS10, [9788-51] S10  
Morin, Evelyn [9786-33] S7, [9786-39] S8, [9786-69] SPSMon  
Morin-Ducote, Garnetta [9787-19] S4  
Morooka, Ken'ichi [9784-106] SPS3  
Morris, Robert E. [9783-211] SPS14, [9783-72] S14  
Morvan, Yannick [9785-31] S6  
Moshavegh, Ramin [9790-19] S4, [9790-34] S7  
Motwani, Manish [9784-142] SPS6  
Moukoko, Karim [9786-63] SPSMon  
Mountney, Peter [9786-100] SPSMon  
Mousavi, Parvin [9785-55] S12, 9786  
Program Committee, 9786 S4 Session  
Chair, [9786-19] S4, 9790 S4 Session  
Chair  
Moussa, Madeleine [9785-55] S11,  
[9786-19] S4, [9786-54] S12  
Mouton, Peter R. [9791-35] SPSWed

Mueller, Klaus D. [9783-110] SPS3, [9783-111] SPS3, SC829  
 Muenzel, Daniela [9783-204] SPS12  
 Mühlendorfer, Steffen [9785-81] SPS2  
 Mukari, Shahizon Azura [9788-75] SPS4  
 Mukhopadhyay, Sourav [9785-127] SPS5  
**Mukhopadhyay, Sudipta** [9785-106] SPS4, [9785-107] SPS4, [9785-127] SPS5, [9785-16] S3  
 Müller, Bernhard H. [9783-81] SPS1  
 Muller, Kerstin [9783-19] S4  
 Müller, Michael [9786-56] SPSMon  
 Müller, Sabine [9784-99] SPS2  
 Muller, Susan [9788-37] S8, [9791-20] S4  
 Müller-Eschner, Matthias [9784-44] S9  
 Müller-Stich, Beat [9784-61] S12, [9786-43] S9, [9789-22] S5  
 Munkc af Rosenschöld, Per [9784-48] S10  
 Mundy, Daniel [9783-208] SPS13  
 Mundy, Kevin [9784-51] S10  
 Munro, Peter [9783-153] SPS7  
 Münzenmayer, Christian [9785-121] SPS5, [9785-81] SPS2, [9791-32] SPSWed  
 Muragaki, Yoshihiro 9789 SWK7 Panel Member  
 Murakami, Hiroki [9790-37] SPS1  
 Muramatsu, Chisako [9785-129] SPS5, [9785-86] SPS3, [9785-93] SPS3, [9790-37] SPS1  
 Murphy, Ethan K. [9788-84] SPS7  
 Murray, Mayan [9791-12] S3  
 Murray, Melissa E. [9785-103] SPS3  
 Musinsky, Stephanie [9783-214] SPS15  
 Muto, Miyu [9784-122] SPS4  
**Myers, Kyle J.** [9783-148] SPS6, [9783-77] S15

**N**

Nadeem, Saad [9784-107] SPS3, [9784-83] SPS2, [9785-140] SPS7, [9785-76] SPS2, [9786-64] SPSMon, [9788-69] SPS4  
 Nagarajan, Mahesh B. [9785-7] S2, [9788-19] S5, [9788-22] S5, [9788-67] SPS4  
 Naidoo, Kalnisha [9791-4] S2  
 Naish, Michael D. [9786-41] S8  
 Nakajima, Ai [9783-85] SPS1, [9783-91] SPS1  
 Nakamura, Daisuke [9786-4] S1  
 Nakamura, Yoshihiko [9784-93] SPS2, [9785-105] SPS4  
 Nakano, Yasutaka [9785-118] SPS5  
**Nakhmani, Arie** [9788-58] SPS2  
 Nam, Jiho [9783-125] SPS4  
 Nam, Woo Hyun [9784-145] SPS6  
 Nam, Woosook [9783-107] SPS2  
 Nano, Tomi [9783-138] SPS5, [9783-41] S8  
 Napolitano, Raffaele [9784-45] S9  
 Näppi, Janne J. 9785 Program Committee, 9785 S12 Session Chair, [9785-57] S12, [9785-77] SPS2, [9785-82] SPS2  
 Nasirudin, Radin A. [9788-62] SPS3  
 Natesan Ramamurthy, Karthikeyan [9784-37] S8  
 Natori, Hiroshi [9785-13] S3

Navab, Nassir 9784 Program Committee, [9784-39] S8, [9786-48] S9, [9786-97] SPSMon  
 Navarro, Victor [9787-16] S4  
 Nawaf, Cayce B. [9785-54] S12  
 Naydenov, Sergei V. [9783-150] SPS6, [9783-175] SPS8  
 Nedios, Sotiris [9788-90] SPS7  
 Negussie, Ayele [9786-53] S11  
 Nelson, Katrina M. [9784-51] S10  
 Nemeth, Sheila Coyne [9785-43] S9, [9785-44] S9, [9785-87] SPS3  
 Nemoto, Mitsutaka [9785-100] SPS3  
 Nemoz, Christian [9783-201] SPS11  
 Neumann, Bernd [9783-81] SPS1  
 Neumuth, Thomas [9787-58] SPSWed  
 Newby, David E. [9784-142] SPS6  
 Newton, Allen T. [9784-41] S9  
 Neylon, John [9784-108] SPS3, [9786-22] S5, [9786-32] S7  
 Ng, Gary C. [9786-17] S4  
 Nguyen, Kytai T. [9788-81] SPS6, [9788-82] SPS6  
 Nguyen, Thien-Dang [9786-50] S10  
 Niazi, Muhammad Khalid Khan [9791-10] S3, [9791-6] S2  
 Nickisch, Hannes [9784-2] S1, [9784-54] S11  
 Nieh, Peter T. [9786-6] S2  
**Nielsen, Mads** 9784 Program Committee, 9784 S3 Session Chair, [9784-5] S1, [9784-8] S2  
 Nielsen, Michael Bachmann [9790-19] S4, [9790-2] S1, [9790-3] S1  
 Niemann, David B. [9783-27] S6  
 Niessen, Wiro J. 9784 Program Committee, [9788-17] S4  
 Nihei, Tsutomu [9788-66] SPS4  
 Nijkamp, Jasper [9786-93] SPSMon  
**Niki, Noboru** 9785 Program Committee, [9785-109] SPS4, [9785-118] SPS5, [9788-44] S9  
 Nikolov, Svetoslav Ivanov 9790 Program Committee, [9790-33] S7  
 Nimsky, Christopher [9787-52] SPSWed  
 Nimura, Yukitaka [9784-87] SPS2, [9785-105] SPS4, [9785-13] S3, [9785-131] SPS5  
**Ning, Ruola** [9785-65] SPS1  
 Nir, Talia M. [9784-36] S8  
**Nishikawa, Robert M.** 9787 Program Committee, 9787 S1 Session Chair, [9787-4] S2, [9787-46] SPSWed, SC1127  
 Nishino, Setsu [9786-4] S1  
 Niu, Kai [9783-27] S6, [9783-28] S6  
 Niu, Tianye [9783-115] SPS4, [9783-169] SPS7  
**Noble, Jack H.** [9784-57] S12, [9786-21] S5, [9786-7] S2  
 Noë, Peter B. [9783-13] S3, [9783-204] SPS12, [9788-62] SPS3  
 Nolden, Marco [9786-2] S1, [9789-22] S5  
 Noll, Matthias [9790-46] SPS3  
 Nomura, Yukihiko [9785-100] SPS3  
 Nong, Zengxuan [9791-22] S5  
 Noo, Frédéric [9783-100] SPS2, [9783-152] SPS7, [9787-3] S5, [9787-37] S8

Nopoulos, Peggy [9788-71] SPS4  
 Norajitra, Tobias [9784-53] S11  
 Nordström, Håkan C. A. [9783-107] SPS2  
 Normand, Nicolas [9783-172] SPS7  
 Norris, Tess [9784-45] S9  
 Novak, Carol L. 9785 Program Committee, 9785 S2 Session Chair  
 Novario, Raffaele [9783-192] SPS10  
 Novosel, Jelena [9784-96] SPS2  
 Nowack, Sebastian [9785-81] SPS2  
 Nüchter, Andreas [9784-70] SPS1  
 Nutter, Brian 9784 Program Committee, [9784-90] SPS2  
 Nye, Katelyn [9783-144] SPS6, [9784-31] S7  
 Nyvit, Martin [9783-68] S13

**O**

O' Shea, Tuathan [9790-22] S5  
 O'Malley, Stacey [9786-23] S5  
 Oberstar, Erick L. [9783-5] S1  
**O'Connor, J. Michael** [9787-31] S6  
 Oda, Hirohisa [9785-13] S3  
 Oda, Masahiro [9784-87] SPS2, [9784-93] SPS2, [9785-13] S3, [9786-48] S9  
 Odhner, Dewey [9785-40] S8, [9785-63] S13, [9786-74] SPSMon, [9786-83] SPSMon, [9788-55] SPS2  
 Oadinaka, Ikenna [9783-73] S14  
**O'Donnell, Matthew** [9784-140] SPS6  
 O'Donnell, Thomas P. [9783-63] S12  
 Ogohara, Kazunori [9785-86] SPS3  
 Ogunleye, Tomi [9784-86] SPS2  
 Oguz, Ipek [9784-10] S3, [9784-49] S10  
 Oguz, Oguzhan [9791-32] SPSWed  
**Oh, Daejoong** [9783-112] SPS3  
 Oh, Jihun [9784-145] SPS6  
 O'Hara, Ryan P. [9789-6] S2, [9789-7] S2  
 Ohmatsu, Hironobu [9785-118] SPS5, [9788-44] S9  
 Ohtomo, Kuni [9785-100] SPS3  
 Okada, Masahiro [9783-85] SPS1, [9783-91] SPS1  
 Okada, Toshiyuki [9784-14] S3  
 Okerlund, Darin [9787-41] S8  
 Okumura, Susumu [9785-86] SPS3  
 Olesen, Jacob Bjerring [9790-18] S4  
 Oliveira, Julia [9786-76] SPSMon  
 Oliver, Arnau [9784-94] SPS2  
 Olson, Jonathan [9786-13] S3  
 Olson, Kyle [9783-3] S1  
 Ometto, Giovanni [9784-80] SPS1  
 Ong, Irene [9787-24] S1  
 Onitilo, Adedayo A. [9787-24] S1  
 Onyike, Chiadi U. [9784-24] S6, [9785-97] SPS3  
 Oostveen, Luuk [9784-147] SPS6  
 Opolonin, Olexandr D. [9783-150] SPS6, [9783-175] SPS8  
 Orasanu, Eliza [9784-121] SPS4  
 Orderud, Fredrik [9790-12] S3  
 Ordovas, Karen G. [9783-145] SPS6  
 O'Reilly, Eileen M. [9784-67] SPS1  
 Orero, Abel [9783-90] SPS1  
 Orientale, Antonio [9785-5] S1  
 Osanna-Elliott, Angelika [9787-53] SPSWed

O'Sullivan, Joseph A. [9783-73] S14  
 OTA, Junko [9785-77] SPS2  
 Otake, Yoshito [9784-14] S3, [9786-10] S2  
 Otazo, Ricardo [9788-32] S7  
 Otero, Hansel [9785-61] S13  
 Otero, Jose J. [9791-8] S2  
 Othman, Ahmed A. [9784-11] S3  
 Ott, Julien G. [9787-39] S8  
 Oubel, Estanislao [9789-19] S4  
 Oudkerk, Matthijs [9784-56] S11  
 Oudkerk, Matthijs [9785-36] S7  
 Ourselin, Sebastien 9784 Program Committee, [9784-112] SPS3, [9784-121] SPS4, [9786-62] SPSMon  
 Ouyang, Minhui [9788-46] S10  
 Oztan, Basak [9791-3] S1

**P**

Pack, Jed Douglas [9788-34] S7  
 Packer, Douglas [9786-99] SPSMon  
 Page, Charles-E. [9789-20] S4  
 Pagel, Mark D. [9788-40] S8, [9788-94] SPS8  
 Pai Raikar, Vipul [9790-61] SPS6  
 Pai, Akshay [9784-5] S1  
 Paik, Sanghyun [9783-180] SPS9  
 Paknezhad, Mahsa [9784-81] SPS1  
 Pal, Ranadip [9784-90] SPS2  
 Paliwal, Nikhil [9786-30] S6  
 Pallavaram, Srivatsan [9784-41] S9  
 Palm, Christoph [9785-132] SPS5  
 Palma, David A. [9785-50] S10  
**Pan, Xiaochuan** [9783-153] SPS7, [9783-162] SPS7, [9783-164] SPS7, [9783-174] SPS8, [9783-58] S11  
 Panayiotou, Maria [9786-100] SPSMon  
 Panjwani, Sahil A. [9784-59] S12  
 Pantanowitz, Liron [9791-10] S3  
 Papageorghiou, Aris [9784-45] S9  
 Parages, Felipe M. [9787-31] S6  
 Paramagul, Chintana [9785-51] S10  
 Pardasani, Utsav [9786-84] SPSMon  
 Parent, François [9786-91] SPSMon  
 Pareto, Deborah [9784-94] SPS2  
 Parisi, Joseph E. [9785-103] SPS3  
 Park, Ben Joonyeon [9789-5] S2  
 Park, Brian J. [9788-61] SPS2  
 Park, Chan Soo [9783-21] S5  
 Park, Eunbi [9784-65] SPS1  
 Park, Eunpyeong [9783-136] SPS5, [9783-228] SPS16  
 Park, Hunkuk [9783-180] SPS9  
 Park, Jinah [9784-65] SPS1, [9785-124] SPS5  
 Park, Jiwoong [9783-88] SPS1  
 Park, Kyuchang [9783-180] SPS9  
**Park, Minsuk** [9790-67] SPS7  
 Park, Miran [9783-105] SPS2  
 Park, Sang Kyeon [9787-51] SPSWed  
 Park, Seyoun [9786-20] S5, [9786-24] S5  
 Park, Subok [9783-82] SPS1, 9787 Program Committee, 9787 S6 Session Chair, [9787-27] S6, [9787-30] S6, [9787-42] S8  
 Park, Su-Jin [9783-207] SPS12, [9783-89] SPS1

Park, Sun Young [9784-114] SPS3, [9785-79] SPS2  
 Park, Sungwook [9788-107] SPS6, [9788-29] S6  
 Park, Taewoo [9788-87] SPS7  
 Park, Yongsup [9784-145] SPS6  
 Parrent, Andrew [9784-16] S4  
 Parry, Mark [9783-208] SPS13  
 Partain, Larry [9783-218] SPS16  
 Partanen, Ari [9786-53] S11  
 Parvathaneni, Prasanna [9784-127] SPS4  
 Parvin, Bahram 9791 Program Committee  
 Parwani, Anil V. [9791-6] S2  
 Patel, Jaymin [9788-104] SPS6  
 Patel, Mayur B. [9784-73] SPS1  
**Patel, Mishal N.** [9789-18] S4  
 Patel, Rajni V. [9786-41] S8  
**Patel, Tushita** [9788-4] S1  
 Patsa, Santanu [9785-127] SPS5  
 Paulsen, Jane S. [9784-66] SPS1  
**Paulsen, Keith D.** [9786-13] S3, [9786-81] SPSMon  
 Paulus, Caroline [9783-86] SPS1  
 Pauly, Olivier [9784-35] S8  
 Pautler, Stephen [9786-54] S11  
 Paysan, Pascal [9783-153] SPS7, [9783-18] S4  
 Pearce, Caleb [9783-2] S1  
**Pedersen, Morten Vester** [9784-125] SPS4  
 Pednekar, Gargi [9786-8] S2  
 Pedrosa, João [9790-13] S3  
 Peikari, Mohammad [9791-38] SPSWed  
 Peissig, Peggy [9787-24] S1  
**Pelc, Norbert J.** [9783-32] S7, [9783-46] S9, [9783-53] S10, [9783-61] S12  
 Pelizzari, Charles A. [9783-153] SPS7  
 Peller, Joseph A. [9791-23] S5  
 Pellinen, Teijo [9791-34] SPSWed  
 Pelzer, Georg [9783-196] SPS11, [9783-203] SPS11, [9783-25] S5  
 Penchev, Petar [9783-137] SPS5  
 Peng, Hanyang [9788-57] SPS2  
 Peng, Hao [9785-140] SPS7  
 Peng, Luke [9783-39] S8  
 Peng, Yun [9785-98] SPS3, [9785-99] SPS3, [9788-46] S10  
 Penicka, Martin [9786-5] S1  
 Peppard, Heather [9788-4] S1  
 Perasso, Annalisa [9784-74] SPS1  
 Pereira, Malessa M. [9785-27] S6  
**Periaswamy, Senthil** [9785-19] S4, [9785-32] S7  
 Peris, Jose L. [9783-90] SPS1  
 Perkhounkov, Boris [9783-174] SPS8  
 Perkins, Amy [9783-58] S11  
 Pernu?, Franjo [9784-105] SPS2, [9784-116] SPS3  
 Perrin, Douglas P. [9784-136] SPS5  
 Peters, Craig A. [9785-61] S13  
**Peters, Inge M.** [9783-43] S8  
 Peters, Jochen [9784-54] S11  
 Peters, Katherine B. [9785-101] SPS3, [9785-30] S6  
 Peters, Terry M. [9783-191] SPS10, [9784-111] SPS3, [9784-16] S4, [9786-1] S1, [9786-25] S6, [9786-42] S8, [9786-47] S9, [9786-77] SPSMon, [9786-84] SPSMon

Petersen, Ronald C. [9785-103] SPS3  
**Peterson, Hannie** [9787-59] SPSWed  
 Petrick, Nicholas A. [9783-148] SPS6, [9783-77] S15, 9785 Program Committee, 9785 S6 Session Chair, [9785-18] S4, [9787-10] S3  
 Petrillo, Michael J. [9783-132] SPS5, [9783-135] SPS5  
 Petrongolo, Michael [9783-143] SPS6  
 Petrov, Dimitar [9787-57] SPSWed  
 Pezeshk, Aria X. [9785-18] S4, [9787-10] S3  
 Pezeshki, Padina [9786-33] S7, [9786-39] S8  
 Pfeffer, Yitzchak [9785-4] S1  
 Pfeiffer, Franz [9783-13] S3, [9783-204] SPS12  
 Pfitzner, Christian [9784-70] SPS1  
 Pham, Dzung L. 9784 Program Committee, 9784 S11 Session Chair, [9784-13] S3, [9784-15] S4, [9788-50] SPS10, [9789-11] S3  
 Philipp, Patrick [9786-2] S1, [9789-22] S5  
 Piana, Michele [9784-74] SPS1  
 Pickering, J. Geoffrey [9791-15] S4, [9791-22] S5  
 Pickering, Mark R. [9783-188] SPS10  
 Piella, Gemma [9784-28] S6  
 Pierce, Mark C. [9791-19] S4  
 Pietsch, Hubertus [9783-51] S10  
 Pilet, Paul [9788-63] SPS3  
 Pin, Christopher [9788-39] S8  
 Pinder, Sarah [9791-4] S2  
 Pinter, Csaba [9786-96] SPSMon  
 Pinto, Peter [9786-53] S11, [9786-88] SPSMon  
 Pinto, Rafael F. [9783-84] SPS1  
**Pirpinia, Kleopatra** [9784-150] SPS6  
 Pisana, Francesco [9783-234] SPS4  
**Plassard, Andrew J.** [9784-41] S9, [9784-73] SPS1, [9784-98] SPS2  
 Platel, Bram [9785-47] S9  
**Plati?a, Ljiljana** 9787 Program Committee  
 Plishker, William [9786-24] S5  
**Pluim, Josien P. W.** 9791 Program Committee, 9791 S4 Session Chair  
 Pochet, Thierry [9783-175] SPS8  
 Podgorsak, Alexander R. [9783-66] S13, [9788-2] S1  
 Poepping, Tamie L. [9783-191] SPS10, [9790-30] S7  
 Poirier, Stefan [9784-16] S4  
 Pokrajac, David D. [9783-87] SPS1, [9783-93] SPS1  
 Politte, David G. [9783-73] S14  
 Polster, Christoph [9783-59] S12, [9783-62] S12  
 Polster, Christoph [9783-51] S10  
 Pochut, Cyril [9783-201] SPS11  
 Poit, Dirk H. J. [9788-17] S4  
 Pop, Mihaela [9784-134] SPS5  
 Popescu, Lucretiu M. [9783-123] SPS4  
 Popovic? Had?ija, Marijana [9791-24] S5  
 Porras-Chaverri, Mariela A. [9783-36] S7  
 Poskitt, Kenneth J. [9788-16] S4  
 Potter, Michael [9786-67] SPSMon  
 Potuzko, Marci [9783-2] S1



- Poulose, Benjamin K. [9784-29] S6, [9784-59] S12  
 Pourmorteza, Amir [9783-45] S9  
 Pozo, José M. [9788-65] SPS3  
 Prabhu, David [9788-104] SPS6  
 Prasad, Arpan Suravi [9786-102] SPSMon  
 Prasad, Gautam [9784-120] SPS4, [9784-62] S12  
 Pratt, Gerhard [9790-10] S2  
 Preciado, Ronny I. [9788-108] SPS10, [9788-51] S10  
 Pretorius, Hendrik P. [9787-31] S6  
 Prevrhall, Sven [9784-2] S1  
 Prieto, Germán A. [9790-64] SPS6  
 Prieto, Juan [9784-7] S2  
 Prince, Jerry L. 9784 Program Committee, 9784 S9 Session Chair, 9784 SWK2 Session Chair, [9784-124] SPS4, [9784-126] SPS4, [9784-13] S3, [9784-15] S4, [9784-24] S6, [9784-32] S7, [9784-33] S7, [9784-47] S10, [9784-52] S11, [9784-98] SPS2, [9785-97] SPS3, [9786-16] S3, [9788-24] S6  
 Prinzen, Martin [9785-81] SPS2  
 Priscari, Bogdan [9791-27] SPSWed  
 Prokop, Mathias [9784-147] SPS6  
 Proksa, Roland M. [9783-204] SPS12, [9783-52] S10  
 Provoost, David [9786-63] SPSMon  
 Puhl, Julian [9790-46] SPS3  
 Pujol, Sonia 9784 Program Committee  
 Puonti, Oula [9784-48] S10
- Q**  
 Qi, Jinyi 9783 Program Committee, 9783 S11 Session Chair  
 Qian, Wei [9785-116] SPS4, [9785-34] S7, [9785-49] S10, [9788-54] SPS2  
 Qin, Bin [9783-23] S5  
 Qin, Xulei [9788-37] S8, [9790-40] SPS1, [9791-20] S4  
 Qiu, Wu [9784-153] SPS6, [9784-60] S12  
**Qiu, Yuchen** [9783-95] SPS1, [9785-29] S6, [9785-71] SPS1, [9785-72] SPS1  
 Qu, Xianghe [9789-29] SPSMon  
 Qu, Xiaolei [9790-43] SPS2  
 Quirk, Stephen [9783-193] SPS10  
 Quon, Harry [9786-24] S5  
**Qutash, Mohammed** [9788-93] SPS8
- R**  
 Rabidas, Rinku [9785-68] SPS1  
 Racine, Damien [9787-39] S8  
 Racoceanu, Daniel [9791-18] S4  
 Radoux, Jean-Pierre [9786-63] SPSMon  
 Rafecas, Magdalena 9783 Program Committee  
 Raghavan, Bagyam [9790-53] SPS3  
 Raghavan, Meera [9785-52] S10  
 Ragothaman, Anjanibhargavi [9784-120] SPS4  
 Raheem, Abdul [9790-6] S2  
 Rahimi, Amir [9783-127] SPS4  
 Rahman, Tasneem [9783-188] SPS10  
 Rahmim, Arman [9790-42] SPS2  
 Raicu, Daniela Stan [9785-111] SPS4  
 Raithel, Martin [9785-81] SPS2  
 Rajagopalan, Vidya [9784-129] SPS4  
 Rajbhandari, Paurakh L. [9783-61] S12  
 Rajpoot, Nasir M. 9791 Program Committee  
 Ramakrishna, Bharath [9785-134] SPS5  
 Ramakrishna, Boominathan [9788-106] SPS4  
 Ramió-Torrentà, Lluís [9784-94] SPS2  
 Ramos-Llorden, Gabriel [9784-1] S1  
 Rana, Raman [9783-133] SPS5, [9783-221] SPS16  
 Rana, Vijay K. [9783-101] SPS2  
 Rand, Roy [9783-218] SPS16  
 Randtke, Edward [9788-40] S8, [9788-94] SPS8  
 Rane, Swati [9784-41] S9, [9784-98] SPS2  
 Ranger, Bryan J. [9790-26] S6  
 Rangwala, Huzefa [9790-62] SPS6  
**Rankin, Adam** [9786-1] S1  
 Rashid Nasab, Alaleh [9783-84] SPS1, [9787-33] S7  
 Rasin, Alex [9785-111] SPS4  
 Raskar, Ramesh [9790-26] S6  
 Rastgo Dastjerdi, Mojdeh [9785-11] S2, [9785-80] SPS2  
 Ratnanather, J. Tilak [9788-74] SPS4  
 Ratner, Vadim [9791-21] S5, [9791-41] SPSWed  
 Rau, Thomas S. [9786-50] S10  
 Raval, Amish N. [9786-3] S1  
**Ravikumar, Nishant** [9784-27] S6  
 Ravishankar, Hariharan [9790-45] SPS3  
 Rawashdeh, Mohammad A. [9787-15] S4, [9787-35] S7  
 Ray, Jay Gopal [9785-127] SPS5  
 Ray, Shonket [9785-69] SPS1  
 Ray, Soumya [9786-4] S1  
 Razavi, Reza [9786-100] SPSMon  
**Reaungamornrat, Sureerat** [9786-16] S3  
 Rebuffel, Véronique [9783-142] SPS6  
 Reddick, Wilburn E. [9788-98] SPS10  
 Reddy, Machireddy Ramasubba [9790-53] SPS3  
 Reed, Warren M. [9787-35] S7  
**Reeves, Anthony P.** [9785-128] SPS5  
 Regge, Daniele [9785-77] SPS2, [9785-82] SPS2  
 Reiber, Johan H. C. [9785-14] S3  
 Reichard, Daniel [9784-61] S12  
**Reimi, Sabrina** [9786-100] SPSMon  
 Reis, Sara [9791-4] S2  
**Reiser, Ingrid S.** 9783 Program Committee, 9783 S13 Session Chair, [9783-162] SPS7, [9787-4] S2  
 Reisliev, Nina Linde [9784-8] S2  
 Reiter, Austin [9784-12] S3, [9784-30] S7, [9784-43] S9  
 Remirez, Andria A. [9786-26] S6  
 Rempler, Markus [9785-1] S1  
 Ren, Liqiang [9783-230] SPS16, [9790-20] S5  
**Ren, Wuwei** [9788-79] SPS6  
 Ren, Xue [9783-165] SPS7  
 Ren, Yacheng [9789-4] S1  
 Ren, Yi [9783-169] SPS7  
 Renger, John [9786-23] S5, [9786-71] SPSMon  
 Rengier, Fabian [9783-190] SPS10  
 Renner, Andreas [9784-156] SPS6  
 Rensonnet, Gaetan [9784-128] SPS4  
 Resnick, Susan M. [9784-13] S3  
 Rettinger, Achim [9786-2] S1, [9789-22] S5  
**Rettmann, Maryam E.** 9786 Program Committee, 9786 S1 Session Chair, [9786-99] SPSMon  
 Reza, Syed M. S. [9785-102] SPS3  
 Rhode, Kawal S. [9786-100] SPSMon  
**Richards-Kortum, Rebecca** [9791-19] S4  
 Rickard, Mary [9783-97] SPS1, [9787-21] S1  
 Rieger, Jens [9783-196] SPS11, [9783-203] SPS11, [9783-25] S5  
 Rinaldi, Aldo [9786-100] SPSMon  
 Rish, Irina [9788-23] S5  
 Ritman, Erik Leo [9783-205] SPS12, [9783-54] S10  
**Rittner, Leticia** [9785-95] SPS3  
 Rivaz, Hassan [9790-50] SPS3  
 Robb, Richard A. [9785-103] SPS3, [9786-94] SPSMon  
 Roberts, David [9786-13] S3, [9786-81] SPSMon  
 Robertson, Nicola J. [9784-121] SPS4  
**Robins, Marthony** [9783-212] SPS15, [9783-217] SPS15  
 Robinson, Adam [9786-24] S5  
 Robinson, John W. [9787-17] S4  
 Robinson, Vance S. [9783-122] SPS4  
 Rochon, Elizabeth R. [9784-155] SPS6  
 Rodgers, Jessica R. [9790-17] S4  
 Rodrigues, George [9785-50] S10  
 Rodriguez-Mena, Eloisa [9787-3] S5  
 Roessi, Ewald [9783-52] S10  
 Rohde, Gustavo Kunde 9791 Program Committee  
 Rohkohl, Christopher [9783-47] S9  
 Rohling, Robert [9786-17] S4  
 Rohr, Karl [9784-44] S9  
 Rollins, Nancy [9788-108] SPS10, [9788-51] S10, [9788-99] S10  
 Romagnoli, Cesare [9785-55] S12  
 Roman, Beth L. [9784-155] SPS6  
 Romano, Rocco [9785-5] S1  
 Romano, Walt [9790-27] S6  
 Romera Romero, Jordi [9784-28] S6  
 Romero Castro, Eduardo [9784-112] SPS3, [9785-88] SPS3, [9791-5] S2  
 Romo-Bucheli, David Edmundo [9791-5] S2  
 Ronaghi, Zaira [9786-65] SPSMon  
 Rong, Junyan [9783-108] SPS2, [9783-126] SPS4  
 Rose, Sean D. [9783-164] SPS7  
 Rosenzweig, Stephen J. [9790-52] SPS3  
 Roshchupkin, Gennady [9788-17] S4  
 Rossi Norrland, Rauni [9787-2] S5  
 Rossi, Peter J. [9784-86] SPS2, [9786-72] SPSMon, [9786-78] SPSMon  
 Rossitti, Sandro [9786-36] S7  
 Roth, Holger R. [9784-89] SPS2, [9785-133] SPS5, [9785-24] S5  
 Roth-Kleiner, Matthias [9783-68] S13  
 Roubidoux, Marilyn A. [9790-36] SPS1  
 Rouet, Jean-Michel [9784-45] S9  
 Roundhill, David [9784-45] S9  
 Roura, Eloy [9784-94] SPS2  
 Rovira, Alex [9784-94] SPS2  
 Rowlands, John A. 9783 Program Committee, 9783 S8 Session Chair  
 Roy, Debasish [9790-21] S5  
**Roy, Olivier** 9790 Program Committee, 9790 S2 Session Chair, [9790-10] S2, [9790-11] S2  
 Roy, Sharmili [9784-146] SPS6  
 Roy, Snehasish [9784-15] S4  
 Royalty, Kevin L. [9783-28] S6  
 Ruat, Marie [9783-201] SPS11  
 Rubaux, Mathieu [9784-142] SPS6  
 Rubaux, Mathieu [9784-4] S1  
 Rudan, John [9786-33] S7, [9786-39] S8, [9786-92] SPSMon  
 Rudin, Markus [9788-79] SPS6  
**Rudin, Stephen** [9783-101] SPS2, [9783-102] SPS2, [9783-128] SPS5, [9783-133] SPS5, [9783-221] SPS16, [9783-233] SPS16, [9783-66] S13, [9788-2] S1, [9788-88] SPS7, [9789-6] S2, [9789-7] S2  
 Rueckert, Daniel [9788-17] S4  
 Ruers, Theo J.M. [9786-93] SPSMon  
 Ruiter, Nicole V. [9784-132] SPS5, 9790 Program Committee, [9790-8] S2, [9790-9] S2  
 Ruiz Pujadas, Esmeralda [9784-101] SPS2  
 Rummeny, Ernst J. [9783-204] SPS12, [9788-62] SPS3  
 Runge, Jurgen H. [9784-148] SPS6  
 Rupcich, Franco [9787-9] S2  
 Ruschin, Mark [9783-107] SPS2  
 Russ, Megan K. [9783-128] SPS5, [9783-133] SPS5  
 Ryder, William J. [9787-40] S8  
 Ryu, Jehwang [9783-180] SPS9  
 Ryzhikov, Volodymyr [9783-150] SPS6, [9783-175] SPS8
- S**  
 Sabol, John M. 9783 Program Committee, 9783 S1 Session Chair  
 Sadhu, Anup [9785-68] SPS1  
 Saering, Dennis [9786-73] SPSMon  
 Safferling, Kai [9791-2] S1  
**Saha, Punam Kumar** 9784 Program Committee, [9788-41] S9  
 Sahathevan, Ramesh [9788-75] SPS4  
 Sahbaee, Pooyan [9783-120] SPS4, [9783-121] SPS4, [9783-212] SPS15, [9783-217] SPS15  
 Sahgal, Arjun [9783-107] SPS2, [9785-91] SPS3  
 Sahiner, Berkman Symposium Chair, [9783-148] SPS6, [9783-77] S15, [9785-18] S4, [9787-10] S3, [9787-26] S6, [9787-29] S6, 9791 Program Committee  
 Saidha, Shiv [9784-47] S10, [9788-24] S6  
 Sak, Mark A. [9790-44] SPS2  
 Sakai, Koji [9784-122] SPS4  
 Sakuma, Ichiro [9790-43] SPS2  
 Salamon, Johannes [9788-30] S7  
 Salcudean, Septimiu E. [9786-17] S4  
 Salehi, Fateme [9790-27] S6  
 Sailsbury, Kenneth [9786-85] SPSMon  
 Salluzzi, Marina [9785-95] SPS3  
 Saltz, Joel H. 9785 S11 Panel Member, [9791-21] S5, [9791-41] SPSWed  
 Salvado, Olivier 9784 Program Committee  
 Salvagnini, Elena [9783-92] SPS1  
 Samala, Ravi K. [9785-33] S7, [9785-37] S7, [9785-65] SPS1, [9785-74] SPS1  
 Samani, Abbas [9786-34] S7  
 Samant, Pratik [9790-20] S5  
 Sambuceti, Gianmario [9784-74] SPS1  
**Samei, Ehsan** [9783-118] SPS4, [9783-120] SPS4, [9783-121] SPS4, [9783-124] SPS4, [9783-212] SPS15, [9783-213] SPS15, [9783-214] SPS15, [9783-216] SPS15, [9783-217] SPS15, [9783-72] S14, [9783-74] S14, [9783-76] S15, [9783-80] S15  
 Samo, Kazuki [9785-86] SPS3  
 Samset, Eigil [9790-12] S3, [9790-14] S3, [9790-51] SPS3  
 Samuelson, Frank W. 9787 Program Committee, 9787 S3 Session Chair, [9787-26] S6, [9787-29] S6, [9787-55] SPSWed, SC1127  
 Sanchez, Adrian A. [9783-162] SPS7  
 Sánchez, Clarisa I. 9785 Program Committee  
**Sanders, Jeremiah** [9783-124] SPS4  
 Sandhu, Gursharan S. [9790-11] S2  
 Sang, Nong [9784-141] SPS6  
 Sankar, Shrinivasan [9785-96] SPS3  
 Sano, Satoshi [9783-199] SPS11  
 Santhanam, Anand [9784-108] SPS3, [9786-22] S5, [9786-32] S7  
 Sapra, Karan [9786-65] SPSMon  
**Sarder, Pinaki** [9791-14] S3  
 Sargent, Dustin [9784-114] SPS3, [9785-79] SPS2  
 Saripalli, Bhargava [9790-59] SPS5  
 Sarkar, Saradwata [9784-78] SPS1, [9786-6] S2  
 Sarment, David [9786-82] SPSMon  
 Sastre, Antonio 9783 SWK6 Workshop Chair  
 Sato, Yoshinobu [9784-14] S3, [9786-10] S2  
 Sauer, Frank 9786 Program Committee, 9786 S11 Session Chair  
 Sauleau, Paul [9786-29] S6  
 Sauppe, Sebastian [9783-18] S4, [9783-30] S6  
 Sawada, Akira [9785-93] SPS3  
 Schabath, Matthew B. [9787-14] S3, [9787-18] S4  
 Schadewaldt, Nicole [9784-149] SPS6  
 Schafer, Sebastian [9783-28] S6, [9786-38] S8  
 Schenk, Olga [9785-125] SPS5  
 Schetelig, Daniel [9786-73] SPSMon  
**Scheuermann, James R.** [9783-40] S8  
**Schiabel, Homero** [9784-77] SPS1, [9787-38] S8, [9787-49] SPSWed  
 Schilling, Kurt G. [9784-127] SPS4  
 Schilling, Ron 9789 SWK7 Panel Member  
 Schittny, Johannes [9788-36] S13  
 Schlifske, Daniel E. [9783-104] SPS2  
 Schmalzer, Jeffrey [9786-85] SPSMon  
 Schmalstieg, Dieter [9790-47] SPS3  
 Schmidt, Bernhard T. [9783-234] SPS4, [9783-51] S10, SC987  
 Schmidt, Günter [9784-35] S8  
 Schmidt, Taly Gilat 9783 Program Committee, 9783 S12 Session Chair, [9783-34] S7, [9783-60] S12, [9787-9] S2  
 Schmidt-Erfurth, Ursula [9784-139] SPS5, [9784-19] S5  
 Schmittlein, Charles Ross [9788-5] S1  
 Schmidt, Holger [9784-2] S1  
 Schnell, Susanne [9784-3] S1  
 Schnurr, Alena-Kathrin [9785-60] S13  
 Schoch, Nicolai J. [9786-2] S1  
 Schöck, Friederike [9783-51] S10, [9783-62] S12, [9783-63] S12  
 Schoeffmann, Klaus [9786-66] SPSMon  
 Scholte, Arthur J. H. A. [9785-14] S3  
 Schönberg, Stefan [9783-234] SPS4  
 Schöndube, Harald [9783-152] SPS7  
 Schoon, Erik J. [9785-46] S9, [9785-48] S9  
 Schramm, Hauke [9785-8] S2  
 Schreiber, Erik 9789 SWK7 Panel Member  
 Schroeder, Josef A. [9785-132] SPS5  
 Schuijff, Joanne D. [9784-147] SPS6  
 Schulz, Heinrich [9784-149] SPS6  
 Schuster, David M. [9784-78] SPS1, [9786-6] S2  
 Schuster, Max [9783-196] SPS11, [9783-203] SPS11, [9783-25] S5  
 Schwartz, Taylor M. [9787-36] S7  
 Schwarz, Karl Q. [9790-16] S3  
 Schwier, Michael [9791-13] S3  
 Scott, Christopher C. [9783-128] SPS5  
 Scott, Jacob G. [9785-52] S10, [9785-53] S10  
 Scott, Richard [9791-29] SPSWed  
 Sedillo, Robert [9783-173] SPS8  
 Sedlaciak, Jan [9786-73] SPSMon  
 Sedlmair, Martin [9783-51] S10, [9785-123] SPS5  
 Seff, Ari [9785-112] SPS4  
 Segars, W. Paul [9783-118] SPS4, [9783-120] SPS4, [9783-121] SPS4, [9783-124] SPS4, [9783-216] SPS15, [9783-32] S7, [9783-32] SPS1  
 Seghers, Dieter [9783-153] SPS7, [9783-18] S4  
**Seibel, Eric J.** 9786 Program Committee, 9786 S9 Session Chair  
 Seidl, Thomas [9786-66] SPSMon  
 Seifabadi, Reza [9786-88] SPSMon  
**Seifert, Maria** [9783-196] SPS11, [9783-203] SPS11, [9783-25] S5  
 Sekar, Sakthivel [9788-106] SPS4  
 Sellke, Eric W. [9785-130] SPS5  
 Semmelmann, Matthias [9785-132] SPS5  
 Semturs, Friedrich [9787-53] SPSWed  
 Senan, Suresh [9785-50] S10  
 Senjem, Matthew L. [9785-103] SPS3  
 Seo, Chang-Woo [9783-106] SPS2  
 Seppenwolde, Yvette [9784-156] SPS6



- Seramani, Sankar [9788-106] SPS4  
 Serduc, Raphael [9783-201] SPS11, [9791-26] SPSWed  
 Seshamani, Sharmishta [9788-52] SPS1  
 Setio, Arnaud Arindra Adiyoso [9785-36] S7  
 Setlur Nagesh, Swetadri Vasan [9783-128] SPS5, [9783-133] SPS5, [9783-66] S13, [9788-2] S1  
 Settlemier, Scott H. [9784-136] SPS5  
 Sevinsky, Christopher J. [9791-28] SPSWed  
 Shah, Amit [9784-39] S8  
 Shah, Taimur T. [9786-55] S11  
 Shahbabaie, Ailreza [9788-76] SPS5  
 Shahrian Varnousfaderani, Ehsan [9784-130] SPS5, [9784-139] SPS5, [9784-19] S5  
 Shakir, Dzhoshkun I. [9786-97] SPSMon  
 Shalev, Ronny Y. [9786-4] S1  
 Shams, Roozbeh [9790-50] SPS3  
 Shamsil, Arefin M. [9786-41] S8  
 Shan, Jing [9783-2] S1, [9783-222] SPS16, [9783-223] SPS16  
 Shan, Yanna [9789-32] S5  
 Shankar, Alok [9783-128] SPS5, [9783-221] SPS16, [9783-233] SPS16  
 Shao, Guoliang [9789-3] S1  
 Shapiro, Linda G. [9791-7] S2  
 Sharma, Harshita [9791-31] SPSWed  
 Sharma, Puneet [9787-8] S2  
 Shechter, Guy 9786 Program Committee  
 Sheikhzadeh, Fahime [9791-17] SPSWed  
 Shekhar, Raj [9786-24] S5  
 Shen, Colette [9786-24] S5  
 Shen, Ming [9790-40] SPS1  
 Shen, Zeyang [9783-109] SPS3  
 Shepherd, John A. [9785-27] S6  
 Sherman, Mark E. [9790-44] SPS2  
 Shi, Fei [9784-102] SPS2, [9784-76] SPS1, [9788-6] S2, [9788-60] SPS2, [9791-45] SPSWed  
 Shi, Liehang [9789-26] SPSMon  
 Shi, Lin 9784 Program Committee  
 Shi, Linxi [9783-99] SPS2  
 Shi, Weili [9786-60] SPSMon  
 Shin, Choul Woo [9783-134] SPS5  
 Shin, Da Wi [9788-68] SPS4  
 Shin, Juneob [9783-9] S2, [9790-41] SPS2, [9790-60] SPS5, [9790-68] SPS7  
 Shinde, Dilip D. [9787-46] SPSWed  
 Shiroishi, Mark [9789-13] S3  
 Shiroishi, Toshihiko [9784-40] S8  
 Shurtuts, Igor V. [9784-136] SPS5  
 Shu, Jasmine [9790-29] S7  
 Shunhavanich, Picha [9783-53] S10  
 Shurter, Roger P. [9783-173] SPS8  
**Sibley, Adam** [9788-95] SPS8  
 Sidibé, Désiré [9785-11] S2, [9785-96] SPS3  
 Sidky, Emil Y. [9783-153] SPS7, [9783-162] SPS7, [9783-164] SPS7, [9783-174] SPS8, [9783-58] S11  
 Siebold, Michael A. [9786-51] S10  
 Siegel, Elliot L. 9789 Program Committee  
 Siegmund, Heiko [9785-132] SPS5  
 Siemens, D. Robert [9785-55] S12, [9786-19] S4  
 Siewerdsen, Jeffrey H. [9783-103] SPS2,  
 [9783-16] S4, [9783-26] S6, [9783-29] S6, [9783-33] S7, [9783-45] S9, [9783-75] S15, [9786-16] S3, [9786-9] S2  
 Sijbers, Jan [9784-1] S1  
 Sikaria, Dhiraj [9783-214] SPS15  
 Sikdar, Siddhartha [9790-62] SPS6  
 Sim, Llewellyn [9787-32] S7  
 Simader, Christian [9784-139] SPS5, [9784-19] S5  
 Simões, Rita [9785-84] SPS3  
 Simpson, Amber L. [9784-67] SPS1, 9786 Program Committee, 9786 S8 Session Chair  
 Singh, Navneet [9785-3] S1  
 Sinha, Ayushi [9784-12] S3, [9784-30] S7, [9784-43] S9  
 Sirazitdinova, Ekaterina [9784-34] S7  
 Siropouspour, Shahin [9786-79] SPSMon  
**Sisniega, Alejandro** [9783-103] SPS2, [9783-16] S4, [9783-26] S6  
 Sitam, Suhardjo [9784-68] SPS1  
 Sivalingam, Udhayaraj [9785-1] S1  
 Skere?, Marek [9783-68] S13  
 Skornitzke, Stephan [9785-62] S13  
 Slabaugh, Greg [9784-20] S5  
**Slagowski, Jordan M.** [9783-113] SPS4  
**Slomka, Piotr J.** [9784-142] SPS6, [9784-4] S1  
 Slump, Cornelis H. [9785-125] SPS5, [9785-84] SPS3  
 Smedby, Örfjan [9786-36] S7  
 Smit, Chiel [9783-43] S8  
 Smith, Alex K. [9783-55] S11  
 Smith, Aria [9788-78] SPS5  
 Smith, Craig F. [9783-150] SPS6, [9783-175] SPS8  
 Smith, Gary T. [9787-18] S4  
 Smith, John R. [9791-16] S4  
 Smith, Melissa C. [9786-65] SPSMon  
 Smith, Miya A. [9784-73] SPS1  
 Smith, Seth A. [9783-55] S11  
 Smith, Walter J. [9783-122] SPS4  
 Smits, Dirk [9787-54] SPSWed  
 Sobrevilla, Pilar [9786-61] SPSMon, [9786-68] SPSMon  
 Sochen, Nir [9784-9] S2  
 Söderman, Christina [9787-2] S5  
**Soh, BaoLin Pauline** [9787-32] S7  
 Solek, Roman [9786-85] SPSMon  
**Soliz, Peter** [9785-43] S9, [9785-44] S9, [9785-87] SPS3  
**Solomon, Justin B.** [9783-212] SPS15, [9783-213] SPS15, [9783-214] SPS15, [9783-216] SPS15, [9783-217] SPS15, [9783-76] S15  
 Solomon, Sharon D. [9784-32] S7, [9784-47] S10, [9788-24] S6  
 Soltanian-Zadeh, Somayeh [9788-76] SPS5  
 Sommer, Stefan [9784-5] S1  
 Song, Allen [9788-108] SPS10, [9788-51] S10  
 Song, Bongyong [9783-107] SPS2  
 Song, Danny Y. [9786-20] S5  
 Song, Han Kyeol [9783-195] SPS10  
 Song, Junjie [9790-32] S7, [9790-66] SPS7  
 Song, Sutaio [9784-64] SPS1  
 Song, Tai Kyong [9790-67] SPS7  
 Song, William [9783-107] SPS2  
 Song, Xiaopeng [9788-21] S5  
 Song, Xiyun [9783-56] S11, [9783-57] S11  
 Song, Yihua [9785-40] S8  
 Sonka, Milan [9784-49] S10, [9788-33] S7, [9788-70] SPS4  
 Sonke, Jan-Jakob [9784-150] SPS6, [9786-93] SPSMon  
 Sørensen, Lauge [9784-5] S1  
 Sossin, Artur [9783-142] SPS6  
 Soulez, Gilles [9786-89] SPSMon  
 Sousa, Maria Angelica Z. [9787-49] SPSWed  
 Spanel, Michal [9788-14] S3  
 Spanias, Andreas S. [9784-37] S8  
**Speidel, Michael A.** [9783-113] SPS4, [9783-5] S1, [9783-64] S13, [9786-3] S1  
 Speidel, Stefanie [9784-61] S12, 9786 Program Committee, 9786 S5 Session Chair, [9786-43] S9, [9789-22] S5  
 Spoerk, Jakob [9784-154] SPS6  
 Sporkin, Helen [9788-4] S1  
 Spörting, Jon [9784-5] S1  
 Sprinkle, Preston C. [9785-54] S12  
 Springer, Michael [9789-6] S2  
 Spronk, Derrek [9783-3] S1  
 Squiers, John J. [9785-130] SPS5  
 Sridharan, Radhika [9787-36] S7  
 Srinivas, Chukka 9791 Program Committee, [9791-11] S3  
 Srivastava, Vishal N. [9790-59] SPS5  
 Stampanoni, Marco F. M. [9783-24] S5, [9783-68] S13, [9783-71] S14  
 Staring, Marius 9784 Program Committee, [9784-91] SPS2  
 Star-Lack, Josh M. [9783-17] S4, [9783-34] S7  
 Stauber, Mark [9786-85] SPSMon  
**Stavro, Jann** [9783-131] SPS5  
 Stayman, Joseph W. 9783 Program Committee, 9783 S9 Session Chair, [9783-103] SPS2, [9783-16] S4, [9783-26] S6, [9783-29] S6, [9783-33] S7, [9783-45] S9, [9783-75] S15  
 Stearns, John [9783-173] SPS8  
 Stec, Jessika [9783-174] SPS8  
 Steinbrener, Jan [9783-15] S4  
 Steiner, Elisabeth [9784-154] SPS6  
 Steiner, Rachel [9788-101] SPS10  
 Stierstorfer, Karl [9783-152] SPS7, [9783-47] S9, [9783-49] S9, [9783-62] S12  
 Stilller, Wolfram [9785-62] S13  
 Stindel, Eric [9785-31] S6  
 Stock, Christian [9786-44] S9  
 Stoel, Berend C. [9784-91] SPS2  
 Stoker, Joshua [9783-208] SPS13  
 Stough, Joshua Victor [9784-126] SPS4  
 Stough, Rebecca G. [9785-26] S6  
 Stoyanov, Danail [9786-62] SPSMon  
 Strandberg, Charlotte [9790-2] S1  
 Strochler, Sabina [9783-192] SPS10  
 Strohmer, Charles M. [9783-27] S6, [9783-28] S6, [9783-5] S1, [9784-82] SPS2, [9786-38] S8  
 Stuart, Matthias Bo [9790-3] S1, [9790-33] S7, [9790-34] S7, [9790-4] S1  
 Studer, Rudi [9786-2] S1  
 Studholme, Colin [9788-52] SPS1  
 Sturgeon, Gregory M. [9783-214] SPS15, [9783-82] SPS1  
 Styner, Martin A. 9784 Conference Chair, [9784-10] S3, [9784-25] S6, [9784-7] S2, [9788-101] SPS10  
 Su, Kening [9789-23] S5  
 Su, Ming Jian [9789-23] S5  
 Su, Yi [9791-30] SPSWed  
 Subramanian, Janani R. [9786-8] S2  
 Suehling, Michael [9785-1] S1  
**Suleiman, Moayyad E.** [9783-96] SPS1  
 Sum, Stephen T. [9784-23] S5  
 Sumkin, Jules H. [9787-46] SPSWed  
 Summers, Ronald M. [9784-89] SPS2, 9785 Program Committee, 9785 S11  
 Panel Member, 9785 S7 Session Chair, [9785-112] SPS4, [9785-133] SPS5, [9785-24] S5, [9785-58] S12, [9785-6] S2, [9785-78] SPS2, [9786-40] S8  
 Sun, Jianyong [9789-28] SPSMon, [9789-30] SPSMon  
 Sun, Qinpei [9789-28] SPSMon  
 Sun, Wei [9784-109] SPS3  
 Sun, Wenqing [9785-116] SPS4, [9785-34] S7, [9788-54] SPS2  
 Sun, Xiaoxia [9784-124] SPS4  
 Sun, Yankui [9788-105] SPS2  
 Sun, Yi [9783-98] SPS2  
 Sun, Yuxin [9783-145] SPS6  
 Sun, Zhi [9786-58] SPSMon  
 Sun, Zhonghua [9788-28] S6  
 Sunderland, Kyle [9786-96] SPSMon  
 Sung, Jin [9783-228] SPS16  
 Surry, Kathleen [9786-52] S11  
**Suryanarayana Kadimesetty, Venkata** [9788-85] SPS7  
 Sutton, Bradley P. [9788-3] S1  
 Suwelack, Stefan [9784-61] S12  
**Suzuki, Hidenobu** [9785-109] SPS4, [9785-118] SPS5  
**Suzuki, Kenji** 9785 Program Committee, 9785 S12 Session Chair  
 Suzuki, Mayumi [9790-38] SPS1  
 Svalkvist, Angelica [9787-2] S5  
**Svihlik, Jan** [9784-115] SPS3, [9788-56] SPS2  
 Swingle, Emily K. [9784-47] S10  
 Syeda-Mahmood, Tanveer F. [9785-9] S2, [9791-16] S4  
 Szczepura, Katy [9787-22] S1  
 Tabanfar, Reza [9786-15] S3, [9786-90] S6  
 Tabary, Joachim [9783-142] SPS6, [9783-86] SPS1  
 Tabata, Yuki [9790-39] SPS1  
 Tachibana, Rie [9785-57] S12, [9785-77] SPS2  
 Tadayyon, Hadi [9784-38] S8, [9790-6] S2  
 Tade, Funmilayo [9784-78] SPS1  
 Taguchi, Katsuyuki [9783-109] SPS3, [9783-59] S12  
 Tahtali, Murat [9783-188] SPS10  
 Tajima, Mikiya [9785-86] SPS3  
 Takabatake, Hirotsugu [9785-13] S3  
 Takagi, Shu [9790-43] SPS2  
 Takahashi, Edwin A. [9783-215] SPS15  
 Takahashi, Kazuki [9790-39] SPS1  
 Takano, Shinta [9790-38] SPS1  
 Takata, Tadanori [9783-149] SPS6  
 Takeda, Yuta [9788-66] SPS4  
 Tam, Johnny [9785-45] S9, [9785-90] SPS3  
 Tamano, Satoshi [9790-43] SPS2  
 Tamura, Masaru [9784-40] S8  
**Tan, Maxine** [9783-95] SPS1, [9785-122] SPS5, [9785-26] S6, [9785-66] SPS1, [9785-71] SPS1, [9785-72] SPS1, [9785-73] SPS1  
 Tan, Tao [9785-22] S4  
 Tan, Virak [9786-11] S2  
 Tan, Xiaomin [9789-29] SPSMon  
 Tanaka, Yuki [9788-66] SPS4  
 Tang, An [9786-89] SPSMon  
 Tang, Ming [9788-57] SPS2  
 Tang, Shanshan [9790-20] S5  
 Tang, Shaojie [9783-155] SPS7  
**Tang, Xiangyang** [9783-155] SPS7, [9783-169] SPS7  
 Tannenbaum, Allen R. [9791-21] S5, [9791-41] SPSWed  
 Tao, Kun [9783-114] SPS4  
 Tapia, Kriscia A. [9787-32] S7, [9787-34] S7, [9787-35] S7  
 Taquet, Maxime [9784-128] SPS4  
 Tarando, Sebastian R. [9785-25] S5, [9788-45] S9  
**Tatano, Rosalia** [9784-34] S7  
 Tateishi, Kiyoko [9783-168] SPS7  
 Tatemama, Tomoko [9784-104] SPS2  
 Tattersall, Paul [9783-90] SPS1  
 Tautz, Lennart [9788-32] S7  
 Tavolara, Thomas [9791-44] SPSWed  
 Tay, Kevin [9787-40] S8  
 Tay-Kearney, Mei-Ling [9785-85] SPS3  
 Taylor, Russell H. [9784-12] S3, [9784-30] S7, [9784-43] S9, [9786-18] S4  
 Taylor, Terrie [9785-44] S9, [9785-87] SPS3  
 Taylor, Zeike A. [9784-27] S6  
 Taylor-Phillips, Sian 9787 Program Committee  
 Tazoe, Jun [9784-122] SPS4  
 Tella, Marcel [9786-62] SPSMon  
 Tellis, Wyatt 9789 Program Committee, 9789 S1 Session Chair  
 Terabayashi, Nobuo [9790-37] SPS1  
**Terentjev, Alexey B.** [9784-136] SPS5  
 Tessier, David [9790-17] S4  
 Thai, Theresa [9785-122] SPS5, [9785-29] S6  
**Thatcher, Jeffrey E.** [9785-130] SPS5  
 Thevenard-Berger, Pierre [9783-181] SPS9  
 Thévenaz, Philippe 9784 Program Committee  
 Thiagarajan, Jayaraman J. [9784-37] S8, [9785-110] SPS4  
 Thittai, Arun K. [9790-49] SPS3  
**Thoma, George R.** [9785-42] S8, [9787-20] S4, [9789-17] S4  
 Thomas, David [9786-22] S5  
**Thomenius, Kai E.** 9790 Program Committee  
 Thompson, Michael O. [9788-5] S1  
 Thompson, Paul M. [9784-120] SPS4, [9784-123] SPS4, [9784-36] S8, [9784-55] S11, [9784-62] S12, [9788-73] SPS4  
 Thompson, Reid C. [9786-35] S7, [9786-37] S7  
 Thomsen, Erik V. [9790-4] S1  
 Thomson, Louise E. [9784-142] SPS6  
 Thouvenot, Audrey [9783-191] SPS10  
 Thunberg, Johan [9784-26] S6  
 Tian, Qiang [9785-64] S13  
 Tian, Xiaoyu [9783-118] SPS4, [9783-120] SPS4, [9783-124] SPS4  
 Tian, Zhiqiang [9784-78] SPS1, [9786-6] S2, [9788-38] S8  
 Tierney, Jaime E. [9790-1] S1  
**Tilley, Steven W.** [9783-29] S6  
**Timberg, Pontus A.** 9787 Program Committee, 9787 S7 Session Chair, [9787-59] SPSWed  
 Tingberg, Anders 9783 Program Committee, 9783 S15 Session Chair, [9787-59] SPSWed  
 Tiwari, Saumya [9791-40] SPSWed, [9791-47] SPSWed  
 Tizhoosh, Hamid R. [9784-11] S3  
**Tkaczyk, Tomasz S.** [9791-19] S4  
 Toews, Matthew [9784-75] SPS1, [9785-94] SPS3, [9790-14] S3  
**Tomaszewski, John E.** 9791 Program Committee, 9791 S2 Session Chair, [9791-14] S3, [9791-36] SPSWed  
 Tomiyama, Noriyuki [9784-14] S3  
 Tong, Yubing [9785-63] S13, [9786-74] SPSMon, [9786-8] S2, [9788-42] S9, [9788-55] SPS2  
 Toomey, Rachel J. [9787-54] SPSWed  
 Torigan, Drew A. [9785-40] S8, [9785-63] S13, [9786-74] SPSMon, [9786-8] S2, [9786-83] SPSMon, [9788-42] S9, [9788-55] SPS2  
 Toth, Daniel [9786-100] SPSMon  
 Toth, Jennifer W. [9786-87] SPSMon  
 Totman, John J. [9784-146] SPS6  
**Touch, Mengheng** [9783-206] SPS12  
**Tourassi, Georgia D.** 9785 Conference Chair, [9787-19] S4  
 Toussignant, Olivier [9783-40] S8  
 Town, Terrence C. [9784-123] SPS4  
 Traber, Marie Sand [9790-18] S4  
 Trahey, Gregg E. [9790-31] S7, [9790-69] SPS7  
**Trammell, Susan R.** [9791-23] S5  
 Tran, Trac D. [9784-124] SPS4

Tran, William T. [9784-38] S8  
 Treanor, Darren 9791 Program Committee  
 Tridandanpani, Srinii [9787-45] SPWed  
 Trier, Caroline [9788-10] S3  
**Trieu, Phuong Dung** [9787-34] S7  
 Tripathi, Piyush [9791-14] S3  
 Tse, Jeffrey [9789-31] SPSMon  
**Tseng, Hsin-Wu** [9787-41] S8  
 Tseng, Tzu-Liang B. [9785-116] SPS4  
 Tsuchida, Takaaki [9785-118] SPS5,  
 [9788-44] S9  
 Tsuji, Tokuo [9784-106] SPS3  
 Tu, Shengxian [9786-5] S1  
 Tukalo, Alexey [9790-9] S2  
 Tupa, Dale [9783-69] S13  
 Turkbey, Baris [9784-89] SPS2, [9785-78] SPS2, [9786-53] S11  
 Turkbey, Evrim B. [9785-58] S12  
 Turkki, Riku [9791-34] SPSWed, [9791-39] SPSWed  
 Turner, James N. [9788-5] S1  
 Turner, Jessica [9788-108] SPS10, [9788-51] S10  
 Tustison, Nicholas J. 9788 Program Committee  
 Tward, Daniel J. [9783-82] SPS1

## U

Udapa, Jayaram K. 9784 Program Committee, 9784 S12 Session Chair, [9785-40] S8, [9785-63] S13, [9786-74] SPSMon, [9786-8] S2, [9786-83] SPSMon, [9788-42] S9, [9788-55] SPS2  
 Ufuk Dalmis, Mehmet [9785-20] S4  
 Umemura, Shin-Ichiro [9790-43] SPS2  
 Underwood, Tracy [9784-154] SPS6  
 Üner, Aysegül [9791-32] SPSWed  
 Uneri, Ali [9786-16] S3, [9786-9] S2  
 Ungi, Tamas [9786-14] S3, [9786-15] S3, [9786-33] S7, [9786-39] S8, [9786-69] SPSMon, [9786-90] S6, [9786-92] SPSMon  
**Upadhaya, Taman** [9785-31] S6  
 Urheim, Stig [9790-14] S3  
 Uslander, Jason M. [9786-23] S5, [9786-71] SPSMon  
 Uysal, Merih Seran [9786-66] SPSMon

## V

Vågberg, William [9783-67] S13  
 Vahtel, Maria [9785-43] S9  
 Valverde, Sergi [9784-94] SPS2  
 van Cappellen van Walsum, Anne-Marie [9785-84] SPS3  
**van der Laak, Jeroen A. W. M.** 9791 Program Committee, [9791-48] SPSWed  
 van der Sommen, Fons [9785-46] S9, [9785-48] S9, [9786-12] S3  
 van der Velden, Sandra [9785-84] SPS3  
 van Ditzhuijzen, Nienke [9788-104] SPS6  
 van Gils, Carla H. [9785-17] S4  
 van Ginneken, Bram 9785 Program

Committee, 9785 S8 Session Chair, [9785-36] S7  
 van Herk, Marcel B. [9784-150] SPS6  
 van Holsbeke, Cedric [9788-43] S9  
 Van Horn, John Darrell [9789-1] S1  
 Van Leemput, Koen 9784 Program Committee, 9784 S10 Session Chair, [9784-42] S9, [9784-48] S10  
 van Middelkoop, Marienke [9788-11] S3  
 Van Peteghem, Nelis [9783-92] SPS1  
 van Rikxoort, Eva M. 9785 Program Committee, 9785 S8 Session Chair  
 Van Setten, Jessica [9784-56] S11  
 Van Steenkiste, Gwendolyn [9784-1] S1  
 van Uden, Inge [9785-47] S9  
 van Vliet, Lucas J. [9784-148] SPS6, [9784-96] SPS2  
 van Walsum, Theo [9784-58] S12  
 van Wieringen, Niek [9786-95] SPSMon  
 van Zelst, Jan [9785-22] S4  
 Vanden Berghe, Pieter [9788-9] S2  
 Vardi, Nitsan [9790-35] S7  
 Vasilyev, Nikolay V. [9784-136] SPS5  
 Vasireddi, Sunil [9783-177] SPS9  
**Vasu, Ram Mohan** [9790-21] S5  
 Vaughan, Thomas [9786-33] S7, [9786-39] S8  
 Vavourakis, Vasileios [9786-31] S7  
 Veeckmans, Bart [9788-43] S9  
 Vembar, Mani [9784-118] SPS3, [9784-135] SPS5, [9784-2] S1, [9788-86] SPS7, [9788-89] SPS7  
 Venkataraman, Rajesh [9784-78] SPS1, [9786-6] S2  
 Vent, Trevor L. [9783-1] S1  
 Venugopal, Mamatha [9790-21] S5  
 Ver Hoef, Lawrence [9784-17] S4  
 Ver Steeg, Greg [9784-36] S8  
 Vera, Sergio [9784-101] SPS2  
 Vercauteren, Tom 9784 Program Committee, [9786-62] SPSMon  
 Verdun, Francis R. [9783-181] SPS9, [9787-39] S8  
 Verger, Loick [9783-142] SPS6, [9783-86] SPS1  
 Verhelle, Filip [9787-54] SPSWed  
 Verma, Sneha K. [9789-27] SPSMon  
 Vermeer, Koenraad A. [9784-96] SPS2  
 Vernooij, Meike W. [9788-17] S4  
 Vespa, Paul M. [9789-1] S1  
 Vidiyala, Sowmya [9789-7] S2  
 Vidotti, Camila [9787-35] S7  
 Vieira, Marcelo A. C. [9787-38] S8  
**Viergever, Max A.** [9784-56] S11, [9784-69] SPS1, [9784-72] SPS1, [9785-36] S7  
 Viers, Lyndsay D. [9783-215] SPS15  
 Vignarajan, Janardhan [9785-85] SPS3  
 Vijayan, Rohan C. [9786-35] S7  
 Vijayan, Sarath [9783-101] SPS2, [9783-102] SPS2, [9783-233] SPS16  
 Vijverberg, Koen P. T. [9785-47] S9  
 Vik, Torbjörn [9784-149] SPS6  
 Vikgren, Jenny [9787-2] S5  
 Vilanova, Joan C. [9784-94] SPS2, [9785-80] SPS2

**Villagomez Hoyos, Carlos A.** [9790-18] S4, [9790-3] S1, [9790-34] S7  
 Villalon-Reina, Julio E. [9784-120] SPS4  
 Villanueva, Flordeliza S. [9783-23] S5  
 Villanueva, Pablo [9783-71] S14  
 Vincent Sheldon, Stephanie A. [9783-215] SPS15  
 Vincken, Koen L. [9784-72] SPS1  
 Viswanathan, Srikrishnan [9788-85] SPS7  
 Vlassis, Nikos A. [9784-26] S6  
 Vogl, Wolf-Dieter [9784-139] SPS5, [9784-19] S5  
 Vogreiter, Philip [9790-47] SPS3  
 Vogt, Carmen [9783-67] S13  
 Vogt, Sebastian [9786-16] S3, [9786-9] S2  
 Voiculescu, Irina [9784-85] SPS2, [9788-12] S3  
 Volegov, Petr L. [9783-173] SPS8  
 Volkov, Volodymyr G. [9783-150] SPS6, [9783-175] SPS8  
 Volovyk, Mykola [9786-2] S1  
 von Tengg-Koblick, Hendrik [9784-44] S9  
 Vos, Frans M. [9784-148] SPS6  
 Vos, Wim [9788-43] S9  
 Vosburgh, Kirby G. 9789 SWK7 Panel Member  
 Vreemann, Suzan [9785-20] S4  
 Vrieze, Thomas J. [9783-79] S15  
 Vrtovec, Tomaž 9784 Program Committee, 9784 S6 Session Chair, [9784-105] SPS2, [9784-116] SPS3  
 Vu, Chau [9784-129] SPS4

## W

Waechter-Stehle, Irina [9784-45] S9  
 Wagener, Asja [9788-35] S8  
 Wagner, Martin [9784-61] S12, [9786-43] S9, [9786-44] S9, [9789-22] S5  
**Wagner, Martin G.** [9784-82] SPS2, [9786-3] S1, [9786-38] S8  
 Wagner, Mary B. [9790-40] SPS1  
**Wahle, Andreas** [9788-33] S7  
 Waldstein, Sebastian M. [9784-139] SPS5, [9784-19] S5  
 Walker, Paul M. [9785-80] SPS2  
 Walker, Ronald C. [9787-18] S4  
 Walker, William F. 9790 Program Committee  
 Wallace, Luisa P. [9787-46] SPSWed  
 Wallis, Matthew G. [9787-23] S1  
 Walsh, Ruth [9787-6] S2  
 Walsh, Timothy [9783-208] SPS13  
 Walters, Martin A. [9788-43] S9  
 Wan, Justin W. L. [9784-100] SPS2  
 Wanders, Johanna O. P. [9785-17] S4  
 Wandner, Johannes [9783-196] SPS11, [9783-203] SPS11, [9783-25] S5  
 Wang, Adam S. [9783-17] S4, [9783-34] S7  
 Wang, Brian [9788-97] SPS9  
 Wang, Brian T. [9784-16] S4  
 Wang, Chenglong [9784-93] SPS2  
 Wang, Cheng-Yi [9785-115] SPS4  
 Wang, Chunliang [9786-36] S7  
 Wang, Dongsheng [9788-37] S8, [9788-38] S8, [9791-20] S4  
 Wang, Huaining [9789-14] S3  
 Wang, Hui [9783-114] SPS4  
 Wang, Jie [9785-75] SPS1  
 Wang, Jieqiong [9785-98] SPS3, [9785-99] SPS3  
 Wang, Jing [9783-163] SPS7  
 Wang, Jinqiao [9788-57] SPS2  
 Wang, Jiong [9783-2] S1  
 Wang, Kai [9783-219] SPS16  
 Wang, Kuang-Ching [9786-65] SPSMon  
**Wang, Kun** [9783-198] SPS11  
 Wang, Lei [9785-60] S13  
 Wang, Mengyu [9787-6] S2  
 Wang, Mingqiang [9789-28] SPSMon, [9789-30] SPSMon  
 Wang, Qian [9789-4] S1  
 Wang, Qian [9784-109] SPS3  
 Wang, Shanshan [9790-24] S5  
 Wang, Shawn [9791-11] S3  
 Wang, Shijian [9789-2] S1  
 Wang, Shijun [9784-89] SPS2  
 Wang, Shuqing [9784-64] SPS1  
 Wang, Siyun [9790-40] SPS1  
 Wang, Tonghe [9783-143] SPS6  
 Wang, Xiangyu [9786-30] S6  
 Wang, Xiaohui [9783-103] SPS2, [9783-223] SPS16, [9783-26] S6  
 Wang, Xiaojia [9789-2] S1  
 Wang, Xiaoyong [9785-134] SPS5  
 Wang, Ximing [9789-31] SPSMon  
**Wang, Xueding** [9790-36] SPS1  
 Wang, Xunheng [9788-72] SPS4  
 Wang, Yaqi [9788-28] S6  
 Wang, Yinong [9785-133] SPS5, [9785-24] S5  
**Wang, Yongtian** [9786-59] SPSMon  
 Wang, Yu [9788-46] S10  
 Wang, Yuzhi [9785-29] S6, [9785-49] S10  
 Wang, Yuxin [9790-36] SPS1  
 Wang, Zhentian [9783-24] S5, [9783-71] S14  
 Wang, Zhiyue J. [9788-99] S10  
 Wang, Ziyuan [9784-96] SPS2  
 Wanke, Isabel [9785-84] SPS3  
 Wanna, George B. [9786-7] S2  
 Ward, Aaron D. [9785-50] S10, [9785-55] S12, [9786-19] S4, [9786-54] S11, 9791 Program Committee, 9791 S4 Session Chair, [9791-15] S4, [9791-22] S5  
 Ward, Rabab Kreidieh [9784-21] S5, [9784-22] S5, [9791-17] SPSWed  
 Warraich, Tajdar [9788-1] S1  
 Warren, Lucy M. [9787-23] S1  
 Washburn, Michael J. [9790-45] SPS3  
 Wasserman, Edward A. [9787-16] S4  
 Watanabe Fernandes, Eric Hideki [9786-91] SPSMon  
 Watanabe, Tsuneo [9790-37] SPS1  
 Watkins, Charles [9786-27] S6  
 Weaver, Donald L. [9791-7] S2  
 Weaver, John B. 9788 Program Committee  
 Weber, Christian [9784-53] S11, [9785-62] S13

Weber, Thomas [9783-196] SPS11  
 Webster, Robert J. 9786 Conference Chair, 9786 S10 Session Chair, [9786-26] S6, [9786-51] S10  
 Weese, Jürgen [9784-54] S11, [9784-71] SPS1  
 Wei, Huijun [9788-28] S6  
 Wei, Jun [9785-139] SPS6, [9785-2] S1, [9785-51] S10, [9785-59] S13, [9785-74] SPS1  
 Wei, Ling [9783-183] SPS9  
 Wei, Wei [9787-36] S7  
 Wei, Zhu [9785-56] S12  
 Wei, Zhuoshi [9785-58] S12  
 Weickert, Joachim [9784-99] SPS2  
 Weimar, Christian [9785-84] SPS3  
 Wein, Wolfgang 9784 Program Committee  
 Weis, Christian [9783-190] SPS10  
 Weiss, Pierre [9788-63] SPS3  
 Weizer, Alon [9785-51] S10  
 Weller, Tobias [9786-2] S1, [9789-22] S5  
 Wells, Andrew K. [9788-43] S9  
 Wells, Kevin [9783-4] S1, [9783-6] S2, [9783-84] SPS1  
 Wells, William M. [9790-14] S3  
 Wels, Michael G. [9785-1] S1  
 Wen, Di [9783-144] SPS6, [9784-31] S7  
 Wen, Gezheng [9787-27] S6  
 Wen, Hongwei [9785-98] SPS3, [9785-99] SPS3  
 Werner, René [9783-38] S7, [9786-73] SPSMon  
 Wesarg, Stefan [9790-46] SPS3  
 West, Erik [9790-11] S2  
 West, Jennifer L. [9788-31] S7  
 Western, Craig [9786-85] SPSMon  
 Whiting, Bruce R. [9783-23] S5, [9783-36] S7  
 Whitley, Melodi [9788-31] S7  
 Whitman, Gary J. [9787-36] S7  
 Wi, Sunhee [9783-65] S13  
 Wichmann, Julian L. [9785-123] SPS5  
 Wiemker, Rafael 9785 Program Committee, [9785-38] S8  
 Wiernert, Stephan [9791-31] SPSWed  
 Wild, Peter [9791-27] SPSWed  
**Wiles, Andrew D.** 9786 Program Committee  
 Wileyto, E. Paul [9783-220] SPS16  
 Wilford, Andrew [9784-97] SPS2  
 Wilkinson, Louise [9787-23] S1  
 Williams, Mark B. [9788-4] S1  
 Williamson, Jeffrey F. [9783-36] S7  
 Williford, Joshua P. [9788-50] SPS10  
**Wilson, David L.** [9783-144] SPS6, [9784-118] SPS3, [9784-135] SPS5, [9784-31] S7, [9786-4] S1, 9787 Program Committee, [9788-104] SPS6, [9788-86] SPS7, [9788-89] SPS7, [9788-93] SPS8  
 Wilson, Laura [9784-73] SPS1  
 Winkelmann, Christopher T. [9786-23] S5, [9786-71] SPSMon  
 Wintermark, Max [9783-32] S7  
 Wirkert, Sebastian J. [9786-44] S9  
 Wismüller, Axel 9785 Program Committee, 9785 S2 Session Chair, [9785-7] S2, 9788 Program Committee, 9788 S10 Session Chair, 9788 S3 Session Chair, 9788 S4 Session Chair, 9788 S5 Session Chair, [9788-19] S5, [9788-20] S5, [9788-22] S5, [9788-67] SPS4  
 Wittenberg, Thomas [9785-121] SPS5, [9785-81] SPS2, [9791-32] SPSWed  
 Wolf, Andreas [9783-196] SPS11, [9783-203] SPS11, [9783-25] S5  
 Wolf, Ivo 9786 Program Committee, [9786-2] S1, [9786-45] S9, [9789-22] S5  
 Wolinsky, Jean-Paul [9786-16] S3, [9786-9] S2  
 Wolter, Scott D. [9783-210] SPS14  
 Wolterink, Jelmer M. [9784-4] S1, [9784-69] SPS1  
 Won, Young Jae [9787-51] SPSWed  
 Wong, Eugene [9786-52] S11  
 Wong, Jih [9787-32] S7  
 Wong, John [9786-24] S5  
 Wong, Molly D. [9783-202] SPS11, [9783-230] SPS16  
 Wong, Sum-Thai [9791-30] SPSWed  
 Wong, Tien Y. [9785-96] SPS3  
 Woo, Jonghye [9788-3] S1  
 Woo, Sang-Keun [9783-195] SPS10  
 Wood, Bradford [9786-40] S8, [9786-53] S11, [9786-88] SPSMon  
 Wood, John [9784-129] SPS4  
 Worrell, Gregory [9786-94] SPSMon  
 Würz, Stefan [9784-44] S9  
 Wright, Margaret J. [9784-62] S12, [9788-73] SPS4  
 Wright, Steven M. [9784-137] SPS5  
 Wrobel, Tomasz P. [9791-40] SPSWed, [9791-47] SPSWed  
 Wu, Caiyun [9786-8] S2, [9788-42] S9  
 Wu, Di [9783-202] SPS11, [9783-230] SPS16  
 Wu, Gongting [9783-2] S1, [9783-223] SPS16, [9783-3] S1  
 Wu, Hao [9784-118] SPS3, [9784-135] SPS5, [9788-86] SPS7, [9788-89] SPS7  
 Wu, Jing [9784-139] SPS5, [9784-19] S5  
 Wu, Kaizhi [9784-141] SPS6  
 Wu, Mingye [9783-114] SPS4, [9783-122] SPS4  
 Wu, Xiaodong SC1026  
 Wu, Xing [9784-104] SPS2  
 Wu, Xizeng [9783-230] SPS16  
**Wu, Yirong** [9787-24] S1, [9787-55] SPSWed  
 Wunderlich, Adam [9787-12] S3, [9787-55] SPSWed

## X

Xi, Dongdong [9789-32] S5  
 Xi, Qing [9790-65] SPS7  
 Xia, Dan [9783-153] SPS7  
 Xia, Jinjun [9790-59] SPS5  
 Xiang, Dehui [9784-102] SPS2, [9784-103] SPS2, [9788-60] SPS2

- Xiang, Jianping [9786-30] S6  
 Xiang, Liangzhong [9790-20] S5  
 Xiao, Chuan [9788-54] SPS2  
 Xiao, Di [9785-83] SPS3, [9785-85] SPS3  
 Xie, Hua (Oliver) [9784-137] SPS5  
 Xie, Huiqiao [9783-169] SPS7  
 Xie, Qingguo [9786-58] SPSMon  
 Xie, Yiting [9785-128] SPS5  
 Xie, Zhongliu [9784-40] S8, [9784-79] SPS1  
 Xing, Yuxiang [9783-14] S3, [9783-146] SPS6  
 Xiong, Guanglei [9788-34] S7  
 Xiong, Zhenyu [9783-101] SPS2, [9783-102] SPS2  
 Xu, Gang [9784-104] SPS2  
**Xu, Jennifer** [9783-103] SPS2, [9783-26] S6  
 Xu, Jinhui [9786-30] S6  
 Xu, Mengling [9790-7] S2  
 Xu, Sheng [9786-53] S11, [9786-88] SPSMon  
 Xu, Xiaopan [9785-64] S13  
**Xu, Yiwen** [9791-15] S4, [9791-22] S5  
 Xu, Yuan [9790-70] SPS7  
 Xu, Yuesheng [9783-158] SPS7  
 Xu, Zhoubing [9784-127] SPS4, [9784-29] S6, [9784-59] S12  
**Xuan, Jason** [9787-47] SPWed  
 Xue, Rong [9788-57] SPS2  
 Xue, Zhiyun [9785-42] S8, [9789-17] S4
- Y**
- Yaffe, Martin J. 9791 Program Committee, [9791-12] S3  
 Yamada, Kei [9784-122] SPS4  
 Yamaguchi, Yusaku [9783-168] SPS7, [9783-171] SPS7  
 Yamaguchi, Yuzuhō [9788-66] SPS4  
 Yamakawa, Tsutomu [9783-85] SPS1, [9783-91] SPS1  
 Yamamoto, Shuichiro [9783-85] SPS1, [9783-91] SPS1  
 Yamamoto, Tetsuya [9785-93] SPS3  
 Yamamoto, Tokunori [9784-93] SPS2  
**Yan, Christina** [9786-15] S3, [9786-90] S6  
 Yan, Fei [9786-60] SPSMon  
 Yan, Shiju [9785-49] S10, [9785-71] SPS1, [9785-72] SPS1  
 Yan, Yan [9790-59] SPS5  
**Yang, Guang** [9784-20] S5  
 Yang, Huamin [9786-60] SPSMon  
 Yang, Jean Y. [9784-7] S2  
 Yang, Jiali [9790-32] S7, [9790-66] SPS7  
 Yang, Jian [9786-59] SPSMon  
 Yang, Jie [9784-68] SPS1, [9788-13] S3  
 Yang, Jinsheng [9783-183] SPS9  
 Yang, Kai [9783-202] SPS11  
 Yang, Lei [9791-45] SPSWed  
 Yang, Pengfei [9783-27] S6  
 Yang, Sook [9783-227] SPS16  
 Yang, Xiaochen [9786-37] S7  
 Yang, Xiaofeng [9784-86] SPS2, 9785 Program Committee, [9786-72] SPSMon, [9786-78] SPSMon  
 Yang, Xiaopeng [9784-131] SPS5  
 Yang, Xirong [9787-47] SPWed  
 Yang, Xulei [9791-30] SPSWed  
 Yang, Yi [9783-169] SPS7  
 Yang, Yuanyuan [9789-28] SPSMon, [9789-30] SPSMon  
 Yang, Yu-Ting [9788-48] S10  
 Yang, Zhen [9784-24] S6, [9784-52] S11, [9784-98] SPS2, [9785-97] SPS3  
 Yaniv, Ziv 9783 SWK1 Workshop Chair, 9786 Conference Chair, 9786 S10 Session Chair, [9786-67] SPSMon  
 Yao, Jianhua [9785-133] SPS5, [9785-24] S5, [9785-6] S2, [9786-40] S8  
 Yao, Peter [9785-61] S13  
 Yao, Yangyang [9783-114] SPS4  
 Yap, Chuin Hong [9787-43] SPWed  
 Yap, Felix [9788-96] SPS8  
 Yap, Moi Hoon [9787-43] SPWed  
**Yardimci Cetin, Yasemin** [9791-46] SPSWed  
 Ye, Chuyang [9784-52] S11  
 Ye, Jieping [9784-55] S11  
 Ye, Jinghan [9783-56] S11, [9783-57] S11, [9783-58] S11  
 Ye, Xujiong [9784-20] S5  
 Yeghiazaryan, Varduhi [9784-85] SPS2  
 Yeh, Benjamin M. [9783-145] SPS6  
 Yen, Kathrin [9786-56] SPSMon  
 Yener, Bülent 9791 Program Committee, [9791-28] SPSWed, [9791-3] S1  
 Yeo, Seung Jun [9783-180] SPS9  
 Yeo, Si Yong [9791-30] SPSWed  
 Yepes-Calderon, Fernando [9788-96] SPS8  
 Yeung, Timothy P. C. [9785-50] S10  
 Yi, Jonghyon [9784-145] SPS6  
 Yin, Hong [9789-14] S3  
 Yin, Yin [9785-19] S4, [9785-32] S7  
 Yin, Zhye [9783-114] SPS4, [9783-122] SPS4, [9788-34] S7  
 Ying, Sarah H. [9784-24] S6, [9784-52] S11, [9785-97] SPS3  
 Yoneda, Kazuya [9785-118] SPS5  
 Yoon, Hong-Jun [9787-19] S4  
 Yoon, Young Cheol [9785-126] SPS5  
 Yorkston, John 9783 Program Committee, 9783 S4 Session Chair, [9783-16] S4  
**Yoshida, Hiroyuki** 9785 Program Committee, 9785 S13 Session Chair, [9785-57] S12, [9785-77] SPS2, [9785-82] SPS2  
 Yoshikawa, Takeharu [9785-100] SPS3  
 Yoshinaga, Tetsuya [9783-168] SPS7, [9783-171] SPS7  
 Yoshino, Yasushi [9784-93] SPS2  
 Youn, Hanbean [9783-125] SPS4, [9783-140] SPS6  
 Young, Kenneth C. [9783-4] S1, [9783-6] S2, [9783-84] SPS1, [9787-23] S1, [9787-57] SPWed, [9789-18] S4  
 Young, Stefano [9785-15] S3, [9787-3] S5
- Yousefi, Siamak [9784-130] SPS5  
 Yu, Chong-Jen [9785-115] SPS4  
 Yu, Houqiang [9790-28] S6  
 Yu, Kai [9784-102] SPS2  
**Yu, Lifeng** [9783-215] SPS15, [9783-37] S7, [9783-44] S9, [9783-79] S15  
 Yu, Lihai [9788-39] S8  
 Yu, Shuai [9788-81] SPS6, [9788-82] SPS6  
 Yu, Wen-Kuang [9785-115] SPS4  
 Yu, Zhicong [9783-205] SPS12, [9783-50] S10, [9783-54] S10  
**Yuan, Baohong** 9788 Program Committee, 9788 S6 Session Chair, 9788 S8 Session Chair, [9788-81] SPS6, [9788-82] SPS6  
**Yuan, Jie** [9790-36] SPS1  
 Yuan, Jing [9784-111] SPS3, [9784-153] SPS6, [9784-60] S12  
 Yuan, Ming [9787-24] S1  
 Yuan, Rong [9786-58] SPSMon  
 Yuchi, Ming [9790-24] S5, [9790-32] S7, [9790-66] SPS7, [9790-7] S2  
 Yun, Hanbean [9783-136] SPS5, [9783-139] SPS5, [9783-228] SPS16, [9783-88] SPS1  
 Yun, Il Dong [9788-87] SPS7  
 Yun, Seungman [9783-125] SPS4, [9783-88] SPS1
- Z**
- Zachary, Josey [9786-98] SPSMon  
 Zamora, Gilberto [9785-43] S9  
 Zang, Xiaonan [9784-144] SPS6, [9786-87] SPSMon  
 Zapf, Michael [9784-132] SPS5, [9790-8] S2, [9790-9] S2  
**Zarei, Nilgoon** [9791-37] SPSWed  
 Zarivala, Hatim A. [9786-23] S5, [9786-71] SPSMon  
 Zavala-Romero, Olmo [9788-78] SPS5  
 Zbijewski, Wojciech [9783-103] SPS2, [9783-16] S4, [9783-26] S6, [9783-29] S6, [9783-33] S7  
 Zeineh, Jack [9791-29] SPSWed  
 Zelzer, Sascha [9789-22] S5  
 Zemcik, Pavel [9788-14] S3  
 Zeng, Dong [9783-119] SPS4, [9783-151] SPS7  
 Zeng, Rongping [9783-148] SPS6, [9783-77] S15, [9787-26] S6, [9787-29] S6  
 Zerbe, Norman [9791-31] SPSWed  
 Zerhouni, Erwan [9791-27] SPSWed  
 Zhai, Zhiwei [9784-91] SPS2  
 Zhang, Aguan [9784-131] SPS5  
 Zhang, Bin [9784-102] SPS2, [9784-103] SPS2  
 Zhang, Dai [9788-57] SPS2  
 Zhang, Dongqing [9784-57] S12  
 Zhang, Guodong [9785-135] SPS5  
 Zhang, Guopeng [9785-64] S13  
 Zhang, Guozhi [9787-50] SPWed, [9787-57] SPWed  
 Zhang, Haichong K. [9790-42] SPS2, [9790-69] SPS7  
 Zhang, Hao [9783-157] SPS7, [9783-159] SPS7, [9783-160] SPS7  
 Zhang, Hongzheng [9788-37] S8, [9791-20] S4  
 Zhang, Hua [9783-119] SPS4, [9783-151] SPS7  
 Zhang, Huayu [9783-14] S3, [9783-146] SPS6  
 Zhang, Ji [9790-54] SPS3  
**Zhang, Jiahao** [9788-5] S1  
**Zhang, Jian J.** [9787-47] SPWed  
**Zhang, Jianguo** 9789 Conference Chair, 9789 S1A Session Chair, [9789-26] SPSMon, [9789-28] SPSMon, [9789-30] SPSMon  
 Zhang, Jing [9787-6] S2  
 Zhang, Jishui [9785-98] SPS3  
 Zhang, Juan [9789-2] S1, [9789-3] S1, [9789-33] SPSMon  
 Zhang, Kai [9789-30] SPSMon  
 Zhang, Li [9784-49] S10  
 Zhang, Linchuan [9788-47] S10, [9789-14] S3  
 Zhang, Ling [9788-33] S7  
 Zhang, Ning [9790-65] SPS7  
 Zhang, Qimee [9788-83] SPS6  
 Zhang, Qiude [9783-115] SPS4  
**Zhang, Ran** [9783-22] S5, [9783-23] S5  
**Zhang, Tian** [9784-148] SPS6  
 Zhang, Wei [9788-25] S6, [9788-26] S6, [9788-91] SPS8  
 Zhang, Xi [9785-64] S13, [9788-47] S10, [9788-49] S10  
**Zhang, Xiang** [9790-26] S6, [9790-63] SPS6, [9790-64] SPS6  
 Zhang, Xiaodong [9790-40] SPS1  
 Zhang, Xinyu [9783-119] SPS4  
 Zhang, Xu [9785-130] SPS5  
 Zhang, Xuejun [9789-13] S3, [9789-23] S5, [9789-29] SPSMon  
 Zhang, Xuming [9784-133] SPS5  
 Zhang, Yakun [9783-120] SPS4, [9783-121] SPS4  
 Zhang, Yan [9786-44] S9  
 Zhang, Zheng [9783-153] SPS7, [9783-58] S11  
 Zhang, Zhiwei [9787-12] S3  
 Zhao, Can [9784-33] S7  
 Zhao, Jun [9789-4] S1  
 Zhao, Liang [9786-30] S6  
 Zhao, Qihua [9783-129] SPS5  
 Zhao, Wei [9783-115] SPS4  
**Zhao, Wei** 9783 Program Committee, 9783 S2 Session Chair, [9783-131] SPS5, [9783-40] S8  
 Zhao, Yue [9788-26] S6, [9788-91] SPS8  
 Zhao, Yulong [9786-29] S6  
**Zheng, Bin** [9783-202] SPS11, [9783-230] SPS16, [9783-95] SPS1, [9785-122] SPS5, [9785-26] S6, [9785-29] S6, [9785-34] S7, [9785-49] S10, [9785-66] SPS1, [9785-71] SPS1, [9785-72] SPS1, [9785-73] SPS1, [9789-2] S1, [9789-3] S1, [9789-32] S5  
**Zheng, Jiabei** [9783-226] SPS16  
 Zheng, Xiaoming [9783-227] SPS16  
 Zheng, Yuanjie [9788-105] SPS2  
 Zheng, Yuese [9783-213] SPS15  
 Zholkover, Adi [9785-4] S1  
 Zhong, Qing [9791-27] SPSWed  
 Zhong, Xiaoli [9790-32] S7  
 Zhong, Xiaoli [9790-66] SPS7  
 Zhou, Bo [9783-144] SPS6, [9784-31] S7, [9788-93] SPS8  
 Zhou, Chuan [9785-139] SPS6, [9785-141] SPS7, [9785-2] S1, [9785-51] S10, [9785-59] S13  
 Zhou, Hanxun [9785-135] SPS5  
 Zhou, Kungang [9783-132] SPS5, [9783-135] SPS5  
 Zhou, Mu [9785-28] S6  
 Zhou, Otto [9783-2] S1, [9783-222] SPS16, [9783-223] SPS16, [9783-3] S1  
 Zhou, Pei [9790-54] SPS3  
 Zhou, Qibing [9790-28] S6  
 Zhou, Shuqin [9788-21] S5  
 Zhou, Xiangrong [9785-129] SPS5, [9785-70] SPS1, [9788-66] SPS4  
 Zhou, Xinxin [9785-70] SPS1  
 Zhu, Dajiang [9784-55] S11  
 Zhu, Dianwen [9788-25] S6, [9788-26] S6, [9788-91] SPS8  
 Zhu, Lei [9783-143] SPS6, [9783-99] SPS2  
 Zhu, Liangjia [9791-21] S5, [9791-41] SPSWed  
 Zhu, Ling [9784-68] SPS1  
 Zhu, Shuxia [9788-6] S2  
 Zhu, Weifang [9784-102] SPS2, [9784-76] SPS1, [9788-6] S2, [9788-60] SPS2, [9791-45] SPSWed  
 Zhu, Yang-Ming [9783-57] S11  
 Zhuang, Juan [9789-32] S5  
 Zidowit, Stephan [9785-60] S13, [9787-58] SPSWed  
 Ziegler, Jens [9783-81] SPS1  
 Zimmerman Moreno, Gali [9784-9] S2  
 Zimmerman, Kevin C. [9783-60] S12  
 Zimmermann, Johannes [9784-35] S8  
 Zinger, Svittana [9785-46] S9, [9785-48] S9, [9786-12] S3  
 Zinn, Kurt R. [9791-33] SPSWed  
 Zografos, Vasileios [9784-42] S9  
 Zoller, Wolfram G. [9790-47] SPS3  
**Zontak, Maria** [9784-140] SPS6  
 Zou, Zilong [9788-13] S3  
 Zuberi, Mohammad Akbar Hosain [9790-10] S2  
 Zuluaga, Maria A. [9784-112] SPS3  
 Zuo, Zhentao [9788-57] SPS2



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Paid Conference Attendees: You may purchase additional online conference proceedings volumes for \$60 each.

Full paid registration includes your choice of Proceedings of SPIE. See the attached list for product order numbers for proceedings options from this meeting. You will need a product order number when you make your proceedings choice on the registration form.

### Available as part of registration:

**Symposium Collection**—online access to multiple related proceedings volumes via the SPIE Digital Library. Available as papers are published.

**Conference Proceedings Volume**—online access to a single conference proceedings volume via the SPIE Digital Library. Available as papers are published.

You may also purchase additional proceedings products beyond what you choose with your registration plan. See below for pricing and product order numbers.

**Paid Conference Attendees: You may purchase additional online conference proceedings volumes for \$60 each.**

### Accessing Online Proceedings

Access to purchased online proceedings will be ongoing using your SPIE login credentials; papers are available as they are published.

To access your purchased proceedings:

- Go to <https://spiedigitallibrary.org> and sign in with your SPIE account credentials. If you do not have an SPIE account, create one using the email address you used to register for the conference.
- Once you have signed in, click the My Account link at the top of the page. You can access your proceedings in the My Conference Proceedings tab.

**Note:** If your organization subscribes to the SPIE Digital Library, you can also access this content via your organization's account when logging on through your institution's network.

Should you need any assistance, please contact SPIE:

**Email:** [SPIEDLSupport@spie.org](mailto:SPIEDLSupport@spie.org)

**Phone (North America):** +1 888 902 0894

**Phone (Rest of World):** +1 360 685 5580

## Conference Proceedings Volumes

Product Order Number		Volume Title/Volume Editors	Price for separate print purchase
Print Volume	Online Volume		Meeting Attendees Only
9783	DL9783	<b>Medical Imaging 2016: Physics of Medical Imaging</b> <i>Despina Kontos, Thomas G. Flohr, Joseph Y. Lo</i>	\$250
9784	DL9784	<b>Medical Imaging 2016: Image Processing</b> <i>Martin A. Styner, Elsa D. Angelini</i>	\$170
9785	DL9785	<b>Medical Imaging 2016: Computer-Aided Diagnosis</b> <i>Georgia D. Tourassi, Samuel G. Armato</i>	\$150
9786	DL9786	<b>Medical Imaging 2016: Image-Guided Procedures, Robotic Interventions, and Modeling</b> <i>Robert J. Webster III, Ziv R. Yaniv</i>	\$125
9787	DL9787	<b>Medical Imaging 2016: Image Perception, Observer Performance, and Technology Assessment</b> <i>Craig K. Abbey, Matthew A. Kupinski</i>	\$80
9788	DL9788	<b>Medical Imaging 2016: Biomedical Applications in Molecular, Structural, and Functional Imaging</b> <i>Barjor Gimi, Andrzej Krol</i>	\$125
9789	DL9789	<b>Medical Imaging 2016: PACS and Imaging Informatics: Next Generation and Innovations</b> <i>Jianguo Zhang, Tessa S. Cook</i>	\$60
9790	DL9790	<b>Medical Imaging 2016: Ultrasonic Imaging and Tomography</b> <i>Neb Duric, Brecht Heyde</i>	\$100
9791	DL9791	<b>Medical Imaging 2016: Digital Pathology</b> <i>Metin N. Gurcan, Anant Madabhushi</i>	\$80

## Symposium Collections

Product Order Number	Collection Title/Included Volumes (See next page for volume titles and editors)
Symposium Collection	
DLC602	<b>SPIE Medical Imaging 2016</b> 9783, 9784, 9785, 9786, 9787, 9788, 9789, 9790, 9791

## General Information

### Registration

Onsite Registration and Badge Pick-up Hours  
Location: Atlas Foyer

Saturday 27 February . . . . . 7:30 am to 4:00 pm  
 Sunday 28 February . . . . . 7:15 am to 4:00 pm  
 Monday 29 February . . . . . 7:30 am to 4:00 pm  
 Tuesday 1 March . . . . . 7:30 am to 4:00 pm  
 Wednesday 2 March . . . . . 7:30 am to 4:00 pm  
 Thursday 3 March . . . . . 7:30 am to 1:30 pm

### Conference Registration

Includes admission to all conference sessions, plenary, panels, and poster sessions, coffee breaks, and a choice of proceedings.

### Course and Workshop Registration

Courses and workshops are priced separately. Course-only registration includes your selected course(s), course notes, and coffee breaks. Course prices include applicable taxes. Onsite, please go to Course Materials Pick-up after you pick up your badge.

### SPIE Member, SPIE Student Member, and Student Pricing

- SPIE Members receive conference and course registration discounts. Discounts are applied at the time of registration.
- SPIE Student Members receive a 50% discount on all courses.
- Student registration rates are available only to undergraduate and graduate students who are enrolled full time and have not yet received their Ph.D. Post-docs may not register as students. A student ID number or proof of student status is required with your registration.

### Press Registration

For credentialed press and media representatives only. Please email contact information, title, and organization to [media@spie.org](mailto:media@spie.org).

### SPIE Cashier

Registration Area  
Open during registration hours

### Registration Payments

If you are paying by cash or check as part of your onsite registration, wish to add a course, workshop, or special event requiring payment, or have questions regarding your registration, visit the SPIE Cashier.

### Receipts and Certificate of Attendance

Preregistered attendees who did not receive a receipt or attendees who need a Certificate of Attendance may obtain those from the SPIE Cashier.

### Badge Corrections

Badge corrections can be made by the SPIE Cashier. Please have your badge removed from the badge holder and marked with your changes before approaching the counter.

### Refund Information

There is a US\$50 service charge for processing refunds. Requests for refunds must be received by 18 February 2016; all registration fees will be forfeited after this date. Membership dues, SPIE Digital Library subscriptions, or Special Events purchased are not refundable.

## Author / Presenter Information

### Speaker Check-In and Preview Station

Location: Terrace Salon One

Saturday through Thursday . . . . . 7:30 am to 5:00 pm  
 All conference rooms have a computer workstation, projector, screen, lapel microphone, and laser pointer. All presenters are requested to come to Speaker Check-In with their memory devices or laptops to confirm their presentation display settings.

### Poster Sessions and Set-up Instructions

Location: Grand Exhibit Hall

#### Sunday/Monday Poster Session

Author Setup Time . . . . . Sunday Noon to 1:30 pm  
 Poster Session . . . . . Monday 5:30 pm to 7:00 pm  
 Authors Remove Posters . . . . Monday 7:00 pm to 9:00 pm

#### Tuesday/Wednesday Poster Session

Author Setup Time . . . . . Tuesday 9:30 am to 11:00 am  
 Poster Session . . . . . Wednesday 5:30 pm to 7:00 pm  
 Authors Remove Posters . Wednesday 7:00 pm to 9:00 pm

- Paper numbers will be placed on the poster boards in numerical order; please find your paper number and put up your poster in the designated space.
- A poster author or coauthor is required to stand by the poster during the scheduled interactive poster session to answer questions from attendees.
- Presenters who have not placed their poster(s) on their assigned board by 30 minutes prior to the session on the day of their presentation will be considered a “no show” and their manuscript will not be published.
- Presenters must remove their posters at the end of the poster session.
- Posters not removed will be considered unwanted and will be discarded.
- SPIE assumes no responsibility for posters left up after the end of each poster session.

**Onsite Services**

**Internet Access**

Location: Grand Exhibit Hall Foyer

Sunday - Thursday

Complimentary wired Internet access is available; attendees can hook up their laptops or use provided workstations.

**WiFi**

Location: Grand Exhibit Hall  
Atlas Foyer  
All Conference Rooms

Complimentary wireless access is available; instructions will be posted onsite.

**SPIE Conference App**



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Search and browse the program, special events, participants, exhibitors, courses, and more. Free Apps available for iPhone and Android smart phones.

**SPIE Bookstore**

Location: Atlas Foyer

Stop by the SPIE Bookstore to browse the latest SPIE Press Books, proceedings, and educational materials. While there, get a t-shirt or educational toy to bring home to the family.

**SPIE Education Services**

SPIE Registration Desk, Atlas Foyer

Browse course offerings and the other education services available: SPIE courses, videos, and CDs as well as customized in-company courses.

**Business Center**

Location: Atlas Foyer

8 am - 5 pm .....7 days a week

Services include copies, print documents from your laptop or storage device, small package FedEx shipping, packing supplies, color copying services, fax services and office supplies. Prices for services are posted onsite.

**Restaurant & City Information**

Location: Atlas Foyer

Sunday through Wednesday. 8:30 to 10:00 am and 3:00 to 4:00 pm

Services include sightseeing, shopping and restaurant information

**Child Care Services**

Marion's Childcare, Inc.

amy@hotelchildcare.com

619-303-4379 office or 619-663-4379 text

Make a Reservation Online

Note: SPIE does not imply an endorsement nor recommendation of these services. They are provided on an "information only" basis for your further analysis and decision. Other services may be available.

**Urgent Message Line**

An urgent message line is available during registration hours: +[619-908-5071]

**Lost and Found**

Cashier Station/Atlas Foyer  
Registration Hours

Found items will be kept at Cashier until 4 pm each day and then turned over to The Hotels Lost and Found Department, [x3956]. At the end of the meeting, all found items will be turned over to Town & Country Lost and Found Department.

**Food and Beverage Services**

**Coffee Breaks**

Saturday 27 February ..... 10 am and 3 pm  
Location: Rose Garden Patio

Sunday 28 February .....9:30 am and 3 pm  
Location: Grand Exhibit Hall

Monday, 29 February ..... 9:30 and 3:20 pm  
Location: Grand Exhibit Hall

Tuesday 1 March .....9:30 am and 3 pm  
Location: Grand Exhibit Hall

Wednesday 2 March .....9:30 am and 3 pm  
Location: Grand Exhibit Hall

Thursday 3 March.....9:30 am and 3 pm  
Location: Atlas Foyer

Complimentary coffee will be served twice each day of the conference. Check individual conference listings for exact times and locations.

**Food & Refreshments for Purchase**

**Terrace Café**

Open 6 am to 10 pm  
Serving breakfast, lunch, and dinner in a bistro style café.

**Market Deli**

Open from 7 am to 10 pm  
Specializing in light to go fare and features Starbucks coffee drinks.

**Charlie's**

Open from 11 am to Midnight  
Sports, Beer and Barbeque

**SPIE-Hosted Lunches**

Location: Grand Plaza

Sunday through Thursday ..... 12:10 to 1:00 pm

SPIE hosted lunches will be included in registration packets for full-conference registrants Sunday through Thursday. Student attendees will receive a complimentary lunch ticket for Monday, Tuesday and Wednesday with their registration. The Sunday Student Lunch with the Experts is on a first-come, first-served basis.

Students may purchase lunch tickets for Thursday's lunch from the cashier at the SPIE Registration Desk if tickets are available. The Registration staff will be notified of available seating starting 10 minutes after the last conference room breaks, usually between 12:20 to 12:30 pm.

Should inclement weather prevent outdoor lunches, they will be served in the Grand Exhibit Hall.





## SPIE EVENT POLICIES

# Acceptance of Policies and Registration Conditions

The following Policies and Conditions apply to all SPIE Events. As a condition of registration, you will be required to acknowledge and accept the SPIE Registration Policies and Conditions contained herein.

### Granting Attendee Registration and Admission

SPIE, or their officially designated event management, in their sole discretion, reserves the right to accept or decline an individual's registration for an event. Further, SPIE, or event management, reserves the right to prohibit entry or remove any individual whether registered or not, be they attendees, exhibitors, representatives, or vendors, who in their sole opinion are not, or whose conduct is not, in keeping with the character and purpose of the event. Without limiting the foregoing, SPIE and event management reserve the right to remove or refuse entry to any attendee, exhibitor, representative, or vendor who has registered or gained access under false pretenses, provided false information, or for any other reason whatsoever that they deem is cause under the circumstances.

### Misconduct Policy

SPIE is a professional, not-for-profit society committed to providing valuable conference and exhibition experiences. SPIE is dedicated to equal opportunity and treatment for all its members and meeting attendees. Attendees are expected to be respectful to other attendees, SPIE staff, and contractors. Harassment and other misconduct will not be tolerated; violators will be asked to leave the event.

### Identification

To verify registered participants and provide a measure of security, SPIE will ask attendees to present a government-issued Photo ID at registration to collect registration materials.

Individuals are not allowed to pick up badges for attendees other than themselves. Further, attendees may not have some other person participate in their place at any conference-related activity. Such other individuals will be required to register on their own behalf to participate.

### Capture and Use of a Person's Image

By registering for an SPIE event, I grant full permission to SPIE to capture, store, use, and/or reproduce my image or likeness by any audio and/or visual recording technique (including electronic/digital photographs or videos), and create derivative works of these images and recordings in any SPIE media now known or later developed, for any legitimate SPIE marketing or promotional purpose.

By registering for an SPIE event, I waive any right to inspect or approve the use of the images or recordings or of any written copy. I also waive any right to royalties or other compensation arising from or related to the use of the images, recordings, or materials. By registering, I release, defend, indemnify and hold harmless SPIE from and against any claims, damages or liability arising from or related to the use of the images, recordings or materials, including but not limited to claims of defamation, invasion of privacy, or rights of publicity or copyright infringement, or any misuse, distortion, blurring, alteration, optical illusion or use in composite form that may occur or be produced in taking, processing, reduction or production of the finished product, its publication or distribution.

### Payment Method

Registrants for paid elements of the event, who do not provide a method of payment, will not be able to complete their registration. Individuals with incomplete registrations will not be able to attend the conference until payment has been made. SPIE accepts VISA, MasterCard, American Express, Discover, Diner's Club, checks and wire transfers. Onsite registrations can also pay with Cash.

### Authors/Coauthors

By submitting an abstract, you agree to the following conditions:

- An author or coauthor (including keynote, invited, and solicited speakers) will register at the author registration rate, attend the meeting, and make the presentation as scheduled.
- A full-length manuscript (minimum 6 pages) for any accepted oral or poster presentation will be submitted for publication in the SPIE Digital Library, printed conference Proceedings, and CD. (Some SPIE events have other requirements that the author is made aware of at the time of submission.)
- Only papers presented at the conference and received according to publication guidelines and timelines will be published in the conference Proceedings and SPIE Digital Library (or via the requirements of that event).

### Audio, Video, Digital Recording Policy

Conferences, courses, and poster sessions: For copyright reasons, recordings of any kind are prohibited without prior written consent of the presenter or instructor. Attendees may not capture or use the materials presented in any meeting/course room or in course notes on display without written permission. Consent forms are available at Speaker Check-In. Individuals not complying with this policy will be asked to leave a given session and/or asked to surrender their recording media.

Your registration signifies your agreement to be photographed or videotaped by SPIE in the course of normal business. Such photos and video may be used in SPIE marketing materials or other SPIE promotional items.

### Laser Pointer Safety Information/Policy

SPIE supplies tested and safety-approved laser pointers for all conference meeting rooms. For safety reasons, SPIE requests that presenters use provided laser pointers.

Use of a personal laser pointer represents user's acceptance of liability for use of a non-SPIE-supplied laser pointer. If you choose to use your own laser pointer, it must be tested to ensure <5 mW power output. Laser pointers in Class II and IIIa (<5mW) are eye safe if power output is correct, but output must be verified because manufacturer labeling may not match actual output. Come to Speaker Check-In and test your laser pointer on our power meter. You are required to sign a waiver releasing SPIE of any liability for use of potentially non-safe, personal laser pointers. Misuse of any laser pointer can lead to eye damage.

## Access to Technical and Networking Events

Persons under the age of 18 including babies, carried or in strollers, and toddlers are not allowed in technical or networking events. Anyone 18 or older must register as an attendee. All technical and networking events require a valid conference badge for admission.

## Unsecured Items Policy

Personal belongings should not be left unattended in meeting rooms or public areas. Unattended items are subject to removal by security. SPIE is not responsible for items left unattended.

## Wireless Internet Service Policy

At SPIE events where wireless is included with your registration, SPIE provides wireless access for attendees during the conference but cannot guarantee full coverage in all locations, all of the time. Please be respectful of your time and usage so that all attendees are able to access the internet.

Excessive usage (e.g., streaming video, gaming, multiple devices) reduces bandwidth and increases cost for all attendees. No routers may be attached to the network. Properly secure your computer before accessing the public wireless network. Failure to do so may allow unauthorized access to your laptop as well as potentially introduce viruses to your computer and/or presentation. SPIE is not responsible for computer viruses or other computer damage.

## Mobile Phones and Related Devices Policy

Mobile phones, tablets, laptops, pagers, and any similar electronic devices should be silenced during conference sessions. Please exit the conference room before answering or beginning a phone conversation.

## Smoking

For the health and consideration of all attendees, smoking, including e-cigarettes, is not permitted at any event elements, such as but not limited to: plenaries, conferences, workshops, courses, poster sessions, hosted meal functions, receptions, and in the exhibit hall. Most facilities also prohibit smoking and e-cigarettes in all or specific areas. Attendees should obey any signs preventing or authorizing smoking in specified locations.

## Hold Harmless

Attendee agrees to release and hold harmless SPIE from any and all claims, demands, and causes of action arising out of or relating to your participation in the event you are registering to participate in and use of any associated facilities or hotels.

## Event Cancellation

If for some unforeseen reason SPIE should have to cancel the event, registration fees processed will be refunded to registrants. Registrants will be responsible for cancellation of travel arrangements or housing reservations and the applicable fees.

## Confidential Reporting of Unethical or Inappropriate Behavior

SPIE is an organization with strong values of responsibility and integrity. Our Ethics Statement and Code of Professional Conduct contain general guidelines for conducting business with the highest standards of ethics. SPIE has established a confidential reporting system for staff and other stakeholders to raise concerns about possible unethical or inappropriate behavior within our community. Complaints may be filed by phone or through the website, and, if preferred, may be made anonymously. The web address is [www.SPIE.ethicspoint.com](http://www.SPIE.ethicspoint.com) and the toll free hotline number is 1-888-818-6898.

## SPIE INTERNATIONAL HEADQUARTERS

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