Chapter elected officers

President               Anneke Erasmus 16529138@sun.ac.za
Vice-President          Frederick Waso 17791308@sun.ac.za
Secretary              Deon Janse van Rensburg 18392016@sun.ac.za
Treasurer               Andre de Bruyn 15731545@sun.ac.za
Outreach coordinator    Ruan Viljoen 16107500@sun.ac.za
Media Liason            Brandon Hattingh 17783003@sun.ac.za

1. Membership

Student members (17)

André de Bruyn                          15731545@sun.ac.za
Anneke Erasmus                         16529138@sun.ac.za
Brandon Hattingh                       17783003@sun.ac.za
Imraan Badrodiën                      17694698@sun.ac.za
Nancy Payne                            nancy.elizabeth.payne@gmail.com
Cathrine Pfukwa                        16230310@sun.ac.za
Charmaine Sibanda                     charmaineelainemusandu@gmail.com
Anthonie de Beer                       18978762@sun.ac.za
Deon Janse van Rensburg                 18392016@sun.ac.za
Ruan Viljoen                           16107500@sun.ac.za
Frederick Waso                         17791308@sun.ac.za
Shane Smith                            srs smith@sun.ac.za
George Dwapanyin                       19724020@sun.ac.za
Naleli Matjelo                         17373700@sun.ac.za
Ratsimandresy Holinirina Dina Miora    20350333@sun.ac.za
Jason Webster                          17766060@sun.ac.za
Wendall Coenraad                      13730045@sun.ac.za

Alumni members (0)
2. Details of chapter activities in 2018

2.1. Welcoming social (March 2018)
At the start of 2018 the chapter had a social pizza evening at the department with all the laser students. The aim of this gathering is for the new students to meet the other chapter members, socialise and to enhance collaborations within the department. This year the theme was to bring a funny hat to the meeting (figure 1). The funding for these events was donated by the SPIE, as well as OSA grants. The funding goes towards the food, drinks.

2.2. First year meet-and-greet and Physics Department open day (April 2018)
Students from the chapter were present at the departmental “meet-and-greet” evening with the undergraduate students, which was organised and hosted by the Physics Department. The evening was an opportunity for undergraduate students to ask questions and find out what we do as postgraduate students in physics. The student chapter is present at the meeting to answer questions from the undergraduates from a laser physics student point of view, also motivating undergraduate students to pursue optics.

2.3. Quiz night (April 2018)
The annual quiz evenings are aimed at encouraging first year and other undergraduate physics students to follow physics subjects in the field of optics and photonics. Previous quiz evenings were a major success, so another quiz evening was held this year in April. The funding for these events was donated by the SPIE, as well as OSA grants. The funding goes towards the food, drinks and prizes.
2.4. International Day of Light 2018 (May 2018)
The Stellenbosch Laser Student Chapter hosted our first International Day of Light event in 2018. Overall, the event reached approximately 108 people through various activities with a light-based theme. This included an open day where demonstrations were put on display for the public to interact with. We also hosted school students from the local area for hands-on spectroscope building, lab tours, and to see the demonstrations. Lastly, Prof Andrew Forbes was invited to give a public lecture. The SPIE International Day of Light micro grant was used to cover the costs of the event described here and a full report was submitted regarding further details of the event.

2.5. Visiting lecturer and postgraduate workshop (August 2018)
With the help of the Stellenbosch University Postgraduate Office, we invited Alaina G. Levine to present a workshop aimed at PhD students in STEM. The workshop included themes such as research-life balance, communicating your value as a researcher, and networking. It was received exceptionally well. SPIE’s visiting lecturer program allowed us to invite Ms Levine to Stellenbosch. As a chapter we also hosted a dinner for Ms Levine with some of the laser physics supervisors of the Physics department. Along with a keynote talk for the Science faculty, Ms Levine also spent time with the students of the chapter giving advice on elevator pitches.
2.6. Pre-postgraduate event (September 2018)
The aim is to have an evening to encourage final year students to pursue an honours (and further postgraduate) studies in laser physics at the department. We also invited an alumni, Prof Anton Du Plessis, to give a physics-in-industry talk. Through this, the objective was to give them an idea of what life is like after postgrad studies in laser physics through people who also studies at Stellenbosch.

The evening also had time for interacting and chatting to students and supervisors. The final year students could ask questions about where to find scholarship information, how to go about contacting supervisors, and what the courses are like in honours compared to third year, etc. The response from the final years was overall positive. It was also a good opportunity for them to get to know some of the people they could potentially be sharing labs within the next year. Funding from SPIE and OSA was used to for catering purposes.

2.7. Conferences representatives

2.7.1. SPIE Optics and Photonics
Charmaine Sibanda represented our student chapter at Optics in Photonics in 2018. The attendance of the conference was made possible through the SPIE Chapter Officer Travel grant.

2.7.2. Representation at the African Laser Center workshop
The student chapter was represented at the African Laser Center (ALC) student workshop held in Stellenbosch in November 2018. Students did a demonstration show to demonstrate the experiments done on outreach to schools (more details on the demonstrations follow in section 3). It is a fun hour at the workshop with everyone enjoying a few simple and entertaining experiments. We hope to encourage students from other chapters to also participate in outreach.
(or to start a chapter). The talk gives also starts a conversation about outreach and students discuss outreach strategies, demo ideas, etc.

2.8. Outreach to schools

Students from the Physics department (including members of the SPIE student chapter) participated in outreach during a week of September 2018, overall reaching approximately 120 students. The outreach initiative aimed to raise awareness among high-school pupils of the enriching opportunities of a career in optics/photonics and physics in general.

Postgraduate students presented a range of interesting and exciting physics experiments/demonstrations (see section 3) at four high schools in the local area. The feedback received from the pupils reached, as well as their teachers, was very positive throughout the week.

During our visits at schools we host a physics demo show, which we've catered this year to be more interactive for all the students attending. By dividing the pupils up into smaller groups they get to interact with the equipment physically and we get to interact with them on a more natural way which enables us to cater our explanations to their understanding.
2.9. Other

2.9.1. Chapter social media
The chapter's Facebook page is https://www.facebook.com/LaserChapter and is what we found this year works better than a website (although we still have our chapter website for those who prefer it to contact us). We aim to be accessible on social media so that we can use to promote our outreach activities to local schools and organizations.

2.9.2. Nationwide chapter collaboration (ongoing)
The Stellenbosch University Chapter is communicating with the Wits chapter in South Africa in order drive nationwide chapter collaboration. The aim of this is to enable us to spread outreach further, to distribute outreach kits on a larger scale to schools across South Africa without the infrastructure of laboratories, and to increase awareness of optics and optics based education to a larger audience.

An example of what we are planning is to communicate about visiting lecturers and International Day of Light 2019 plans to see whether collaboration is possible. We will also be sharing outreach ideas, such as demonstrations.

This drive should enable easier communication between chapters, through for example a Whatsapp group with at least two representatives of each chapter.

2.9.3. Conference prize
The Stellenbosch University Laser Student Chapter sponsored an ad hoc prize of R2500.00 at the 2018 South African Institute of Physics conference. The prize was awarded in the Photonics division recognizing an exceptional PhD student who gave an oral presentation. The funding for the prize was from both the SPIE and OSA chapter grants we received.
3. Demonstrations
The physics demonstrations involve students by asking questions or for volunteers to do the experiment with the postgraduate student. The pupils show a great interest and full fascination for the physics concepts that are demonstrated and do not get bored during the show with enough humour and spectacular ‘wow’-effects.

These demonstrations are used in outreach activities to local schools, for open days, etc.

Fluorescence & Phosphorescence:
Using a UV lamp and various dyes in solution we explained the difference between the two processes of fluorescence and phosphorescence. We show students how electrons in atoms may be excited (for instance, by shining light at them), and how this excitation energy may be released again in the form of emitted light.

Optical communications:
Music from an mp3 player is converted to a light signal and transmitted to a receiver where it is decoded again, and played over a loudspeaker. This demo was used as a basis to explain how information can be encoded and transmitted through light. The workings of optical fibres were also illustrated, though it was clear this is not a practical application as birds, clouds or other obstructions can interrupt the data transfer.

Tyndall experiment:
A stream of water coming from a reservoir by opening a tap was used to highlight an application of total internal reflection. Everyone knows that light travels in a straight line, but when the light is aligned through the stream of water leaving the tap, total internal reflection ensures that the light ‘bends’ with the water. This illustrates the application of optical fibres, and explains how the technology of the optical communications experiment can be applied in modern technology by utilising fibre optics technology.

Plasma Ball:
A plasma ball with fluorescent gas makes voltage breakdown in the gas clearly visible. When the demonstrator holds a fluorescent light bulb, and brings this close to the plasma ball, the bulb starts to fluoresce. This is because of the current that is running from the plasma ball, through the bulb, through the demonstrator through the ground. When a volunteer touches the plasma ball with one hand, the light bulb in the other hand, and a second volunteer holds the other end of the bulb, it still fluoresces. Even though the theory of path of least resistance predict that a current should not flow through the second volunteer through the ground, the nature of an Alternating Current (AC) makes the light bulb to fluoresce.
Wheels and spinning discs:
A simple experiment where a person stands on a disc that can rotate with minimal friction. The dependence of angular momentum on the radius from the rotational axis is explained with the person spinning with his/her arms stretched out vs. kept close. Also, the person may also be holding onto a spinning bicycle wheel. Whenever the spinning wheel is tilted, the person on the disc will start rotating as to counter-act the change in total angular momentum caused by the tilt of bicycle wheel. This was used to demonstrate the law of conservation of angular momentum.

Marshmallows in vacuum:
Marshmallows are placed in a bell jar, which is then evacuated. The marshmallows expand due to air pockets trapped in them. This demonstration illustrates the inverse proportionality of volume and pressure in the ideal gas law.

Egg in a bottle:
Demonstrating the effect of temperature according to the ideal gas law. A small fire is lit inside a flat bottom beaker. A hardboiled egg which is larger than the opening of a glass bottle is placed onto the opening. The egg forms a seal and the lower pressure caused in the bottle as the fire goes out and the temperature cools causes the egg to be sucked into the bottle in a dramatic fashion.

Corn starch and water
Non-Newtonian fluid mechanics is demonstrated by mixing corn starch and water. The mixture is viscous when no external force is applied to it. However, once pressure is applied (by for example squeezing it into a ball), the mixture becomes more solid.

Microscopy demonstration
A laser pointer sent through a droplet of water suspended from above is used to demonstrate microscopy. The microscopic particles in the water are magnified as large shadows on the wall behind the droplet.
4. Planned activities for 2019

4.1. Social gathering
At the start of 2018 we had a social pizza evening at the department with all the laser students. The aim of this gathering is for the new students to meet the other chapter members, socialise and to enhance collaborations within the department. We are planning to have another one at the start of 2019. SPIE funding is put towards catering for the event.

4.2. Open day and first year meet and greet
We will be present at the departmental open days of 2019, which is organised by the physics department. At the past open days and similar events, our chapter members have done demonstrations, lab tours and answered questions from the audience to promote physics as a field of study.

4.3. International day of light 2019
The chapter is applying for the international day of light grant from the SPIE for 2019. We plan to work with the Laser Research Institute and Physics Department to organize outreach activities surrounding the event or an open day with exhibitions demonstrating optics and photonics. Suggested activities include inviting a guest speaker for a public lecture, inviting school students to the department, and having hands on photonics activities for the students.

4.4. Annual quiz night
The quiz evenings are aimed at encouraging first year and other undergraduate physics students to follow physics subjects in the field of optics and photonics. Previous quiz evenings were a major success, so another quiz evening is planned for 2019. The funding for these events was donated by the OSA, as well as SPIE grants.

4.5. Outreach (September 2019)
In 2019 the physics department is planning another annual physics outreach road trip. Although this year we focused on more locally based schools, in the past it has been a successful tradition to extend our outreach to schools further from us in Stellenbosch. In the past, trips to the Garden Route (2x), West Coast (3x), Overberg and Namibia were made. The precise route that we want to visit during our 2019 version of the road trip is still to be determined. Possible costs for this road trip will be vehicle rental, petrol expenses, maintenance of demonstration equipment, and accommodation/food expenditures.

In 2017 and 2018 the chapter applied for the Outreach education grant from the SPIE to help us fund the road trip. This was unfortunately unsuccessful, but we are planning on applying again for the grant in 2019.

4.6. Pre-postgraduate session (second semester)
The social evening with the final year undergraduate students was a great opportunity for them to discuss postgraduate questions with our chapter members. We are planning to host another similar evening later in the year of 2019 for the postgraduate members to encourage undergraduates who are graduating in December to continue their studies in laser physics. Costs for this will include food and drinks again.

4.7. Industry event
We are planning to have guest speakers from industry talk to the students. The aim of this is for students to be exposed to information about what it is like to work in industry after completing a degree in physics (optics). Students have the opportunity to ask questions and interact with the speakers afterwards over light refreshments.
4.8. Local outreach school trips
Apart from the road trip, we also plan to do more local school (day) trips as in the past for outreach activities. The aim is to raise awareness of laser physics in South Africa and to encourage future science students to consider optics and photonics as a potential subject. A physics demonstration show will be performed for high school students (varying from grade 9 to 12), with specific emphasis on considering physics as your field of study or as a career. The vehicle rental and petrol costs for this outreach were covered by funds from SPIE and OSA. Various demonstrations, as described in section 3 were performed during a 1 hour show.

4.9. Labview training
It was found that there is a need for training in scientific skills, such as using Labview, amongst students. With the department of physics, Labview training sessions have been organized to teach students how to use Labview. These sessions will cover topics ranging from basics (for those who have never used Labview before) to more advanced sessions with examples.

4.10. Conference representation (SPIE officer travel grant 2019)
We plan to send one of our chapter officers to a SPIE conference in 2019 to represent our student chapter and attend the leadership workshop and student chapter meeting. This will make use of the current SPIE Chapter Officer Travel Grant available.

4.11. Visiting lecturer
In 2018 the chapter used their visiting lecturer grant to invite Alaina G. Levine. Due to the success of her visit (and other visiting lecturers before her), and how well it was received by the students we are already thinking of possible lecturers to invite on the visiting travel grant in 2019.
5. Financial information (2019)

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<th>Description</th>
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<td>2018-03-12</td>
<td>Beverages and pizza for opening function</td>
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<td>Vouchers for quiz evening (prizes)</td>
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Overview

Total funds spent in 2018: ZAR 11 577.45
Received from SPIE as activity grant for spending in 2018: ZAR 11 247.66

*Other sources of funding include the OSA as well as the Stellenbosch University Physics department.

Funding for 2019

We will apply for the SPIE activity grant and OSA grants again to cover costs for the activities planned for in 2019.