Exoplanet discoveries and advances in exoplanet detection and characterization technologies have fueled great interest in the scientific community and the general public. Precision radial velocity and microlensing programs from ground-based telescopes have discovered hundreds of exoplanets in systems similar to and vastly different from our own solar system, including a potentially habitable planet orbiting Proxima Centauri. The Kepler, CoRoT, and TESS missions have added thousands of new planets, including terrestrial planets in the habitable zone, using precise transit measurements. New missions, such as CHEOPS, and the future extremely large telescopes (ELTs) and James Webb Space Telescope (JWST) will characterize the bulk compositions and atmospheres of many of these known planets. GAIA’s catalogs of high-precision stellar positions promise orbital solutions identifying many new planets. Significant investments in ground and space-based exoplanet imaging and characterization technologies have resulted in great progress toward the ultimate goal of characterizing exoplanet systems containing terrestrial planets. The first dedicated ExAO coronagraph systems (GPI, SPHERE, SCExAO) have become operational on large telescopes paving the way for similar instruments on the ELTs, which are expected to measure significant numbers of spectra of giant planets. These results will inform the required scale, duration, and agility of future planet imaging and characterization missions.

In the past decade we have seen amazing progress in direct detection technologies for both imaging and high-resolution spectroscopy techniques. The first direct spectra of giant planets with the GRAVITY interferometer has demonstrated tremendous promise for multi-aperture interferometric techniques. Laboratory demonstrations of coronagraphs have achieved \(-5\sigma\) contrast in broad-band visible light, at small working angles. These technologies are within striking distance of the required \(-10\sigma\) contrast to observe exo-earths. The Roman Space Telescope coronagraph is under development and has demonstrated the ability to control dynamic aberrations using onboard wavefront sensors. Major advances have been made in the design of coronagraphs for large, segmented aperture telescopes. Starshade petals, trusses, and optical shields have been built and deployed to tolerate consistent with exo-earth detection. A starshade for the Roman Space Telescope that would join the telescope on orbit late in the next decade is under study.

Significant progress has been made in models of exoplanet instruments to predict science performance and aid in the design of future space missions and ground observatories. Full end-to-end models like AYO and EXOSIMS simulate direct imaging space-based missions while ground based end-to-end models simulate extreme precision radial velocity cadences and observing scenarios. Instrument models, ranging from radiometric performance to observation sequencing, are necessary to find the most efficient observational approaches and instrument designs.

This session seeks papers that describe progress in planet detection technologies and methodologies. While direct imaging has been emphasized in this summary, papers are encouraged in indirect techniques that will lead to a better understanding of planetary systems.

Papers are solicited in, but are not limited to, topics such as:
- radial velocity measurements
- transit measurements
- gravitational microlensing
- astrometric measurements
- coronagraphic or interferometric systems
- starshades
- starlight-suppression techniques
- observational approaches including high-resolution spectroscopy
- high-contrast estimation and wavefront control
- high-contrast imaging with adaptive optics
- image-processing techniques for extracting images and spectra (i.e. post-processing)
- exoplanet characterization instrumentation including polarimetry
- spectroscopy of exoplanets
- mission concepts and design reference mission studies
- instrument performance models including SNR studies and error budgets
- techniques for detection of circumstellar dust.

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