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Full Name (First Last)	Presentation Authors	Presentation Type	Presentation Title	Presentation Abstract
Lyu Abe	Abe L., Guyon O., Tamura M., Enya K., Tanaka S., Matsuo T.	Talk	Status of PIAA-related experiments and projects	The Phase-Induce Amplitude Apodization (PIAA) Coronagraph is a promising technique for both ground-based and space-based high contrast imaging. PIAA coronagraphy offers very high throughput, full angular resolution and 1 to 2 lambda/D IWA depending on the contrast goal. Several studies and laboratory experi-ments are currently being conducted for PIAA coronagraphy in space (SPICA, TOPS & TPF-C missions) and ground-based projects. An Extreme-AO upgrade of the HiCIAO instrument for Subaru Telescope is cur-rently being developed and includes a PIAA coronagraph.
Roger Angel	Roger Angel, Tae Kang and Brian Cuerden, Steward Observatory, Philip Stahl, MSFC, Olivier Guyon, Subaru, Domenick Tenerelli, Lockheed Martin	Talk	Thermally actuated primary mirror for space exoplanet imaging with TOPS	The Telescope to Observe Planetary systems (TOPS) will use an off-axis parabolic primary mirror and a PIAA coronagraph. A prototype demonstrator is planned with an advanced PIAA and a meter-class spherical mirror in place of the unobscured primary, allowing a simple but full system test to the 10^-10 contrast level needed to detect Earth-like planets. The primary will incorporate thermal actuation to correct low order modes, and a small MEMS mirror will be used for wavefront correction in the reformatted Gaussian pupil. The primary will be of standard lightweight honeycomb design and figured to high accuracy, but made of a ULE variant with very low but finite thermal expansion. Residual low order errors will be sensed on-orbit and nulled out by slightly varying the temperature of the back faceplate and individual rib elements. Radiative coupling to heated and cooled fingers in each cell will be used to for thermal control with no mechanical contact or stress. Preliminary analysis shows that Zernike modes up to the number of honeycomb cells should be correctable to better than 90% fidelity. Interferometric measurements of a honeycomb test mirror of borosilicate glass show a single cell influence function with 300 nm stroke and ~5 minute time constant.
Pierre Baudoz	P. Baudoz, A. Boccaletti, D. Rouan	Talk	Multiple-Stage Four Quadrant Phase Mask Coronagraph	A renew of interest into Lyot coronagraphy started about 10 years when concepts of improved stellar coronagraphs were proposed and studied theoretically. Among them, one of the most prolific coronagraph is the Four Quadrant Phase Mask (FQPM) proposed by Rouan et al. in 2000. It has been tested not only in the lab like a lot of other context but it has been installed on a ground-based telescope (Boccaletti et al. 2004) in combination with Adaptive Optics system and has already provided scientific results (Gratadour et al. 2005, Riaud et al. 2006). The main limitation of the FQPM, as all phase mask coronagraph, is the chromaticity of the mask dephasing. Here we propose to use a combination of chromatic FQPM in cascade to achromatize the overall dephasing of the coronagraph. First, we will present a theoretical study of the achromatization using this Multiple-

				Stage FQPM. Then, preliminary tests of this concept will be shown.
Ruslan Belikov	Ruslan Belikov, Amir Give'on, Laurent Pueyo, Jeremy Kasdin, Kunjithapatham Balasubramanian, Brian Kern, Andy Kuhnert, Stuart Shaklan, John Trauger	Talk	Laboratory Results in High Contrast Imaging with the Shaped Pupil Coronagraph	Direct imaging of extrasolar planets, and terrestrial planets in particular, is an exciting but difficult problem requiring a telescope imaging system with unprecedented levels of contrast. One promising design is the Shaped Pupil Coronagraph (SPC), pioneered by our lab at Princeton. The SPC was designed to achieve 10^10 contrast at an inner working angle of 4 lamdba/D, based on the requirements of NASA's space-based Terrestrial Planet Finder Coronagraph (TPF-C) mission. However, it has long been recognized that a key problem in achieving these requirements in practice is estimation and control of telescope aberrations in broadband light. Furthermore, it is crucial to control these aberrations as fast as possible because of finite mission lifetime as well as due to the dynmic nature of some aberrations. In this paper, we summarize the most recent experimental results of wavefront control in monochromatic as well as broadband light on the testbeds at Princeton and JPL, as well as describe the experimental techniques and the algorithms used. In particular, we describe the sources of contrast limiting factors we encountered and methods used to overcome them, which in turn defines the requirements for the hardware and algorithm performance. We also demonstrate a detection of synthetic planets and exo-zodiacal light on the testbed.
Jean-Luc Beuzit	J.-L. Beuzit, M. Feldt, K. Dohlen, D. Mouillet, P. Puget, J. Antici, P. Baudoz, A. Boccaletti, M. Carbillet, J. Charton, R. Claudi, T. Fusco, R. Gratton, T. Henning, N. Hubin, F. Joos, M. Kasper, M. Langlois, C. Moutou, J. Pragt, P. Rabou, M. Saisse, H. M. Schmid, M. Turatto, S. Udry, F. Vakili, R. Waters, F. Wildi	Talk	SPHERE: A Planet Finder instrument for the VLT	Direct detection and spectral characterization of extra-solar planets is one of the most exciting but also one of the most challenging areas in modern astronomy. For its second generation instrumentation on the VLT, ESO has supported two phase A studies for a so-called Planet Finder dedicated instrument. Based on the results of these two studies, a unique instrument, SPHERE, is now considered for first light in 2010, including a powerful extreme adaptive optics system (SAXO), various coronagraphs, an infrared differential imaging camera (IRDIS), an infrared integral field spectrograph (IFS) and a visible differential polarimeter (ZIMPOL). We will briefly summarize the science objectives, describe the proposed conceptual design and discuss the main limitations and corresponding instrumental issues of such a system. We will also derive the expected performance of the proposed instrument.
				We present the results of a survey of young (<=300 Myr), close (<=50 pc) stars with the Simultaneous Differential Imager (SDI) implemented at the VLT and the MMT for the direct detection of extrasolar planets. Our SDI devices use a double Wollaston prism and a quad filter to take images simultaneously at 3 wavelengths surrounding the 1.62 um methane absorption bandhead found in the spectrum of cool brown dwarfs and gas giant planets. By performing a difference of adaptive optics corrected images in these filters, speckle noise from the primary star can be significantly attenuated, resulting in photon (and flat-field) noise limited data. In our VLT data, we achieved H band contrasts >= 10 mag (5sigma) at a

Beth Biller	B.A. Biller, L. Close, E. Nielsen, E. Masciadri, R. Lenzen, W. Brandner, D. McCarthy, T. Henning, M. Hartung, K. Stapelfeldt, J. Trauger	Talk	An Imaging Survey for Extrasolar Planets around 54 Close, Young Stars with SDI at the VLT and MMT	separation of 0.5 from the primary star on 45% of our targets and H band contrasts of <= 9 mag at a separation of 0.5" on 80% of our targets. With this degree of attenuation, we should be able to image (5sigma detection) a 5 MJup planet 15 AU from a 70 Myr K1 star at 15 pc. We have obtained datasets for 54 stars. 45 stars were observed in the southern sky at the VLT and 11 stars were observed in the northern sky at the MMT (2 stars were observed at both telescopes). We believe that our SDI images are the highest contrast astronomical images ever made from ground or space for methane rich companions. We detected no tentative candidates with S/N > 2 sigma. Followup observations were conducted on 8 <2sigma candidates (with separations of 3 - 15.5 AU and masses of 2-10 MJup, had they been real) -- none of which were detected at a second epoch. For the best 20 of our survey stars, we attained 50% completeness for 6-10 MJup planets at semi-major axes of 20-40 AU. Thus, our completeness levels are sufficient to significantly test theoretical planet distributions. From our survey null result, we can rule out (at the 98.8% confidence/2.25 sigma level) a model planet population using a planet distribution where N(a) $\propto$ constant out to a distance of 45 AU (further model assumptions discussed within). We also discuss preliminary results of an experiment at the High Contrast Imaging Testbed at JPL using a similar SDI multiwavelength differential imaging scheme bracketing the Oxygen (A) telluric absorption feature at 0.762 um.
Anthony Boccaletti	Boccaletti A., Baudrand J., Baudoz P., Riaud P.	Talk	Coronagraphic Differential Imaging at VLT/NACO	Although several projects are ongoing to build instruments dedicated to the direct detection of extrasolar giant planets, current telescopes and instruments are still of interest to develop and test advanced technics which will be eventually used on planet finder instruments. In 2003, a Four Quadrant Phase Mask (4QPM) was installed in NACO at the VLT. Commissioning has proven the performance of this system which is obviously limited by the level of AO correction. However, interesting results were obtained on circumstellar disks (Riaud et al. 2006, Boccaletti et al. 2007, in preparation) as on Active Galactic Nuclei (Gratadour et al. 2005). After a brief reminder of these results we will introduce the new concept of 4QPM implemented in February 2007 on NACO and designed to be operated in combination with the NACO SDI (Simultaneous Differential Imaging) system. Commissioning data obtained with an artificial source and natural stars will be presented as potentially interesting results on AB Dor C.
Anthony Boccaletti	Boccaletti A., Riaud P., Baudrand J., Daban J.B., Douet R., Dohlen K., Mouillet D.	Poster	Development of Coronagraphs for exoplanet detection with SPHERE	SPHERE (SpectroPolarimetric High contrast Exoplanet REsearch) is a 2nd generation ESO instrument for the VLT for which the prime goal is the detection and characterization of extrasolar giant planets in the visible and the near IR (first light foreseen in mid-2010). For achieving high contrast with an 8-m telescope corrected with extreme AO, specific systems are required to suppress the starlight and to calibrate the halo of quasi-static speckles. In SPHERE, this task is achieved with a combination of coronagraphy and differential imaging. We will review the requirements for coronagraphy in SPHERE and

				discuss the instrumental solutions we are investigating. The operation of SPHERE in survey mode implies the simultaneous use of 2 instruments fed by the same coronagraphic device and covering the spectral range 0.95-1.8microns. This is putting important constraints on the chromatic behavior of the coronagraph. We will present first results of our experiments and compare it with estimated performance.
Xavier Bonfils	X. Delfosse, T. Forveille, M. Mayor, S. Udry	Talk	Gliese 581 : a system with 3 very low-mass planets	Gliese 581 is a planetary system known to host at least three planets, one hot Neptune (16 Mearth), and two super-Earth (5 & 8 Mearth). The 5 Mearth planet resides in the warm edge of the habitable zone of the star and is thus the known exoplanet which most resemble our own Earth. The 8 Mearth orbits Gl581 at 0.25 AU and closes the cold edge of the habitable zone. I will describe the detection and properties of these planets, how they strengthens some already known statistical properties and how they mesh up with planetary formation theory.
Eric Cady	Eric Cady, Robert Vanderbei, N. Jeremy Kasdin	Talk	Optimal design and tolerancing of occulters for finding Earth-like planets	One proposed design for directly detecting extrasolar planets is a occulter, a spacecraft that would fly between a telescope and a target star, blocking the light from the star. Diffraction effects require the occulter to be shaped to prevent the formation of Poisson's spot; these shapes can be adjusted to create a dark shadow at the telescope, effectively removing virtually all of the starlight. This shadow is wavelength-dependent and sensitive to errors in shape and alignment. Recently, we developed shapes that allow the planet to be seen, even at small angular separation. We present a method of optimization to find designs that give desired performance over a spectral band, and discuss the interrelationship with tolerancing in control and manufacturing.
Alexis Carlotti	A. Carlotti, G. Ricort, C. Aime, Y.E. Azhari, R. Soummer	Talk	Apodized apertures using a Mach-Zehnder interferometer. Laboratory results.	A Mach-Zehnder interferometer can be used to obtain an apodized aperture for stellar coronagraphic applications. The image of the telescope entrance aperture is formed inside the two arms of the interferometer and additional opposite phase screens are placed there. Two complementary beams leave the Mach-Zehnder, corresponding to an apodized and an anti-apodized virtual apertures. We aim to use adequate phase screens to obtain apodizations in the form of prolate spheroidal functions. To date, we have obtained a one-dimensional cos(x) apodization by tilting the mirrors of the interferometer and a circular symmetric cos(x^2+y^2) apodization using as phase screens a divergent and a convergent lens of opposite powers. This method presents several advantages. No light is lost in the process of apodization. The chromatic effect induced by the interferometric process may be used to compensate for the chromaticity of coronagraphs. We will present at the conference the laboratory results obtained in monochromatic and white lights, that are in excellent agreement with theoretical predictions.
				We present the project of a new solar coronagraph that makes it possible to observe the solar corona very close to the solar limb, without using Lyot's mask and stop technique. The high dynamic

Alexis Carlotti	C. Aime, J. Arnaud, A. Carlotti, M. Faurobert, A. Ferrari, C. Grec and G. Ricort	Poster	The Prolate Apodized Solar Coronagraph	capability is obtained using a strongly apodized aperture. A good choice for the aperture transmission is the generalized prolate spheroidal function of prolateness coefficient c on the order of 10. Such an instrument operated in space, could reduce the diffraction halo produced by the Sun by a factor 100 000, at the cost of an intensity throughput of 10 %. The classical resolution, in terms of equivalent width of the PSF, is reduced by a factor of about 1.7 while the MTF of the telescope becomes similar to a Gaussian function with unchanged cut-off frequency D/lambda. The telescope design is an unobstructed circular aperture and the variable transmission produced directly at the entrance window. This concept, although demanding in terms of mechanical and optical achievements, is preferred to the more classical re-imaging of a clear aperture and subsequent apodisation, for image quality concerns. It does not need a wide field telescope and may take advantage of adaptive optics for ground based observations. It is expected that such a system should give much better images than the classical Lyot coronagraph very close to the solar limb. Such observations should give access to coronal heating processes expected to occur close to the solar surface, and provide information on Coronal Mass Ejections mechanisms at work in the very low corona.
Joseph Carson	Joe Carson	Talk	A Database of Companion Search Non-Detections for Nearby Stars	We describe here an ongoing effort to create a database of images and quantitative non-detection upper limits for companions to nearby stars, based on high contrast imaging data acquired by ground and space observatories. A compilation of such data, with sensitivity curves calculated in a consistent manner, is important for the preparation of target lists for the next generation of high-contrast surveys. It also will open an opportunity for a wide range of archival studies. We have recently developed simple data analysis routines to generate point source sensitivity curves from datasets collected with a range of observing facilities. We are in the process of soliciting the astronomy community to help test these routines, and subsequently use them to submit their non-detection upper limits to the NASA Star and Exoplanet Database (http://nsted.ipac.caltech.edu). Example data products will be discussed.
Joseph Carson	Babar Ali, John Stauffer, Joe Carson	Poster	The NASA Star and Exoplanet Database (NStED)	The NASA Star and Exoplanet Database (NStED) is an archive and search facility for data on a variety of published measurements of positions, kinematics, photometry, multiplicity, activity, other fundamental stellar properties, and datum of interest to the stellar astronomy, and the planet finding community in particular. The initial population of stars is currently the Hipparcos catalog but will soon expand to include the entire Tycho-2 catalog supplemented with Kepler and CoRoT catalogs. This base is merged with data taken from other published catalogs (e.g. 2MASS, etc.), tabular data from published papers, as well as images, spectra and transit light curve data. NStED allows users to fully trace the data to the original publication and provides an option to view the 'as published' value of the datum. There are currently 140,230 stars in NStED.

Webster Cash		Talk	External Occulters for Direct Exoplanet Studies	An External Occulter, flying in formation with a conventional telescope can provide an unobstructed view of the planets around nearby stars. A recent breakthrough in the apodization of the Fresnel equation allows occulters of practical size and distance to be built and cleanly reaveal Earth-like planets at distances in excess of 10 parsecs.
Celine Cavarroc	Cavarroc C., Boccaletti A., Meixner M., Baudoz P.	Poster	Centering procedures with the coronagraphs of MIRI	MIRI is a mid IR instrument of the JWST equipped with four coronagraphs. Three of them are 'Four Quadrant Phase Masks' providing small Inner Working Angle well suited to mid IR wavelengths. The problem of pointing with a coronagraph is critical because of the non linearity of the component and usually the need to match the diffraction of the star with that of a calibration star. I will first present the capabilities of detection of MIRI coronagraphs and their sensitivity to the pointing errors. Once these constraints set, I will study which centering algorithm is robust and accurate enough to satisfy them and will propose an observational strategy.
Gael Chauvin		Talk	Direct Imaging Detection of Planets and Brown Dwarfs	With the development of high contrast imaging techniques and infrared detectors, vast efforts have been devoted during the past decade to detect and characterize lighter, cooler and closer companions to nearby stars, and ultimately image new planetary systems. Complementary to other observing techniques (radial velocity, transit, micro-lensing, pulsar-timing), this approach has opened a new astrophysical window to study the physical properties and the formation mechanisms of brown dwarfs and planets. In this talk, I will briefly present the observing challenge and needs associated to the direct imaging of faint companions to bright stars. I will review the different observing techniques and strategies used from space and ground-telescopes and the main samples of nearby stars selected to conduct these deep imaging surveys. I will summarize the main results obtained sofar about the detection of substellar companions down to the planetary mass regime, the characterization of their physical properties and of their cool atmospheres as well as the current detection performances obtained in terms of mass and physical separation. Finally, with the next generation instruments, hundreds of exo-planets are expected to be imaged around 2010. In complement to other techniques, the increased number of direct imaging detection will enable comprehensive studies of the exo-planets statistical properties to strongly improve our understanding of their formation and evolution, their relation to disks and brown dwarfs companions and, ultimately, their chemical composition and internal structure.
	C. H. Chen, A. Li, C. Bohac, K. H.			We have obtained Spitzer IRS 5.5-35 micron spectroscopy of the debris disk around beta Pictoris. In addition to the 10 micron silicate emission feature originally observed from the ground, we also detect the crystalline silicate emission bands at 28 micron and 33.5 micron. This is the first time that the silicate bands at wavelengths longer than 10 micron have ever been seen in the beta Pictoris disk. The observed dust emission is well reproduced by a dust model

Christine Chen	Kim, D. M. Watson, J. van Cleve, J. Houck, K. Stapelfeldt, M. W. Werner, G. Rieke, K. Su, M. Marengo, D. Backman, C. Beichman, and G. Fazio	Talk	The Dust and Gas Around beta Pictoris	consisting of fluffy cometary and crystalline olivine aggregates. We searched for line emission from molecular hydrogen and atomic S I, Fe II, and Si II gas but detected none. We place a 3 sigma upper limit of <17 Earth masses on the molecular hydrogen S(1) gas mass, assuming an excitation temperature of Tex = 100 K. This suggests that there is less gas in this system than is required to form the envelope of Jupiter. We hypothesize that the atomic Na I gas observed in Keplerian rotation around beta Pictoris may be produced by photon-stimulated desorption from circumstellar dust grains.
Mark Clampin		Talk	Extrasolar Planetary Imaging Coronagraph	The Extrasolar Planetary Imaging Coronagraph (EPIC) is a proposed NASA Discovery mission to image and characterize extrasolar giant planets in orbits with semi-major axes between 2 and 10 AU. EPIC will provide insights into the physical nature of a variety of planets in other solar systems complimenting radial velocity (RV) and astrometric planet searches. It will detect and characterize the atmospheres of planets identified by radial velocity surveys, determine orbital inclinations and masses, characterize the atmospheres around A and F type stars which cannot be found with RV techniques, and observe the inner spatial structure and colors of debris disks. The robust mission design is simple and flexible ensuring mission success while minimizing cost and risk. The science payload consists of a heritage optical telescope assembly (OTA), and visible nulling coronagraph (VNC) instrument.
Mark Clampin		Poster	Optical Design of the James Webb Space Telescope (JWST)	The James Webb Space Telescope is a 6.5 meter aperture, segmented mirror space telescope scheduled for launch in 2013. The project is a partnership between NASA, ESA and CSA. This paper will provide an overview of the current JWST architecture and mission status including technology developments and risks. We will discuss the optical performance and specification for the telescope in order to provide a context for the discussion of NIRCam, FGS and MIRI coronagraphs.
Laird Close		Talk	Detection of Planetary Mass Objects with Laser Guide Star Adaptive Optics	I will present new detections of very low mass objects at the planetary mass range detected with Laser Guide Star Adaptive Optics at the Keck Observatory. I will also discuss how LGS AO systems may be able to image rocky planets. An update of our LGS AO survey for extrasolar planets will be given.
Johanan Codona		Talk	Phase Apodization Coronagraphy	Apodization of a telescope PSF by applying a phase profile across the pupil has been proven in the lab and on the sky at the MMT. A great advantage to using phase apodization is that a coronagraph capability can be provided within an instrument with only a phase plate included in a pupil filter wheel, without the need for a Lyot stop or special stabilization of the image on a focal plane mask. The phase masks used up until now have been based on either ad hoc designs or iterative approaches based on simple notions of anti-speckle steering. The iterative design algorithms are related to closed loop halo suppression algorithms with inherent limitations that eventually limit the suppression and may unnecessarily reduce the Strehl ratio and core

				encircled energy. This paper presents a new algorithm for designing apodizing phase plates which has much better control of the dark search region in the focal plane, with closer inner working angles, deeper halo suppression, and better control of the PSF core and Strehl ratio. The limits of suppression depth, inner working angle, Strehl ratio vs. suppressed halo power, and chromatic limitations are presented.
Vincent Coude du Foresto	V. Coude du Foresto (LESIA-Obs.Paris); O. Absil (LAOG-Grenoble Univ.); M. Barillot (Alcatel Alenia Space); M. Swain (JPL)	Poster	Prospects for nulling interferometry from Antarctica	The high Antarctic plateau is a very unique environment whose main characteristics make it a premier site for high angular resolution, high dynamic range observations at infrared wavelengths. This is due to a combination of cold temperatures (low emissivity), dry air (infrared transparency), and a night time atmospheric turbulence which is concentrated in the first ~30m near the ground (which results in a large isoplanetic angle). Above that turbulent layer (a location that can be reached either by support structures or tethered balloons), the free air seeing is both exceptionnally benign and slow. There, simulations show that a small dedicated interferometer (two 1m-class telescopes) equipped with a nuller instrument performs better than the same instrument behind 8m-class telescopes on a temperate site. It can characterize the distribution of dust emission around nearby main sequence stars, a necessary precursor science for Darwin and TPF-I. The nature of the site, intermediate between ground and space both in potential and technical challenge, adds particular relevance to the demonstration of nulling for a space mission.
Justin Crepp	Justin Crepp (University of Florida); Joseph Carson (JPL); Eugene Serabyn (JPL); Kent Wallace (JPL); Jian Ge (University of Florida); Ivan Kravchenko (University of Florida); Andrew Vanden Heuvel (University of Florida)	Poster	High-Contrast Imaging of Visual Binary Stars	We have built a band-limited image mask for the PHARO near-IR instrument at the Hale 200 telescope at Palomar. This technology is coupled to an off-axis optical configuration that can deliver K-band Strehl ratios as high as 94%. Due to the linear geometry of the coronagraphic mask, we have the ability to observe visual binary stars. We present here our predicted performance and preliminary results.
John Debes	J. H. Debes, A. J. Weinberger, G. Schneider	Talk	Red, Grey, or Blue? The Colors of Nearby Circumstellar Disks	High contrast imaging of nearby circumstellar dust disks around young stars can in prinicple reveal much about the composition and properties of the dust that reflects the central star's light, testing theories of planet formation and evolution with observable constraints. In practice, knowledge of the dust has been hampered by the challenging nature of the observations and the small number of wavelengths imaged. We present a combination of new HST NICMOS photometry of three nearby disks that may be in the process of forming planets with archival data. We produce the first reflectance spectra from the visible to the near-IR for these disks.
Emmanuel Di	Di Folco, Absil, Augereau, Coude du	Talk	The faint hot component of debris	Very few main-sequence stars exhibit warm dust in their 5-10AU close environment, where terrestrial planets are expected to have formed. Near-infrared interferometry is a powerful means, combining high dynamic range and high spatial resolution, to directly detect faint emission from hot grains in exozodiacal clouds. We will review the results of our search for 2micron excesses around Vega-like stars, including the nearby Sun-like stars Tau Ceti and Epsilon Eridani, with the

Folco	Foresto	Talk	disks revealed by infrared interferometry	FLUOR interferometric instrument and the CHARA Array of telescopes. Our recent detections, combined with Spitzer observations around 10micron, put strong constrains on the properties and distribution of hot grains in these inner planetary systems. We will present the conclusions of our preliminary modeling for the detected hot grains as well as their implication for the selection of targets for future planet finding missions like DARWIN or TPF.
Keigo Enya	Keigo ENYA, Lyu ABE, Shinichiro TANAKA, Takao NAKAGAWA, Motohide TAMURA, Hirokazu KATAZA, Olivier GUYON, and the SPICA Working Group	Talk	The SPICA Coronagraph Project	We present the coronagraph project for the 3.5m SPace Infrared telescope for Cosmology and Astrophysics (SPICA) space telescope which is schedule for launch around year 2015 by the Japanese HII-A rocket. This actively cooled (4.5 K), single aperture telescope will operate in the mid and far infrared spectral regions, and up to submillimetric wavelengths (200 microns). The lowest spectral region (5 to 20 microns), where the spatial resolution is the most favorable, will be dedicated to high contrast imaging with coronagraphy. In this contribution, we summarize the scientific goals, show our progresses in high-contrast imaging laboratory experiments, and study results from other expected coronagraph candidates such as the PIAA.
Jay Farihi	Farihi, Song, Schneider, Zuckerman, Macintosh, Lowrance, Becklin, Bessell	Talk	An HST/Nicmos Coronagraphic Search for Planetary Mass Companions to Nearby Young Stars	We have carried out a search of 109 nearby young stars with HST/NICMOS. Camera 2 coronagraphic observations with the F160W (H-band) filter, utilizing the roll subtraction technique to remove the science target point spread function, provide companion sensitivity below the deuterium burning limit for nearly all targets at separations as close as $0."7$ from the center of the coronagraph. This talk will present a status report, current statistics, and the overall sensitivity achieved by this space-based coronagraphic survey.
Erin Ford	Grover Swartzlander, Laird Close, Erin Ford, Rukiah Abdul-Malik, Joshua Kim, Mary Anne Peters	Talk	Optical Vortex Coronagraph	The optical vortex coronagraph is a promising scheme for achieving high contrast low loss imaging of exoplanets as close as 2 lambda/D from the parent star. Laboratory and observatory demonstration of this device will be described, along with results from a numerical model.
Jonathan Fortney		Talk	Extreme Planetary Atmospheres: Modeling Hot Jupiters	In this talk I will discuss model visible and infrared spectra of the highly irradiated giant planets often known as hot Jupiters. I will discuss successes and failures of 1D and 3D models compared to the variety of exciting data obtained from Spitzer and other telescopes. The high planetary temperatures (~1000-2000 K), along with previous albedo upper limits is the optical, imply that these atmospheres likely absorb 90+% of the light incident upon them. This was expected, due to broad absorption by neutral atomic alkalis, which are stable at these temperatures. I will make connections to planets at wider orbital separations, which are the targets of current and future imaging projects.
	Fukagawa, M. (Nagoya University), Itoh, Y., Oasa, Y. (Kobe University), Kudo, T. (Graduate University for		Near-Infrared Images	The unique morphology in the disk around the Herbig Ae star HD 142527 has been found by the near-infrared, mid-infrared, and submillimeter observations. In order to further study the disk property, we conducted polarimetric observations of HD 142527 in J, H, and K bands using coronagraphy. The disk consisting of two arcs is strongly polarized. The polarization level is higher

Misato Fukagawa	Advanced Studies), Fujiwara, H. (University of Tokyo), Tamura, M., Hayashi, M., Hayashi, S. (Subaru Telescope)	Poster	of the Disk around HD 142527	for the fainter eastern arc (up to about 50%) than the western arc, which supports the suggestion by the previous studies that a geometrically thick disk is inclined along the east-west direction. Images were also obtained in L' band, and the two arcs were detected without a significant color (K â€“ Lâ €™) difference between the eastern and western sides. We present the images and discuss dust property in the disk.
Raphael Galicher	R. Galicher; P. Baudoz; G. Rousset	Talk	Principle, simulations and performances of the Self-Coherent Camera	In the context of extrasolar planet, a lot of technical solutions have been proposed to remove the stellar light. However, these solutions are limited by the phase errors of the incoming beam. Correction or calibration of the wavefront are then necessary to overcome this limitation. We will present the principle and simulations of a new imaging method used to calibrate and remove all the residual speckles introduced by wavefront errors. This technique called a Self-Coherent Camera (SCC, Baudoz et al. 2006) is a new type of simultaneous differential imaging technique based on the incoherence between the star and its companion lights. The residual speckles are encoded in the recorded image using interference fringes. A dedicated data processing removes the residual speckles from the image. Firstly, we will explain how the SCC can solve the quasi-static speckles limitation. Secondly, we will expose the simulated SCC performance using current optic adaptative and telescope specifications. Finally, we will analyze the performance that can be reached associating the SCC and a coronagraph.
Amir Give'on	A. Give'on, S. Shaklan, B. Kern	Talk	Electric field conjugation-based wavefront correction algorithm for high contrast imaging systems - experimental results	High contrast imaging from space must overcome photon noise of the diffracted star light and scattered light from optical components defects. The very high contrast required (up to 10^â^'10 for terrestrial planets) puts severe requirements on the wavefront control system, as the achievable contrast is limited by the quality of the wavefront. This paper presents the results obtained on the High Contrast Imaging Testbed (HCIT) using a band limited Lyot coronagraph, at the Jet Propulsion Laboratory, operating at 2% bandwidth, using a general closed loop correction algorithm for high contrast imagining coronagraphs by conjugating the electric field in a predefined region in the image where terrestrial planets would be found. The estimation part of the algorithm reconstructs the complex field in the image plane using phase diversity caused by the deformable mirror. This method is compared to speckle nulling to analyze performance.
David Golimowski	David Golimowski (JHU), John Krist (JPL), Christine Chen (NOAO), Karl Stapelfeldt (JPL), David Ardila (IPAC/SSC), Mark Clampin (NASA/GSFC), Glenn Schneider (U. of Arizona), Murray Silverstone (U. of Arizona), Holland Ford (JHU), and	Poster	Observations and Models of the Debris Disk around the K dwarf HD 92945	HD 92945 is a young (~100 Myr), nearby (~22 pc) K1V star from which IRAS and Spitzer detected excess infrared emission consistent with the presence cold (~40 K) circumstellar dust. Coronagraphic V- and I-band images obtained in 2004 and 2005 with HST's Advanced Camera for Surveys reveal scattered light from a moderately inclined disk extending to ~8 from the star. The disk has a strikingly uniform morphology with a shallow surface brightness profile within ~5.5 from the star. Beyond this distance, the surface brightness drops precipitously. The disk's V-I color appears neutral. Coronagraphic images with HST's NICMOS show no scattered light above the

	Arizona), Holland Ford (JHU), and Garth Illingworth (Lick Observatory)			residuals of the subtracted wings of the occulted star, which confirms that the disk is not red like those observed around earlier type stars. We present results of models of the scattered-light ACS images and the infrared spectral energy distribution of the disk derived from unresolved images obtained with the Multiband Imaging Photometer for Spitzer (MIPS) and the CSO SHARC-II camera.
Carol Grady	Grady, Schneider, Woodgate, Wisniewski, Brittain, Sitko, Collins	Talk	The Evolution of Protoplantary Disks: A Decade of HST Coronagraphy	We review results of coronagraphic imaging of protoplanetary disks associated with Herbig Ae and Classical T Tauri stars with HST STIS and NICMOS in the context of multi-wavelength surveys for accretion activity.
Olivier Guyon		Talk	The coronagraph tree of life	Stellar Coronagraphy has been an extremely active field in the last 10 to 15 years, with many new concepts having being suggested for direct imaging of exoplanets/disks from either ground-based or space telescopes. I will briefly review these concepts and show they can be grouped in wider families. I will also show that the theory behind coronagraphy is now well understood: fundamental physics allows us to set quantitative limits on how coronagraphy can help us image exoplanets, and what technical challenges need to be overcome.
Olivier Guyon	O. Guyon, J.R.P. Angel, C. Bowers, J. Burge, A. Burrows, J.L. Codona, T. Greene, M. Iye, J. Kasting, H. Martin, D. McCarthy, V. Meadows, M. Meyer, E.A. Pluzhnik, N. Sleep, T. Spears, M. Tamura, D. Tenerelli, R. Vanderbei, B. Woodgate, R.A. Woodruff, N. Woolf	Talk	Direct imaging of nearby exoplanets with a small size space telescope: Telescope to Observe Planetary System (TOPS)	The Telescope to Observe Planetary Systems (TOPS) is a proposed space mission to image in the visible (0.4-0.9 micron) planetary systems of nearby stars and provide low resolution spectrophotometry with a small size telescope (2m or less). TOPS incorporates a highly efficient Phase-Induced Amplitude Apodization (PIAA) coronagraph, high accuracy wavefront control techniques and a thermally actuated primary mirror. TOPS can detect planets within 2 lambda/d with nearly 100% throughput and preserves the full angular resolution of the telescope. An ongoing laboratory experiment has successfully demonstrated high contrast coronagraphic imaging within 2 lambda/d with the PIAA coronagraph and focal plane wavefront sensing scheme envisionned for TOPS. The same techniques are currently being developped for ground-based high dynamical range imaging on the Subaru Telescope. For the ~10 most favorable stars, a 1.2m TOPS would have the sensitivity to discover 2 R_E rocky planets within habitable zones and characterize their surfaces or atmospheres through spectrophotometry. Many more massive planets and debris discs will be imaged and characterized for the first time. TOPS2, a 2m version of TOPS, would allow direct imaging and spectrophotometry of Earth-sized planets around at least 20 nearby stars.
Sara Heap		Talk	Finding Terrestrial Planets Using External Occulters	
	D.C. Hines (SSI), G. Schneider (U of Arizona), S.A. Metchev (UCLA), E.E.			We present HST/NICMOS coronagraphic images of the circumstellar structure associated with the nearby, ~80 Myr old, sun-like G-dwarf star HD 61005, discovered by the FEPS Spitzer Legacy Science Program to exhibit infrared excess emission indicative of circumstellar dust. The

Dean Hines	Mamajek (CFA), L.A Hillenbrand (CalTech), D. Hollenbach (NASA Ames), J.M. Carpenter (CalTech), M.R. Meyer (U of Arizona), D.E. Backman (NASA Ames) J. Bouwman (MPIA), T. Henning (MPIA), J.S. Kim (U of Arizona), A. Moro-Martin (Princeton), J. Najita (NOAO), M.D. Silverstone (Eureka Scientific), J. Rodmann (MPIA), S. Wolf (MPIA)	Talk	The Moth: An Unusual Circumstellar Debris Structure Associated with HD 61005	HST/NICMOS observations reveal dust-scattered starlight extending to distances ~240 AU from the occulted star. The structure is strongly asymmetric about its major axis, but is mirror-symmetric about its minor axis; morphologically, the object resembles a wing-spread moth with the star as the head. Scattered, near infrared light is traced to within 10 AU of the star (limited by the coronagraphic obscuration) with no evidence of a turnover in radial surface brightness profiles. The fraction of 1.1 micron starlight scattered by the structure relative to the stellar photosphere is larger than any debris disk previously observed. The swept shape of the debris disk may be caused by the motion of the HD 61005 system through its local interstellar medium.
Dean Hines	Dean C. Hines (Space Science Institute) & Glenn Schneider (University of Arizona)	Poster	High Contrast Imaging with NICMOS - II: Coronagraphic Polarimetry	The spectral element set available in Camera 2 of the Near Infrared Camera and Multi-Object Spectrometer (NICMOS) aboard HST for coronagraphic imaging includes polarizers with a central pass-band of 2 micron. Combining these attributes, we have now commissioned and calibrated a coronagraphic polarimetry mode. Here we discuss the capabilities of this mode, illustrated by science observations of the protoplanetary disks around the T-Tauri stars GM Aur and TW Hya, which we have previously imaged non-polarimetrically at 1.1 and 1.6 microns with the NICMOS coronagraph. We also discuss the use of NICMOS coronagraphic polarimetry for observing a variety of targets with HST, and the importance of incorporating polarizing optics into future space-based coronagraphic facilities.
Tomonori Hioki	Tomonori Hioki, Yoichi Itoh, Yumiko Oasa, Misato Fukagawa, and Subaru Disk and Planet Survey Team	Poster	Near-Infrared Coronagraphic Observations of the T Tauri Binary System UY Aur	We obtained high resolution (~0.1) near-infrared images of UY Aur using the Coronagraphic Imager with Adaptive Optics (CIAO) on the Subaru Telescope. UY Aur is classical T Tauri binary systems. We detected a half-ring shaped circumbinary disk around UY Aur. It has a clumpy structure along the disk and a cavity between the binary and the disk. The lower limit of the clump mass is calculated to be ~9.6 earth mass, assuming optically thin conditions in near-infrared.
				This opening session focuses on the remarkable contributions of the French astronomer Bernard Lyot (1897-1952) to high-contrast instrumentation and observing. The first speaker, a historian of solar physics, will recount Lyots path to and development of the coronagraph during the interwar decades. The second, an astronomer who had the good fortune to begin with Lyot, will discuss his maÃ“tres instrumental innovations during and after World War IIa brilliant career that, alas, ended prematurely in Egypt shortly after the 1952 eclipse. Four questions need addressing when considering Lyots research on and with the coronagraph during 1929-1939. Why and how, despite having made an excellent start in planetary astrophysics, did Lyot undertake to create the first instrument that would permit coronal observations in full daylight? How, once successful, did he exploit and develop the resulting coronagraphs capabilities? How did he go about building an ever more robust case for the reliability of his instrument and its results? And

Karl Hufbauer and Audouin Dollfus	K. Hufbauer & A. Dollfus	Talk	Bernard Lyot: The Spirit of Innovation	why, notwithstanding contemporary admiration for Lyots achievements, did so very few seek to take up and go beyond his work during the 1930s? The answers to these questions shed interesting light on Lyots pioneering research. They also raise more general issues that may well have come up in the careers of many attending this conference, e.g., the considerations that lead or discourage a scientist from embarking on a quite novel line of inquiry; the factors that influence how one who does so follows up on a promising beginning; and the strategies that s/he might use to convert putative findings into accepted results. Turning to 1939-1952, Audouin Dollfus will greatly enlarge our appreciation for Lyot's versatility by describing three distinct endeavors - his development of the phase contrast method; his design of the monochromatic birefringent filter and use for studying chromospheric and coronal phenomena; his coronameter method to detect the solar corona without a coronograph; and his high resolution telescope for planetary observations installed at Pic du Midi. Lyotâ€™s unrelenting drive to improve astronomical instrumentation serves still today as a model for the innovations that make this conference possible.
Garth Illingworth		Talk	Challenges & Opportunities: The Decadal Survey and Science Funding	The implementation of the projects in the last Astronomy and Astrophysics Decadal Survey has been impacted by the mismatch between the expected costs of projects, the real costs and Federal budgets available for science. The number of projects being implemented this decade is much less than we had hoped and the balance between small, medium and large projects is not optimal. There is a strong sense that we need to be more realistic in the upcoming Decadal Survey about both lifecycle program costs and likely Federal budgets over the next decade. The impact on the number of projects and the range of scientific areas that will be addressed will likely be substantial. While the challenges are large, there will still be many opportunities for doing forefront scientific programs and missions. I will discuss the overall perspective, as developed from my experience as AAAC chair, and give some sense of the opportunities (and challenges ahead), with emphasis on the context for undertaking planet searches and the rationale behind the setting up of the Exoplanet Task Force.
			Disk Instability vs	I will discuss ways to distinguish between disk instability and core accretion, the two competing paradigms for giant planet formation. Disk instability happens when a massive disk fragments into planet-sized self-gravitating clumps. Scattered light from these disks will illuminate high altitude density variations that result from stirring of the disk by the forming planet. These variations will evolve quickly, within several years, but do not correlate with the position of the planet itself. Alternatively, core accretion happens when solid particles collide and coagulate into larger and larger bodies until a body large enough to accrete a gaseous envelope forms -- around 10-20 Earth masses. This process is thought to be more quiescent than gravitational instability, so the disk

Hannah Jang-Condell		Talk	Disk Instability vs. Core Accretion: Observable Discriminants	should appear smooth. Although a 10-20 Earth mass core is insufficiently massive to fully clear an annular gap in the disk, it does perturb the disk material immediately in its vicinity, creating shadows and brightenings at the protoplanet's location. The planet may also begin to clear a partial gap. Shadowing and illumination on this partial gap can alter the thermal structure at the upper layers of the disk on a sufficiently large scale to be observable. Observing the signatures of either disk instability or core accretion requires milliarcsecond resolution and high contrast imaging. Advances in coronography, adaptive optics, and interferometry are bringing us ever closer to begin able to make these detections. Observational confirmation of either process taking place in a young circumstellar disk will help resolve the long-standing debate over how giant planets form.
Sandra Jeffers	S.V.Jeffers, C.U.Keller, M.Rodenhuis, N. Miesen	Poster	Science Goals of the Extreme Polarimeter (ExPo)	To advance our understanding of the formation, evolution and structure of extra-solar planetary systems we are building a high-precision imaging polarimeter (ExPo). ExPo will initially be located at the 4.2m William Herschel Telescope on La Palma. We will use polarimetric techniques similar to those developed for high-precision solar polarimetry to reach a sensitivity of 10^{-5}, to polarimetrically image and characterise planets and protoplanetary debris discs. I will present a review of the proposed data analysis techniques and science goals that will be achievable using the significant improvement in polarimetric imaging capabilities.
Franco Joos		Talk	Polarimetric direct detection of extra-solar planets with SPHERE/ZIMPOL	We are currently working out a phase-B study for building a second generation VLT-instrument, named SPHERE, which aims to directly detect extra-solar planets. SPHERE (Spectro-Polarimetric High-contrast Exo-planet REsearch) is a multi-mode instrument for direct detecting and analyzing young (IR) and old (vis) extra-solar planets. The institute of Astronomy at ETH Zurich is responsible for the visual instrument of SPHERE, the high-accuracy imaging polarimeter ZIMPOL (Zurich IMaging POLarimeter). ZIMPOL reaches a polarimetric accuracy of 10^-5. ZIMPOL uses fast (kHz) modulation/demodulation of the incoming polarized signal and is therefore faster than seeing variations. Light reflected by planetary atmospheres can highly be polarized whereas the central star can be assumed as unpolarized. With diffraction limited resolution at the VLT and an extreme adaptive optics combined with coronagraphy direct detection of extra-solar planets will be possible with SPHERE/ZIMPOL.
				When Bernard Lyot presented the first movie of the solar corona to the IAU in 1938, the audience of astronomers must have appreciated the following: through a feasible technical innovation, scientists could routinely study a known phenomenon through direct imaging. Yet, beyond their imagination was the fact that a small modification to the Lyot coronagraph would reveal new faint moons and rings of the Jovian planets, and the debris disk of Beta Pic. Brad Smith (1994) noted that the disk-like nebulosity that appeared in CCD data was verified at the Las Campanas du

Paul Kalas	Paul Kalas (UC Berkeley)	Talk	The Spirit of Lyot Conference: Motivations and Goals	Pont 2.5 meters *â€œI decided to look for it [the Beta Pic disk] visually in the eyepiece using transfer optics and a hastily rigged coronagraphic mask. I could see it very clearly! The disk was certainly real.â€* Why were these latter discoveries made in the 1980â€™s instead of the 1930â€™s? It seems that even though Lyot had made a breakthrough with respect to solar observations, the community did not make a sufficient connection with the great French astronomer to realize the full scientific potential of his coronagraph. So what are we missing today? By bringing together instrumentalists and research astronomers, the Spirit of Lyot Conference intends to play a major role in maximizing the scientific gains that are possible with today's state-of-the-art technologies.
Paul Kalas	Paul Kalas, James Graham, Michael Fitzgerald (UC Berkeley)	Poster	The Blue Needle: Extreme asymmetry in the HD 15115 debris disk	We present the first scattered light images of an edge-on dust disk surrounding the F2V star HD 15115 using the Hubble Space Telescope in the optical, and Keck adaptive optics in the near-infrared. With a needle-like morphology, HD 15115 represents the most asymmetric debris disk observed to date. The east side of the disk is detected to ~315 AU radius, whereas the west side of the disk has radius >550 AU. We find a blue optical to near-infrared scattered light color relative to the star that indicates grain scattering properties similar to the AU Mic debris disk. The existence of a large debris disk surrounding HD 15115 adds further evidence for membership in the Beta Pic moving group. We hypothesize that the extreme disk asymmetry is due to dynamical perturbations from HIP 12545, another Beta Pic Moving Group member east of HD 15115 that shares a common proper motion vector, heliocentric distance, Galactic space velocity, and age.
Markus Kasper	M. Kasper, C. Verinaud, J.L Beuzit, N. Yaitskova, N. Hubin, A. Boccaletti, K. Dohlen, T. Fusco, A. Glindemann, R. Gratton, N. Thatte	Talk	EPICS: A planet hunter for the European ELT	Presently, dedicated instruments developments at large telescopes (SPHERE for the VLT, GPI for Gemini) are about to discover and explore self-luminous giant planets by direct imaging and spectroscopy. The next generation of 30m-40m ground-based telescopes, the Extremely Large Telescopes (ELTs), have the potential to dramatically enlarge the discovery space towards older giant planets seen in reflected light and ultimately even a small number of rocky planets. EPICS is a proposed instrument for the European ELT, dedicated to the detection and characterization of expolanets by direct imaging and spectroscopy. It will exploit state-of-the-art diffraction and speckle suppression techniques to deliver highest contrasts. In this presentation, we will discuss the main challenges and limitations of this game and analyse EPICS' science capabilities. We will further outline the instrument concept and present our research and development plans for the next years.
				The 6.5m MMTO Telescope uses the world's first deformable secondary mirror to provide adaptive optic correction with the minimum of warm surfaces in the science beam, well suited for thermal imaging. The Clio camera is a thermal infrared imaging coronagraph optimised for L amd M band diffraction limited imaging with the MMT

Matthew Kenworthy	M.A. Kenworthy, P.M.Hinz, J.L. Codona, J. Roger P. Angel, A. Heinze, D. Apai, E. Mamajek, S. Sivanandam, M. Meyer	Talk	Exoplanet Surveys at Five Microns with Direct and APP Imaging at the MMT Observatory	AO system, typically achieving 90 percent Strehl at 4.85 microns. We have three ongoing direct imaging surveys to look for extrasolar planets around nearby stars, which include a local A star survey, a 6 parsec M star survey, and a solar-type star survey. We present the current status of these surveys, and introduce the first on-sky results from a newly developed coronagraphic optic, called the Apodizing Phase Plate, which implements diffraction suppression though modification of the wavefront's phase, and we are currently using it to enhance the direct imaging surveys.
Takayuki Kotani	T. Kotani, J. Nishikawa, K. Yokochi, N. Murakami, L. Abe, M. Tamura, T. Kurokawa, A. Tavrov, M. Takeda	Poster	Low speckle noise coronagraph with UNI+PAC	Unbalanced nulling interfometer (UNI) and phase and amplitude correction (PAC) by an adaptive optics system with two deformable mirrors is a novel pre-optics of a coronagraph which can absorb the dynamic range (the central star intensty and the speckle intensity) of about 1E-2. UNI makes a wavefront error magnification and after that the error can be virtually compensated beyond the AO limit, e.g., getting lambda/10000 quality wavefront by lambda/1000 optics. A space coronagraph which has a dynamic range of 1E-8 with lambda/1000 quality combined with the UNI-PAC can achieve total dynamic range of 1E-10 with lambda/1000 wavefront quality thourgout the optics. In an experiment, we confirmed the error magnification by the UNI (lambda/80 -> lambda/20, under the central star reduction ratio is 5%) and we are now trying to compensate the magnified wavefront errors and observe the reduced speckle intensity with a common-path AIC nulling coronagraph.
John Krist		Talk	Coronagraph imaging of debris disks with HST	Debris disks represent the most visible evidence of solar systems around other stars, having been created from the collisions of planetesimals such as comets and asteroids. They show evidence of planetary mass companions and interactions with nearby stars by the presence of gaps, clearings, and warps. Unfortunately, they are far from obvious, and even the brightest of these disks reflect, in total, far less than one percent of the stellar light. Imaging them requires high contrast optical systems capable of suppressing the diffraction pattern from the telescope using a coronagraph, along with additional post-processing to remove residual instrumentally scattered light. The high resolution and stable optical system of the Hubble Space Telescope allows it to image disks orders of magnitude too faint to be seen from the ground, and over 70% of the debris disks imaged in scattered light to date have been seen only with HST. I will present a summary of the capabilities of HST's NICMOS, STIS, and ACS coronagraphs and review the results of the debris disk imaging observations made using them.
John Krist		Poster	The JWST NIRCam Coronagraph	The Near Infrared Camera (NIRCam) on the James Webb Space Telescope will provide imaging over a wavelength range of 1-5 microns. To take advantage of the expected stable JWST point spread function and high sensitivity of NIRCam, a simple Lyot coronagraph will be included for high contrast imaging. This will provide NIRCam the ability to detect hot Jovian-mass companions orbiting young (<1 Gyr) stars within 150 pc as well as Jupiters around some of the

				nearest, low-mass stars. It will also be used to study protostellar and debris disks. We will present the design of the coronagraph and its expected performance based on optical modeling.
John Krist		Poster	PROPER: An IDL Optical Propagation Library	PROPER is a freely available library of IDL (Interactive Data Language) routines to simulate the propagation of light through an optical system. It automatically applies near and far field propagators. It includes functions to create complex apertures, model a deformable mirror, and create amplitude and phase aberrations (Zernike, PSD-defined, user-generated map). PROPER is primarily designed to model wavefront sensing and control algorithms for high contrast imaging (exoplanet detection with TPF-like coronagraphs). It is provided as source code and has a detailed manual. It is available from www.openchannelsoftware.com/projects/PROPER.
Marc Kuchner		Talk	The First Science from the Keck Interferometer Nuller	The Keck Interferometer Nuller combines the light from the two 10m Keck telescopes in a manner that removes on-axis light interferometrically---a alternative to coronagraphy. We will explain how the Nuller works and show some of the first scientific results from the Nuller: observations of a Nova (RS Oph) and a nearby debris disk (51 Oph).
Marc Kuchner	Marc Kuchner and Sara Seager	Posters	Mass-Radius Relationships for Earths and Super-Earths	Transit observations and radial velocity measurements, have begun to populate the mass-radius diagram for extrasolar planets; future coronagraphic imaging should add to the picture. Clearly, the radius of a planet indicates something about a planet's composition--but what? I will attempt to answer this question in general for low-mass planets (< Neptune mass) taking into account the wide range of possible planet chemistries, from iron planets to carbon planets to water planets.
Sylvestre Lacour	S. Lacour, P. Tuthill, G. Perrin	Poster	Self-calibration of coronagraphic OTF	Coronagraphic devices are well suited for extrasollar planetary system detection. By extinguishing the light coming from the central star, it allows a photon noise efficient detection. The drawback is a a speckle noise extremely difficult to calibrate, especially because it depends on time-dependant factors like gravitational deformations, temperature gradients, and pointing errors. We propose here an instrumental setup allowing self-calibration of the optical transfer function. The goal is to enable a coronagraphic instrument to detect extrasollar planets at very small angular distance from their parent star, between 0.7 to 5 lambda/d. The concept is based on the fact that, in this zone, the detection is limited by the optical defects instead of the photon noise. To do so, a 4 quadrant coronagraph is complemented by a pupil remapping system as described in Perrin et al. (2006).
	David Lafreniere, Rene Doyon, Christian Marois, Daniel Nadeau, Ben		Results of the Gemini	We present the results of the Gemini Deep Planet Survey, a near-infrared adaptive optics search for giant planets around 85 nearby young stars. The observations were obtained with the Altair adaptive optics system at the Gemini North telescope and angular differential imaging (ADI) was used to suppress the speckle noise of the central star. For the typical target of the survey, a 100 Myr old K0 star located 22 pc from the Sun, the observations are sensitive enough to detect

David Lafreniere	Christian Marois, Daniel Nadeau, Ben R. Oppenheimer, Patrick F. Roche, Francois Rigaut, James R. Graham, Ray Jayawardhana, Doug Johnstone, Paul G. Kalas, Bruce Macintosh, and Rene Racine	Talk	Results of the Gemini Deep Planet Survey -- constraints on the existence of planets on wide orbits	planets more massive than 2 Mjup with a projected separation in the range 40-200 AU. We will briefly review the ADI technique and its performance, summarize the observations and results, and present a statistical analysis of the survey results which provide upper limits on the fractions of stars with giant planet or low mass brown dwarf companions. The main result of this analysis is that, assuming a planet mass distribution dn/dm ~ m^-1.2 and a semi-major axis distribution dn/da ~ a^-1, the upper limits on the fraction of stars with at least one planet of mass 0.5-13 Mjup are 29% for the range 10-25 AU, 13% for 25-50 AU, and 8.9% for 50-200 AU, with a 95% confidence level.
David Lafreniere	R. Doyon, M. Beaulieu , D. Lafreniere, N. Rowlands, J. Hutchings, R. Jayawardhana, D. Johnston & A.W. M.R. Meyer	Poster	The JWST Tunable Filter Imager (TFI) Coronagraph	The Fine Guider Sensor (FGS) of the James Webb Space Telescope (JWST) a tunable filter imager (TFI) with a spectral resolution (/) of ~100 covering the 1.5 to 5 m wavelength range. A set of 4 reflective Gaussian occulting spots/ bars on the pick-off mirror of the instrument along with four apodizing masks located in the pupil wheel enable coronagraphic operation. Each coronagraphic field covers a square field of view of 20x20. This paper presents the coronagraph design of TFI and its performance. The combined coronagraphic and differential spectral imaging capabilities of the TFI coronagraph constitute a powerful tool for detecting and characterizing exoplanets with JWST.
Gregory Laughlin	Gregory Laughlin	Talk	Formation and Evolution of Planetary Systems	The galactic planetary census is approaching 250 planets, and these worlds possess an astonishing variety of physical and orbital characteristics. This wealth of data is in turn informing theories of the formation and evolution of planetary systems. In this talk, I will review current thinking on the core-accretion model for Jovian planet formation, and will look at how the theory can account for the range of systems that are observed. I will then talk about how the core accretion theory makes predictions for the evential imaging of Jovian planets from the ground and space.
Jeremy Leconte	J. Leconte, R. Soummer, B.R. Oppenheimer, S. Hinkley, D. Brenner, A. Sivaramakrishnan, J. Kuhn, M.D. Perrin, L.C. Roberts Jr. , M. Simon, R.A. Brown, G. Chabrier, I. Baraffe	Poster	The Lyot Project: Survey Analysis.	The Lyot project survey has observed 57 stars so far. We have developed some image processing and analysis tools to reduce speckle noise with Angular Differential Imaging, and to estimate the detection sensitivity (dynamic range) from the data. We apply these techniques to each star of the survey, and give a general overview of the instrument sensitivity. We use a Monte-Carlo based approach to define the possible population of companions around these stars, and we determine the completeness of each observation as a function of mass and semi-major axis, according to the measured dynamic range for each star. We use the overall survey non-detection results to constrain the possible population of companions.
				The New Worlds Observer architecture uses an external occulter to extinguish the on-axis light from a star and a separate telescope to collect the light from objects around that star, such as planets and debris disks. The separation of the starlight suppression capability from the photon collection capability makes the New Worlds Observer architecture very flexible. This paper describes NWO concepts ranging from low-cost precursor

Charles Lillie	Charles F. Lillie, Amy S. Lo, Tiffany M. Glassman	Poster	New Worlds Observer: From Minotaur to Ares V: From Proof of Concept to LifeFinder	missions to Terrestrial Planet Finding (TPF) missions, and provides a path that extends beyond TPF to Planet-Imager and LifeFinder. Low cost precursor missions could be launched on a Minotaur using a small(~10 meter) occulter to work with a small(~0.5 m), telescope. Intermediate precursor missions could be accomplished by launching a larger occulter as a secondary payload to work with existing telescopes such as SOFIA or JWST. The former may allow direct detection of known giant planets, while the latter has the potential to discover Exo-Earths. A full TPF mission would consists of a large occulter working with a dedicated telescope; this can potentially find many terrestrial planets, as well as perform a host of ancillary astronomy investigations such as imaging debris disks and characterizing atmospheres of Jovian planets, as well as making general astrophysics observations. By utilizing the in space servicing capabilities that may be developed for the Exploration program, the lifetime of these occulters may be greatly extended by refueling and repair. In the future, larger occulters (>100 m) could be assembled on orbit. Thus, when coupled with a large telescope, the NWO architecture provides a path towards Lifefinder. NWO is a flexible architecture that allows scalability on all levels to suit the budget available for Exo-Planet Missions.
James Lloyd		Talk	Inside the Spot: High Contrast Imaging with Adaptive Optics Non-Redundant Masking Interferometry	I will describe recent work on high contrast imaging for the characterization of companions to low mass stars. With novel techniques in adaptive optics aperture masking interferometry, much closer inner working angles than typical for Lyot coronagraphy can be implemented. On the Palomar 200, these techniques have been used to measure the dynamical mass and luminosity of a brown dwarf. The combination of adaptive optics and precision radial velocities has been used to determine accurate masses for stars near the Hydrogen burning limit. In near future, improvements in the adaptive optics aperture masking technique may enable the detection of proto-planets in nearby starforming regions.
Kevin Luhman		Talk	Measuring the Physical Properties of Young Substellar Companions	Young nearby stars are promising targets for direct imaging of planetary companions because substellar objects are brightest when they are young. I will use recent observations of young substellar companions (e.g., GQ Lup B, 2M 1207B, CHXR73B) to illustrate some of the challenges in measuring the physical properties of planetary companions that are directly imaged around young stars.
Richard Lyon	Richard Lyon, Mark Clampin	Poster	Towards A Comparative Analysis of Approaches for Direct Detection of Exo-Solar Planets	We compare and contrast a number of approaches for space-based direct detection and characterization of exo-solar planets. These approaches include internal and external occulting systems.
Bruce Macintosh	GPI constortium	Talk	The Gemini Planet Imager	The Gemini Planet imager is a next-generation planet-detection system for the Gemini Observatory. It combines a 1800-actuator adaptive optics system, an apodized-pupil Lyot coronagraph, ultrasmooth optics, a precision infrared interferometric wavefront sensor, and a infrared integral field spectrograph. It is predicted to achieve contrast > 10^-7 around stars brighter

			Imager	than I=8 mag, allowing a comprehensive survey for Jovian-mass companions to moderate-age (<2 Gyr) field stars. It will also have a polarimetric mode for high sensitivity to circumstellar debris disks, and open a wide variety of adjunct science missions. I will discuss the GPI design, capabilities, and science drivers.
Russell Makidon	Russell Makidon, Roeland van der Marel, Matt Mountain, Scott Friedman, Alex Fullerton, and Stefano Casertano	Poster	The Challenges of Coronagraphy with JWST	The James Webb Space Telescope (JWST) - a segmented-aperture 6.5 m class observatory that will orbit the second Sun-Earth Lagrange point - will provide unique imaging and spectroscopic capabilities for wavelengths ranging from the optical (0.70Âµm) to the mid-infrared (28Âµm). To take advantage of JWST's unprecedented sensitivity, the Near Infrared Camera (NIRCam), the Fine Guidance Sensor Tunable Filter Imager (FGS-TFI), and the Mid-Infrared Imager (MIRI) have been designed with coronagraphic capabilities, making use of band-limited occulting masks or Four Quadrant Phase Masks to provide high contrast imaging at Near Infrared or Mid-Infrared wavelengths. While JWST is expected to provide an extremely stable observing platform, thermal variations arising from typical telescope slews will undoubtedly affect the phasing of the primary mirror's segments, thereby reducing the quality of the PSF presented to the coronagraphic imagers. Here we discuss some of the observational and operational challenges facing JWST's coronagraphs, and present some of the techniques currently envisioned to mitigate those challenges.
Geoffrey Marcy		Talk	Observed Properties of Exoplanets	The measured masses and orbits of the 185 known exoplanets within 200 pc provide information on the formation and dynamics of planetary systems. Multiple-planet systems, especially those in resonances, contain rich information on migration, scattering, and capture. Some old theories of planet formation survive, but many new processes have emerged as important. A new domain of planets from 1-14 Earth masses, not found in our Solar System, is becoming accessible observationally, with several detections in hand. The formation and possible final structures of rocky and rock-ice planets may yield more diversity than currently imagined. The Kepler Mission and a new 2.4-m Automated Planet Finder telescope at Lick Obs. portend the detection of rocky planets around other stars.
Mark Marley		Talk	Characterization of Extrasolar Planets: Lessons From Atmospheres Modeling	When the landmark of the first direct detection of an extrasolar planet is achieved, the next task will be to characterize the object. The goals of characterization will include determination of the mass, radius, composition, and atmospheric structure of the planet. Evolution and atmospheric models will be required to guide the observations and interpret the data. Given this situation, one might reasonably inquire about the veracity of the models and how well they can be applied in practice to cool atmospheres. In my review I will explore the history of atmospheric modeling and discuss the track record of models in the solar system. Some brown dwarfs are already known to be cooler than hot, young Jupiters and provide further testing grounds for the models. I'll consider the remaining uncertainties, especially regarding

				cloud modeling, and will focus the key issues expected to be faced in the early characterization of extrasolar planets.
Christian Marois		Talk	Speckle Noise Attenutation in Coronagraphy and High-Contrast Imaging	I will review the current progress in speckle noise (static, quasi-static and atmospheric) attenuation involving several observational strategies and data reduction schemes to attenuate the speckle noise and to recover the flux from faint exoplanets. I will mainly focus on the Angular Differential Imaging, the Speckle Symmetry and the Simultaneous Spectral Differential Imaging techniques. I will present the speckle noise attenuation performances obtained using such techniques with current adaptive optics systems and some very interesting discoveries made with them, as well as the modeling effort to predict the expected contrast when using these techniques with future instruments like the Gemini Planet Imager.
Patrice Martinez	P. Martinez, A. Boccaletti, M. Kasper, P. Baudoz, C. Cavarroc	Talk	Optimization of Apodized Pupil Lyot Coronagraph for Planet Finder Instruments	In the context of exoplanet imaging with ground based telescopes, we studied the optimization of the Apodized Pupil Lyot Coronagraph (APLC). APLC is an improvement of the Lyot coronagraph design combining a radially variable transmission in the pupil plane with a small Lyot mask in the focal plane of the instrument. The interest of this coronagaph has already been demonstrated for monolithic 2-8 meters telescopes and some prototypes are being manufactured for several projects. Our analysis is focused on the optimization of APLC for Extremely Large Telescopes (30-60 meters) but is still applicable to any telescope diameter and configuration. Here, we define a tool to optimize APLC parameters with respect to telescope designs in order to derive the optimal mask size for high contrast imaging. We analyze the behavior of the optimal mask size in function of ELTs characteristics (central obscuration, spiders, low-order segment aberrations and reflectivity) and chromatism. This optimization is then applied to specific ELT designs.
Taro Matsuo	T. Matsuo, H. Shibai, T. Ootsubo, and M. Tamura	Talk	Planetary formation scenarios revisited: Core accretion versus disk instability	The core-accretion and disk instability models have so far been used to explain planetary formation. These models have different conditions, such as planet mass, disk mass, and metallicity for formation of gas giants. The core-accretion model has a metallicity condition ([Fe/H] > −1.17 in the case of G-type stars), and the mass of planets formed is less than 6 times that of the Jupiter mass Mj. On the other hand, the disk instability model does not have the metallicity condition, but requires the disk to be 15 times more massive compared to the minimum mass solar nebulae model. The mass of planets formed is more than 2Mj. These results are compared to the 161 detected planets for each spectral type of the central stars. The results show that 90% of the detected planets are consistent with the core-accretion model regardless of the spectral type. The remaining 10% are not in the region explained by the core-accretion model, but are explained by the disk instability model. We derived the metallicity dependence of the formation probability of gas giants for the core-accretion model. Comparing the result with the observed fraction having gas giants, they are found to be consistent.

				On the other hand, the observation cannot be explained by the disk instability model, because the condition for gas giant formation is independent of the metallicity. Consequently, most of planets detected so far are thought to have been formed by the core-accretion process, and the rest by the disk instability process.
Dimitri Mawet	D. Mawet	Poster	Annular Groove Phase Mask: an achromatic vortex coronagraph intended at differential polarimetric imaging	The Annular Groove Phase Mask (AGPM) is a broadband vectorial vortex coronagraph consisting of integrated subwavelength optical elements. After presenting the status of the manufacturing operations of near-infrared and visible prototypes, we will show why the polarization properties of the AGPM are well suited to differential polarimetric imaging. Using this special ability, we will present an instrumental concept of imaging coronagraphic spectro-polarimeter for the 1.5-meter Super Earth Explorer-Coronagraphic Off-Axis Space Telescope (SEE-COAST). Preliminary performance assessment in presence of realistic sources of noise (wavefront errors, non-common path aberrations, mask and optical component imperfections, etc) leads to 1e-9 contrasts after speckle subtraction, over a 30 %-bandwidth in the visible wavelength range and at inner working distances as small as 1 lambda/D. The AGPM is basically a vortex of topological charge 2, leading to a theta^2 sensitivity to tip-tilt. Thanks to optical integration, we will show how to practically increase the topological charge and therefore decrease the tip-tilt sensitivity, which can be useful especially for larger telescopes.
Michael McElwain	Michael McElwain, James Larkin, Stan Metchev, Ben Zuckerman	Poster	Speckle Suppression with the OSIRIS IFS	We present the first high contrast imaging results using speckle suppression techniques on OSIRIS integral field spectrograph (IFS) data. OSIRIS is a lenslet-based IFS that operates behind the Keck II adaptive optics (AO) system. This instrument has a spectral resolution of 3800 and diffraction limited sampling over a small, rectangular field of view. The integral field nature of OSIRIS can be used in high contrast observations to monitor the PSF over a full broad band filter and suppress some diffraction features that commonly mask faint point source detections. We employ speckle and spectral suppression techniques to search for non-stellar (brown dwarf and planetary) companions in the halos of nearby, young stars.
Rowin Meijerink	R. Meijerink (1) A. Glassgold (1) J. Najita (2) (1) UC Berkeley (2) NOAO	Poster	Probing X-ray Irradiated Protoplanetary Disks	Strong X-ray emission has been observed from low-mass young stellar objects. The X-rays interact with the upper layers of the surrounding protoplanetary disk, where they are expected to dominate the thermal and chemical balance. We investigate whether there are specific diagnostics for the effects of X-rays on the properties of the gas using an updated version of the model presented earlier by Glassgold, Najita & Igea (2004). We extend recent work by Glassgold, Najita & Igea (2007) which predicts strong [NeII] 12.81 micron emission by X-ray irradiated disks. We find a near-linear correlation between the neon fine-structure line emission and the X-ray luminosity, which is consistent with the observations of this line by SPITZER (Pascucci et al. 2007, ApJ in press). We also make predictions of the observability of the forbidden and fine-structure lines of CI, CII, OI, SI and SII. We will

				discuss the spatial distribution of the emissivity of these lines as a function of position in the disk and compare the regions of the disk that they probe.
Bertrand Mennesson		Talk	A single-mode nulling rotating coronagraph for high contrast ground based imaging	I describe a new observational method to conduct very high contrast near infrared observations of the close environment (i.e. within 15 to 200 mas) of nearby astronomical targets using a single-telescope. This approach, best described as a single-mode nulling coronagraph (a.k.a. â€œfiber nullerâ€), uses destructive interference between two or more sub-apertures of a single telescope, in conjunction with fast aperture rotation (~0.1Hz) and wavefront filtering through single-mode fibers. In the case of a large ground based telescope located at a prime astronomical site and equipped with extreme adaptive optics, contrast ratios greater than 10^4 should be accessible within 15mas of the central star, showing that the instrument clearly occupies a unique region between regular coronagraphs, limited in spatial resolution (no high contrast within 100 mas), and long baseline interferometers, traditionally limited in dynamic range (<100:1).The astrophysical applications of such a device are numerous, ranging from the study of stellar atmospheres and circumstellar disks, to the direct detection of brown dwarfs or self luminous planets within a few AUs of young nearby stars. A simple laboratory experiment quickly provided 10^6 rejection using visible laser light, and over 10^4 broad-band dual polarization stable rejection in the H band (~1.65 microns). An initial near infrared set-up will be mounted and tested in 2007 on the Palomar Hale 5m telescope using two ~1.5m sub-apertures.
Stanimir Metchev	S. Wolf, J. Rodmann, M. Silverstone, D. Hines, G. Schneider, M. Meyer, L. Hillenbrand, S. Kim, J. Carpenter, I. Pascucci, D. Ardila, J. Krist, J. Najita, & T. Henning	Talk	Multi-Wavelength Modeling of the Resolved Debris Disk around HD 107146	The debris disk around HD 107146 offers an important opportunity to explore the morphology and physical properties of second-generation circumstellar dust disks because of its unique combination of near face-on viewing geometry and availability of resolved maps of the circumstellar emission over a broad range of wavelengths. The disk is resolved from the optical and the near-infrared, where it is imaged coronagraphically in scattered light, to the far-infrared, sub-millimeter, and millimeter, where it is seen in thermal emission. The coronagraphic observations, in particular, place strong constraints on the radial and azimuthal distribution of the circumstellar dust, and on its scattering properties. We present a unified description of the HD 107146 debris disk based on a radiative transfer model that incorporates the multi-wavelength resolved emission, spectral energy distribution, and 8-36 micron Spitzer/IRS spectrum of the star. Our model presents a self-consistent picture of the physical properties of the dust grains (size distribution, composition) and the overall morphology of the disk (inner and outer radii, density distribution). In particular, our constraint on the inner disk radius places a stringent upper limit on the semi-major axis of any potential giant planet that may be orbiting around HD 107146 and truncating its inner disk.
				We present a summary of the capabilities available with NIRCam and the FGS/TFI instruments on the James Webb Space Telescope for high contrast

Michael Meyer	Michael R. Meyer (Steward Observatory, The University of Arizona) and the NIRCam (P.I. M. Rieke; http://ircamera.as.arizona.edu/nircam/) and FGS/TFI (P.I.s J. Huchings and R. Doyon; http://achille.astro.umontreal.ca/fgs/) Teams	Talk	Studying the Formation and Evolution of Planetary Systems with JWST: High Contrast Imaging with NIRCam and FGS/TFI	imaging of circumstellar disks and planets. NIRCam is equipped with a number of coronagraphic imaging options and appropriate range of pupil stops for use with a suite of broad-, intermediate-, and narrow-band filters from 1-5 microns. FGS/TFI provides a tunable filter capability from 1.5-2.6 & 3.1-5.0 microns with coronagraphic spots placed in the camera field of view. We describe a range of representative programs that can be undertaken with JWST to study the formation and evolution of planetary systems including: 1) searches for planets around a volume-limited sample of nearby stars; 2) a complementary survey for planets around more distant young sun-like stars; 3) studies of circumstellar disk composition and structure as a function of age and stellar properties; and 4) prospects for spectroscopy of exoplanets through primary and secondary transit spectroscopy utilizing a slitless grism from 2.4-5.0 microns.
Nick Miesen		Poster	A laboratory simulator of polarized light from exoplanets and circumstellar disks	I describe a laboratory simulator to test and calibrate the Extreme Polarimeter, ExPo, which will observe circumstellar disks and exoplanets. The set-up is meant to be as close to the actual situation as possible. The star and planet are simulated with an arc lamp that illuminates two fibers. The star has a flux of ~1011 photons per second, and the exoplanet is partially linearly polarized with a flux of ~102 photons per second to simulate the reflected light. The separation on the sky is 1â€ corresponding to 53â€ in the lab (~ 250 microns) for the fiber separation. Two lenses of 83mm simulate the 4.2-m William Herschel Telescope , the scale being determined by the diffraction Ã«/D. Between these two lenses, the seeing and the atmospheric dispersion are simulated with a rotating glass plate covered with hairspray (seeing) and a wedge prism (atmospheric dispersion).
Guillaume Montagnier	D. Segransan, J.-L.Beuzit, S. Udry, M. Mayor, T. Forveille	Talk	Characterization of the brown dwarf desert around solar neighborhood G&K dwarfs using NACO-SDI.	We have been conducting a systematic search for brown dwarfs around solar neighborhood G&K dwarfs, usingÂ NACO in its Simultaneous Differential Imaging mode.Â We took advantage ofÂ the CORALIE planet search radial velocity survey, to select a subsample of 36 G&K dwarfs out of 1600 inside 50 parsecs. These 36 stars display radialÂ velocity drifts compatible with a substellar companions in the separation range accessible to NACO+SDI,Â and that are not known as long period spectroscopic or visual binaries. We found 16 obvious stellar companions (mostly late M type dwarfs). At this stage of the data processing, we do not directly detect the companions on the remaining 20 stars, pointing that these companions are either massive planets or low mass brown dwarfs. We will present here the results of our program and new constraints on the brown dwarf desert in the separation range from 1 to 100 AU.
	D. Mouillet, J.L. Beuzit, M. Feldt, R.			Following the general presentation of the VLT/SPHERE project (Beuzit et al), I will analyse the scientific goals of this new instrument dedicated to high contrast imaging, covering various aspects of planetary system studies: the statistical investigation of planetary mass or brown dwarf companionship in complementarity to other

David Mouillet	Gratton, J.C. Augereau, A. Boccaletti, S. Desidera, K. Dohlen, T. Henning, M. Kasper, M. Langlois, C. Moutou, P. Puget, H.M. Schmid, M. Turatto, S. Udry, F. Vakili, R. Waters	Poster	VLT/SPHERE scientific goals and performance	detection techniques, the relation to stellar parameters, the characterization of the very cool objects atmosphere, and the evolution from the earliest stages of formation in circumstellar disks. I will discuss the identified scientific priorities for this instrument in the context of the current capabilities or of the up-coming facilities in 2010. The corresponding main system specifications or trade-offs are highlighted as well as the foreseen operation strategy so as to achieve the required performance.
Markus Mugrauer	M. Mugrauer, R. Neuhaeuser, T. Mazeh	Talk	The multiplicity of planet host stars	We present new results from our ongoing multiplicity study of exoplanet host stars. We show new optical and infrared imaging and spectroscopy data of a new white dwarf companion to an exoplanet host star and present our observations of two new planet host triple-star systems. In addition we discuss the properties of the confirmed planet host multiple-star systems which are known today. We compare the properties of exoplanets detected in these stellar systems with those of planets orbiting around single stars and describe all difference which were found between these two both planet populations.
Mamadou N'Diaye	M. N'Diaye, K. Dohlen, S. Cuevas	Poster	Apodized Pupil Lyot Coronagraph, working without Lyot stop	In the context of high dynamic range imaging, the Apodized Pupil Lyot Coronagraph, (APLC), proposed by Soummer (2005), is a combination of an apodization placed in the input pupil, an opaque mask in the following focal plane and a Lyot stop in the coronagraph exit pupil to block the rejected starlight that is left outside the exit pupil. In this work, we propose to leave this Lyot stop off. It is shown that a good bright star extinction can also be reached. This configuration probes to be very interesting for instruments in progress, like FRIDA (inFRared Imager and Dissector for the Adaptive optics system of the Gran Telescopio Canarias), where a stellar coronagraph would be installed. In FRIDA there are some mechanical constraints which prevents from putting a Lyot stop within their second pupil plane, in fact the spectrograph pupil.
Eric Nielsen	Eric L. Nielsen, Laird M. Close, Beth A. Biller, Elena Masaciadri	Poster	Constraints on Extrasolar Planet Populations from VLT NACO and MMT Direct Imaging Surveys	We consider the implications of a null result from the direct imaging surveys for self-luminous extrasolar planets conducted at the VLT and MMT, achieving high contrasts at small separations to 65 young, nearby target stars. Analysis of these data suggest a dearth of planets more than three times the mass of Jupiter beyond 15 AU, with fewer than 20% of stars expected to have such a planet. We also consider the effects of spectral type on these results, and the implications for conducting future planet surveys biased toward target stars of later spectral types. Finally, we consider a number of distributions of extrasolar planet orbital parameters, and determine which are consistent both with planets discovered by the radial velocity method, and the null results of our surveys, and which can be ruled out with high confidence.
			The Broadband	A key design feature of a conventional coronagraph is an opaque occulting mask placed in the image plane of a telescope. Unlike the conventional coronagraph, a holographic vortex coronagraph (HVC) makes use of a blazed vortex grating instead of an opaque occulting mask. A wave front incident perpendicular to the grating is

David Palacios		Talk	The Broadband Performance of a Holographic Vortex Coronagraph	transformed into a helix in the first diffracted order. Total destructive interference occurs along the axis of the helix attenuating an on-axis source. An HVC is naturally achromatic: the impinging phase front is transformed into the same helical shape regardless of wavelength. In this talk I will compare the broadband performance of an HVC with that of a conventional coronagraph. I will discuss limitations to the technique and ways to improve upon it.
Guy Perrin	Guy Perrin, Sylvestre Lacour, Julien Woillez, Takayuki Kotani, Ã‰ric ThiÃ©baut	Poster	Diffraction-limited high dynamic range imaging from the visible to the infrared	We propose a novel technique to achieve high angular resoluion imaging at high dynamic range that will be well adapted to some astrophysical cases such as imaging of planets very close to their central star and of structures in disks. The fundamental idea is to apply techniques developed for long baseline interferometry to the case of a single-aperture telescope. The pupil of the telescope is broken down into coherent sub-apertures each feeding a single-mode fiber. A remapping of the exit pupil allows interfering all sub-apertures non-redundantly. A diffraction-limited image with very high dynamic range is reconstructed from the fringe pattern analysis with aperture synthesis techniques, free of speckle noise. Raw dynamic ranges of a million can be obtained in only a few tens of seconds of integration time for bright objects and can be improved with off-line processing techniques. The technique can be applied to either visible or infrared wavelengths, the number of fibers matches the number of coherent patches over the pupil. The technique can also be applied to space coronography. First simulations show that contrasts of 10^10 can be achieved within a distance of a fraction of lambda/D on regular brightness candidates for planet search.
Mary Peters	Mary A. Peters, Laird M. Close, Grover A. Swartzlander, Erin Ford, Rukiah S. Abdul-Malik, Matt Rademacher, Tom Stalcup	Talk	BESSEL: A High Strehl Visible Telescopic Test Bed for Planet Finding Coronagraphs	We have constructed a high-speed image stabilization system, Bessel, which attaches to an 8-inch refractive telescope at Steward Observatory. The high-speed tip/tilt mirror platform is controlled by a photon-counting camera that allows us to correct the wavefront distortion at a rate exceeding 1 KHz. Bessel has a strehl ratios over 96% at 800nm when the telescope aperture stopped down to less than the Freid parameter (approximately 50 mm). With this telescopic system, we will characterize the optical vortex coronagraph (OVC). We will report here on our on-telescope performance with Bessel. We welcome other coronagraphic architectures for realistic telescopic characterizations as well.
Lisa Poyneer		Talk	Wavefront control for high-contrast imaging	We review fundamental error terms and limitations to high-contrast imaging with Adaptive Optics wavefront control. The impact of design choices such as WFS bandwidth, WFS type (e.g. Shack-Hartmann vs. direct phase) and wavefront control algorithms will be discussed in detail. We will wrap up with a discussion of the Gemini Planet Imager wavefront controller and its predicted performance.
				Direct imaging of exo-planets requires that an efficient starlight suppression system and wavefront compensator work together to achieve a stable null with sufficient contrast. The performances of several configurations for these two sub-systems have been extensively studied

Laurent Pueyo	Laurent Pueyo, Ruslan Belikov, N.J Kasdin	Talk	Performance study of integrated coronograph-adaptive optics designs	over the past few years, with particular attention being payed to the following four quantities and their relationship: throughput, contrast level, inner working angle and bandwidth. In this paper we propose a new approach that considers starlight suppression and wavefront correction as a unique integrated component that is the combination of a shaped-pupil and two sequential deformable mirrors that operate simultaneously as a short stroke pupil mapping device and a wavefront compensator. To do so we first develop a new method based on Huygens wavelets to explain the contrast limits of pupil mapping due to propagation, and study the hybrid associations of PIAA systems and shaped pupils that have been introduced in order to mitigate these effects. Since two cascaded deformable mirrors are, in principal, a wavelength independent amplitude actuator, we argue that they could be used in conjunction with shaped pupils to carry some of the apodisation load and thus increase the throughput of the new hybrid system. Finally we will present a full performance analysis of several hybrid designs and illustrate how the four aforementioned performance metrics are related, in order to ultimately highlight the tradeoffs underlying the decision to be made among these various designs.
Douglas Rabin	D. M. Rabin, O. C. St. Cyr, J. M. Davila	Talk	Advances in Solar Coronagraphy	Could Bernard Lyot have imagined the protean forms in which his most notable invention, the coronagraph, would appear 75 years later? Could he have foreseen that the most widely used solar coronagraphs would be based in space, or that coronagraphs would seek to image planets and disks around other stars? Perhaps soâ€”he was far more than a builder of creative instruments. I will discuss advances in solar coronagraphy since Lyotâ€™s time, in both the science that drives the observations and the technology that sustains them.
Michiel Rodenhuis	Michiel Rodenhuis, Christoph U. Keller	Poster	Design Options for the Extreme Polarimeter (ExPo)	The Extreme Polarimeter, ExPo, is being developed for the detailed study of circumstellar disks and exoplanet characterization at the 4.2-m William Herschel Telescope at La Palma. This imaging polarimeter is designed to measure linear polarization at the 10-5 level around bright stars at distances outward of about 0.5 arcsec. We will discuss the design options for this instrument as well as the advantages and disadvantages of specific components such as the Atmospheric Dispersion Compensator, the polarising beamsplitting element, the coronograph mask, and the polarisation modulator based on either ferroelectric or nematic liquid crystals. The merits and disadvantages of each of these will be discussed along with the impact of a certain choice on the overall instrument performance. Finally, an analysis of several off-the-shelf scientific cameras for the actual image recording will be presented.
				One of the objectives of the James Webb Space Telescope (former NGST) is the understanding of the formation of stars planetary systems. JWST will include four instruments, one of which is MIRI, a mid-IR camera / spectrometer. The instrument is particularly well suited to the direct detection of extrasolarplanet because of the favourable star/planet contrast in this spectral ranges, the

Daniel Rouan		Talk	Review of the JWST MIRI coronagraph	image quality and because it features a set of coronagraphs based on the four-quadrant phase mask design. Our group at Observatoire de Paris-Meudon was responsible for this sub-system and I present the basic principles, the final design, the various technology paths followed for the phase-mask manufacturing, the lab experiment to qualify the coronagraphs and finally the expected performances and the observational strategy. I'll discuss the expectations in terms of giant planet detection and characterization, using the set of dedicated filters / 4QPM-coronagraphs.
Daniel Rouan	Daniel Rouan, Didier Pelat	Poster	Nulling interferometry: A new concept of achromatic phase shifter using cellular mirrors	A new idea to obtain a phase shift (pi or any value) on a broad band (typically delta lambda / lambda = 0.7) is proposed. Based on a unique component, a twin cellular mirror, it offers the great advantage of a robust nulling interferometer with very few components and a fully symmetric optical scheme. Both the distribution of the cells thickness and their 2D arrangment obey to rather strict rules derived from some peculiar arithmetical laws. Using MOEMS could add a great flexibility. The theoretical frame will be presented, as well as results of modelling and, hopefuly, first laboratory results.
Tobias Schmidt		Poster	Direct detection of exoplanet host star companion Gamma Cep B using CIAO at the 8m telescope Subaru	Gamma Cep is known as a single-lined spectroscopic triple system at a distance of 13.8 pc, composed of a K1 III-IV primary star with V= 3.2 mag, a stellar-mass companion in a 66-67 year orbit (Torres 2007) and a sub-stellar companion with mass times sin(i) = 1.7 Jupiter masses, that is most likely a planet (Hatzes et al. 2003). We used the Adaptive Optics camera CIAO at the Japanese 8m telescope Subaru on Mauna Kea, Hawaii, with the semi-transparent coronograph to block most of the light from the primary to be able to image Gamma Cep B directly. We could clearly detect Gamma Cep B and used a photometric standard to determine the magnitude of B after PSF subraction of K = 7.3 +- 0.2 mag. With the data the orbit of the two stars could be refined and thus we were able to determine the dynamical masses of these two stars in the Gamma Cep system, namely 1.40 +- 0.12 solar masses for the primary and 0.409 +-0.018 solar masses for the secondary (consistent with a M4 dwarf) as well as a new minimum mass of the sub-stellar companion of mass times sin(i) = 1.60 +- 0.13 Jupiter masses.
Glenn Schneider	Glenn Schneider and Dean C. Hines	Talk	High Contrast Imaging with NICMOS - I: Teaching an Old Dog New Tricks with Coronagraphic Polarimetry	HST's Near Infrared Camera and Multi-Object Spectrometer (NICMOS), with its highly stable point spread function, very high imaging Strehl ratio (panchromatically > 98% over its entire 0.8 - 2.4 micron wavelength regime) and coronagraphic imaging capability, celebrated its tenth anniversary in space earlier this year. These combined instrumental attributes uniquely contribute to its capability as a high-contrast imager as demonstrated by its continuing production of new examples of spatially resolved scattered-light imagery of both optically thick and thin circumstellar disks and sub-stellar companions to young stars and brown dwarfs well into the (several) Jovian mass range. We review these capabilities, illustrating with observationally based results, including examples obtained since HST's entry into two gyro guiding mode in mid 2005. The

			Polarimetry	advent of a recently introduced, and now commissioned and calibrated, coronagraphic polarimetry mode has enabled very-high contrast 2 micron imaging polarimetry with 0.2 spatial resolution. Such imagery provides important constraints in the interpretation of disk-scattered starlight in assessing circumstellar disk geometries and the physical properties of their constituent grains. We demonstrate this new capability with observational results from two currently-executing HST programs obtaining 2 micron coronagraphic polarimetric images of circumstellar T-Tauri and debris disks.
Jean Schneider	Schneider, Boccaletti, Riaud, Tinetti and the SEE COAST team	Talk	The Super-Earth Explorer	The Super-Earth Explorer is a space mission to be submitted to ESA for a launch in 2018. Its objective is to characterize exoplanets previously found by radial velocity (or astrometry) by direct imaging of their reflected light in the visible. We present the main characteristics of the spacecraft and some of its detailed scientific objectives.
Eugene Serabyn	E. Serabyn	Poster	ExAO experiments with a well-corrected subaperture	A 1.5 m "well-corrected subaperture" (WCS) on the Palomar Hale telescope now regularly provides ExAO-level image quality, with stellar Strehl ratios exceeding 90%, corresponding to wavefront errors of under 100 nm. Using this system, a wide variety of ExAO experiments can thus be carried out well before â€œnext generationâ€ ExAO systems are deployed on large telescopes. Some of the experiments include infrared ExAO imaging and performance optimization, a comparison of coronagraphic approaches in the ExAO regime, visible wavelength AO, predictive AO, and exoplanet transit spectroscopy.
Stuart Shaklan	Stuart Shaklan and Marie Levine	Poster	Terrestrial Planet Finder Coronagraph Mission Overview	NASAâ€™s plan for a large-scale observatory to directly detect and characterize terrestrial planets has been significantly delayed by funding shortfalls. It appears more likely that a smaller, focused extra-solar planet mission could fly in the next decade. Mission modeling studies show that a 1.5 m aperture coronagraphic telescope could detect and characterize a handful of Earth-like planets and many Jupiter-class planets. The technology for the giant-planet portion of the mission, including a contrast ratio of 2x10^9 in 10% bandwidth light, is in hand and no fundamental roadblocks remain. External occulter technology is less mature but once developed a formation-flying occulter could join the telescope in orbit to form a powerful exo-planet characterization observatory.
				To date, nulling coronography has achieved the deepest level of starlight suppression than any other coronagraphic technique. The terms starlight suppression and contrast are often used interchangably and incorrectly. At 3.5 lambda/D the airy function sidelobes has dropped to 0.001 of the stellar flux. Starlight suppression of 1e-7 will then produce a speckle pattern with a contrast of 1e-10. This paper describes three topics in nulling coronagraphs. The first is starlight suppression of 1.1e-7 in laser light, the level of star light suppression needed for 1e-10 contrast. A similar experiment in broadband (16%) white light has demonstrated ~1.2e-6 suppression. Both experiments were starlight suppression using a single mode optical fiber. Starlight suppression to

Michael Shao	M. Shao, R. Samuel, K. Wallace, B. Levine	Talk	Visible Nulling Coronagraph	1e-6~1e-7 requires wavefront measurements with sub-angstrom level accuracy. This is most easily done with a wavefront sensor that works with light after the coronagraph rather than the bright starlight in front of the coronagraph. Our nulling coronagraph uses a post coronagraphic interferometer to perform two functions, 1) measure the wavefront and provide an correction/error signal for the deformable mirror, and 2) post coronagraph PSF subtraction. We show that the post coronagraph interferometer has very significant SNR advantages over other post coronagraph approaches such as speckle nulling. A secondary function of the post coronagraphic wavefront sensor is that since it measures the amplitude and phase of the wavefront of the starlight after exiting the coronagraph, that amp*exp(i*phi) can be used to estimate the residual speckle pattern for subsequent PSF subtraction. By measuring the PSF at the same time as we're measuring the science image, the stability requirements can be relaxed by many orders of magnitude. (over rotating the telescope around the line of sight for example). The post coronagraph interferometer is being used in the PICTURE project (coronagraph behind a 60cm telescope on a sounding rocket), the Gemini Planet Imager and a study of an extreme AO coronagraph for the TMT telescope. The nulling coronagraph is being used in the PICTURE project, a proposed Discovery mission EPIC, a study for an extreme AO coronagraph for the TMT and a study for an alternative coronagraphic instrument for TPF-C.
Nick Siegler		Poster	Very-Low-Mass Binaries Archive	I present the Very-Low-Mass Binaries Archive, a website that contains an uptodate list of all stellar and substellar binary systems whose total system masses are less than 0.2 solar masses. This includes brown dwarfs and planetary systems. The Archive targets both theorists and observers interested in understanding the empirical data of this subject which hopefully will aid in understanding formation mechanisms and system evolution. For example, I will present evidence from the Archive showing young binary systems (less than 10 Myr) have different properties than older field systems suggesting an evolutionary progression. I also present a newly discovered brown dwarf resolved 66 mas from its companion, an L5 dwarf, using laser guide star adaptive optics from the Keck II telescope.
Anand Sivaramakrishnan	Anand Sivaramakrishnan, Ben R. Oppenheimer, Remi Soummer, Sasha Hinkley, Doug Brenner, Jeremy LeConte, Lewis C. Roberts, Marshall D. Perrin, James P. Lloyd, Russell B. Makidon, Jeff R. Kuhn	Talk	The Lyot Project: status and results	The Lyot Project near-IR coronagraph, operating behind the AEOS 3.6m 941-channel adaptive optics system, has opened up new search areas in the mass-separation parameter space of faint companions to nearby stars brighter than V=7. As the first so-called extreme AO system on sky, often operating at a 90% Strehl ratio at H with an upgraded AEOS AO system, its use has uncovered some hitherto unforeeseen difficulties in the search for faint companions. The coronagraph possesses a simultaneous dual-polarization mode and a novel technique for precision relative astrometry and photometry. We have also developed a refinement of the angular differential

				imaging technique in order to suppress the static and quasi-static speckles that limit our dynamic range. We are about to explore newer coronagraph designs, and place an Integral Field Unit spectrograph behind the coronagraph.
Andrew Skemer	Andrew Skemer, Laird Close	Poster	The First Resolution of the 0.1 Binary T Tau Sa and Sb at 10 um with MMT Mid-IR AO and Super-Resolution	Although T Tauri is one of the most studied objects in astronomy, the nature of its circumstellar environment remains elusive due to the small angular separation of its three components (N, Sa, and Sb; all within 1). However, the long temporal baseline of observations and astrometric orbital solution of T Tauri make it a unique laboratory for studying the physics of circumstellar disks in multiple object systems. We present a new technique where we estimate spatial frequencies from high resolution, short wavelength data to eliminate degrees of freedom from super-resolution Mid-IR AO PSF fitting. The method allows us to resolve the Southern components T Tau Sa and Sb at a separation of 0.3 lambda/D (0.1) using MIRAC4 and Mid-IR AO on the MMT at ~98% Strehls. Our results include 10% filters on and off the 10 micron silicate feature (and broad N), and we review how these new measurements help us understand the circumstellar structure and composition of the enigmatic T Tauri triple system.
Remi Soummer	Remi Soummer, Andre Ferrari, Claude Aime	Talk	Speckle noise in high dynamic range imaging, an overview	We present an overview of the statistical properties of speckle noise, which is the main limitation to high contrast imaging. We derive and analyze the properties, for both direct and coronagraphic images, and describe the effect of a coronagraph on the speckle and photon noise. We discuss the case of direct images and the particular case of the distribution of the instantaneous Strehl Ratio. Current observations with coronagraphic instruments have shown that the main limitations are due to residual quasi-static speckles. We propose a generalization of the statistical model to include static, quasi-static and fast residual atmospheric speckles. The results provide insight into the effects on the dynamic range of wavefront control, coronagraphy, active speckle reduction, differential speckle calibration. This study is focused on ground-based imaging with extreme adaptive optics, but is general enough to be applicable to space, with different parameters and timescales.
Karl Stapelfeldt	C. McCabe & K.R. Stapelfeldt (JPL/Caltech)	Poster	Circumstellardisks.org: An Online Database of Spatially Resolved Circumstellar Disks	We present an online database of circumstellar disks that have been spatially resolved either in scattered light, thermal dust continuum or molecular line emission. Providing a complete list of both first generation (e.g., T Tauri, HAeBe and YSO) and second generation (e.g.,debris) disks, circumstellardisks.org provides a sortable database of the basic stellar and disk properties for systems with known spatially resolved disks (e.g., spectral type, R band magnitude, distance, disk size, inclination, and how well resolved the disk is). In addition, each object is linked to a more detailed page which provides a list of references, linked to ADS, that either discuss the resolved disk or have unresolved measurements of the disk at wavelengths greater than 1 micron. As of February 2007, there are 99 spatially resolved circumstellar disks, 86% of which are around pre-main-sequence objects. Of the 80% of systems

				with modeled disk inclinations available, 15% are in an edge-on configuration, with inclinations greater than 85 degrees, whereas 6% have face-on disks with inclinations less than 5 degrees.
Karl Stapelfeldt	Stapelfeldt, Karl; Krist, John; Bryden, Geoff; Chen, Christine	Poster	An HST/Spitzer Study of the HD 10647 Debris Disk	We present HST/ACS Imaging and Spitzer spectrophotometry of HD 10647, an F9 star at d= 17 pc with a radial velocity planet in a 2 AU orbit. A diffuse debris ring with radius 90 AU is detected, the first debris disk imaged in scattered light around a star hosting a confirmed extrasolar planet. We present scattered light and spectral energy distribution models which constrain the disk density distribution and dust properties.
Christopher Stark	Christopher Stark, Marc J. Kuchner	Poster	Debris Disk Structures Induced by Terrestrial-Mass Planets	Three-body models of dust dynamics suggest that extrasolar planets can create significant resonant structures in exozodiacal clouds and other debris disks. These structures are a worrisome source of confusion for missions that aim to directly detect extrasolar planets. So far, most models of these resonant structures have focused on Neptune- and Jupiter-mass planets. However, our simulations suggest that, under the right conditions, terrestrial-mass planets can also create high-contrast structures. Using a custom tailored hybrid symplectic integrator on the 420-node Thunderhead cluster at Goddard Space Flight Center, we have performed many simulations of 25,000 particles each in an effort to catalog these structures. The models incorporate a realistic size distribution of particles and include enough particles to overcome the limitations of previous simulations that were often dominated by a handful of long-lived particles. These high-fidelity simulations allow us to confidently predict the contrast in the resulting ring structures.
Motohide Tamura	M. Tamura, K. Hodapp, R. Suzuki, L. Abe, H. Takami, H. Suto, O. Guyon, R. Kandori, J. Morino, J. Hashimoto, V. Stahlberger, S. Jacobson, H. Yamada, R. Shelton, A. Tavrov, N. Murakami, J. Nishikawa, M. Hayashi, T. Usuda, T. Yamada, T. Nishimura	Talk	HiCIAO and exoplanet/disk searches on Subaru	HiCIAO is a new high-contrast instrument for the Subaru telescope. HiCIAO will be used in conjunction with the new adaptive optics system (188 actuators and/or its laser guide star - AO188/LGSAO188) at the Subaru infrared Nasmyth platform. It is designed as a flexible camera comprising several modules that can be configured into different modes of operation. The main modules are the AO module with its future extreme AO capability, the warm coronagraph module, and the cold infrared camera module. HiCIAO can combine coronagraphic techniques with either polarization or spectral simultaneous differential imaging modes with minimizing efforts for un-common path errors. In this contribution, we will outline the HiCIAO instrument, the development status, our proposed campaign on the Subaru 8.2m telescope for extensive exoplanet/disk imaging searches.
				The PIAA (phase-induced amplitude apodization, Guyon 2003) coronagraph uses two mirrors to realize the apodization needed for high contrast imaging for extrasolar planet searches. It achieves a very high throughput and a very small inner working angle (IWA) simultaneously, without being affected too much by resolved stellar disks or telescope tip-tilt errors. However, the PIAA designed to give high contrast by itself would suffer from optics shapes that are difficult to polish,

Shinichro Tanaka	S.Tanaka (Univ. of Tokyo, ISAS/JAXA), O.Guyon (Subaru Telescope), E.A.Pluzhnik (W.M.Keck), L.Abe (NAOJ), K.Enya (ISAS/JAXA), and T.Nakagawa (ISAS/JAXA)	Poster	Laboratory Demonstration of the PIAA/Binary-Mask Hybrid Coronagraph	as well as the reduced bandwidth because of chromatic diffraction. Both these problems can be simultaneously solved by adopting a hybrid PIAA design (Pluzhnik et al. 2006), where the apodization created by the two-mirror system is made moderate combining a classical apodizer with PIAA apodization. We report here the implementation of a hybrid PIAA system with properly designed binary apodization masks, and show in the laboratory that such a combination is a robust approach to high contrast imaging. Thanks to thermal stabilization and mechanical isolation of the whole PIAA optics, the image drift on the final focus is kept quite small (Â` a few pixels in 1-2 hours). Under this stability, standard speckle nulling technique successfully killed broad speckles in half the image plane, and the contrast reached 6.5 Â~10^(-7) at a separation of Â 1.5 lambda/D.
Angelle Tanner		Talk	Companion Survey of SIM PlanetQuest Targets	Over the past two years we have conducted two separate surveys with the Palomar PALAO/PHARO AO+coronagraph system to search for companions around the targets in all three SIM PlanetQuest planet search Key projects. These projects include two surveys to detect terrestrial mass planets around nearby, main-sequence stars (EPIcS, Shao and Marcy - PIs) and one to detect hot Jupiters around young stars in nearby clusters (SIM/YSO, Beichman - PI). Our SIM/YSO sample consists of 40 stars in the Pleiades and Taurus-Aurigae clusters, while the EPIcS sample consists of 40 stars observable from the Northern Hemisphere. At a distance of 130 and 140 parsecs for the Pleiades and Taurus, we are looking within a range of 50 to 1000 AU with the potential of detecting planets down to 10-20 MJ. While the FGK stars are ten times closer, we reach minimum masses of 20-30 MJ due to their older age. Thus far, we have detected 8 potential companions around 5 stars in the Pleiades and 27 potential companions around 13 stars in Taurus. In the EPIcS sample, we have found two confirmed proper motion companions. Follow up observations, including AO imaging and spectroscopy, will be conducted in the next year to prove whether these sources are true companions. This talk will review the findings of these Palomar surveys, as well as additional high contrast Palomar surveys seaching for brown dwarf and planetary companions.
Julien Totems	Julien Totems, Olivier Guyon	Poster	High contrast tests with a PIAA coronagraph in air	The Phase-Induced Amplitude Apodization Coronagraph, which allows high contrast imaging with a small inner working angle, is extremely attractive for future space and ground-based high contrast missions. An experiment is currently under development in our lab at the Subaru Telescope in Hilo, Hawaii, to qualify its capabilities. We will describe the optical configuration adopted and our efforts to stabilize the wavefront in order to improve its perfomance.
Wesley Traub		Talk	Terrestrial Planet Finder project	I will review the status and plans for three versions of TPF (coronagraph, interferometer, and occultor), including how these missions currently might fit into overall NASA plans. I will discuss the full-scale versions of TPF but will also dwell on the possible role of mid-scale and small-scale

				versions for detection and characterization of giant planets, terrestrial planets, and exozodiacal dust.
John Trauger		Talk	ECLIPSE	
John Trauger		Talk	Active wavefront control for high contrast exoplanet imaging from space	Active correction of the optical wavefront is an element of all coronagraphs designed for high-contrast imaging from space. This can be accomplished with one or more deformable mirrors, guided by information from the central star and known characteristics of the coronagraph elements. This is a report of wavefront sensing and control methods used, in the laboratory, to suppress background speckles of starlight to levels more than a billion times fainter than the star at angular separations as small as 4 lambda/D. These methods illustrate a coronagraphic approach to the imaging and spectroscopy of exoplanets as small as an Earth-twin in reflected starlight.
Christophe Verinaud	C. Verinaud, M. Kasper, J.L Beuzit, N. Yaitskova, V. Korkiakoski, K. Dohlen, P. Baudoz, T. Fusco, L. Mugnier, N. Thatte	Poster	EPICS performance evaluation through analytical and numerical modeling	The Science Case of the Exo-Planets Imaging Camera and Spectrograph (EPICS) for the E-ELT is very challenging and calls for the development of new concepts in the field of high contrast imaging. Accurate performance evaluation is of prime importance. We will give an overview of how the EPICS study aims at modeling the instrument as a whole, including the telescope, the instrument with dedicated AO and coronagraphy, and the associated data processing.
Arthur Vigan	Arthur VIGAN, Maud LANGLOIS, Claire MOUTOU, Kjetil DOHLEN, Anthony BOCCALETTI, Marcel CARBILLET	Poster	Characterizing extra-solar planets with long slit spectroscopy	Direct detection of exoplanets is one of the most challenging prospects for astronomical instrumentation today. The SPHERE1 instrument for the VLT (ESO) is currently under development to achieve this goal with very good performance. It aims at detecting exoplanets down to a few masses of Jupiter at distances as close as 0.1â€ to the central star with the use of extreme adaptive optics and coronagraphs. One of its science modules, the Infra-Red Dual Imaging Spectrograph (IRDIS), offers several observing modes. One of them is long slit spectroscopy with low (~40) or medium (~400) resolution that allows measuring the planets spectra once they have been detected by other instrumental configuration. The main problem is to extract a good spectrum of the planet from that of the star. We are facing many difficulties in this task. One of the main limitations is the speckle noise close to the star. Moreover, as we use a dispersive element, the chromatic dependence of the speckle patterns creates a modulation of the spectrum known as speckle chromatism. Finally, we are also facing problems linked to the use of a long slit: Airy patterns of the star modulating the spectrum, difficulty to preserve a continuous slope for the planet spectrum and slit efficiency. Several simulations have been performed using the SPHERE end-to-end simulation package based on CAOS in order to generate images as representative as possible to the one that will be delivered by IRDIS signal. We present here an analysis of the different noise sources and limitations, as well as their influence on the signal. As a result we will also present the current state of the data reduction process that is planned for the slit spectroscopy mode.

John Wilson	Wilson, J.C., Hinz, P., Kenworthy, M., Skrutskie, M., Jones, T.J., Nelson, M., Woodward, C.E., & Garnavich, P.	Poster	LMIRCam 3-5 micron imager for the LBT combined focus	LMIRCam is a 3-5 micron Fizeau imaging channel for use at the combined focus of the Large Binocular Telescope (LBT). LMIRCam is being developed by the University of Virginia, University of Minnesota, Notre Dame and the University of Arizona. It will reside within the 10 micron Nulling Interferometric Camera (NIC). We present this instrument's predicted science capabilities, instrument design, and its potential use as a test bed for complex coronographic methods.
John Wisniewski	J. Wisniewski, M. Clampin, C. Grady, D. Ardila, H. Ford, D. Golimowski, G. Illingworth, & J. Krist	Poster	HST/ACS Coronagraphic Observations of the HD 163296 Circumstellar Disk: Evidence of Time-Variable Self-Shadowing?	We present Hubble Space Telescope Advanced Camera for Surveys (HST/ACS) coronagraphic observations of the Herbig Ae star HD 163296. HD 163296's scattered light disk was resolved in the F606W and F814W filters in observations obtained in 2003 and in the F435W filter in observations obtained in 2004. Analysis of single-epoch data indicates that the disk (V-I) color is redder than the observed stellar (V-I) color. This spatially uniform red disk color might be indicative of either an evolution in the grain size distribution (i.e. grain growth) and/or composition. Both of these processes would be consistent with the observed flat geometry of the outer disk, as diagnosed by the observed r^{-3} power law behavior of its median azimuthally averaged disk surface brightness, which suggest that grain evolution is occurring. Comparison of ACS and STIS epoch scattered light data reveals differences in the observed disk surface brightnesses, of order 1 mag arcsec^{-2}, in both V and white-light filter bandpasses. Along with the observed variability in the visibility and surface brightness of the ansa(e) in the disk, and spectropolarimetric variability of the system, these results suggest that the resolved scattered light disk is variable, a phenomenon not previously observed in any other Herbig protoplanetary system. We speculate that the observed behavior might be attributable to the variable inflation of the scale height of the inner disk wall, which results in variable self-shadowing of the outer disk.
Mark Wyatt		Talk	Debris disk structure arising from planetary perturbations	If there are planets orbiting in a system which also has a debris disk then their gravitational perturbations will impose structure on that disk. This structure is potentially observable leading to the exciting prospect of detecting planets in systems indirectly by looking at the morphology of their debris disks. The 15 or so debris disks which have been imaged are usually not found to be axisymmetric, rather they exhibit asymmetries, clumps, offsets, warps, and spiral structure. Moreover, the same disk when observed at different wavelengths can exhibit different structures. This set of features is exactly that predicted to arise from planetary perturbations, suggesting that we are indeed witnessing the effect of unseen planets. In this talk I will review the ways in which planets impose strucutre on debris disks and how that is manifested in observations of those disks.