Barbara Rojas <babs@astro.cornell.edu>

Cornell University

Poster # 1

Metallicity determination of M dwarfs in the Near Infrared.

Host star metallicity is a determining factor in the abundance of planets. Above solar metallicity, the number of stars with planets and presence of multiple planets increases. M dwarfs planet hosts known to date have shown abundances below solar metallicity when measured with optical spectra and photometry, suggesting that M dwarfs have a planetary formation process that differs from F,G and K dwarfs. This can also be due to statistics,with only few M dwarfs with planetary candidates known, and/or the lack of reliable abundances estimates for this type of stars. Doppler planet search surveys are starting to be undertaken in the near infrared for planets around cool stars, such as Gemini PRVS (Rayner 2006) and T-EDI (Edelstein et al. 2006). T-EDI is an interferometric spectrometer at Palomar Hale 200 that will explore populations of planets around low mass stars that have been excluded from current Radial Velocity (RV) surveys in the optical band. We are investigating metallicity determination of M dwarfs for preparatory science for NIR Radial Velocity surveys.

Aviv Ofir <avivofir@wise.tau.ac.il>

Wise Observatory, Tel Aviv University

Poster # 2

Identifying Transiting Circumbinary Planets

Transiting planets manifest themselves by a periodic dimming of their host star by a fixed amount. On the other hand, light curves of transiting circumbinary (CB) planets are expected to be neither periodic nor to have a single depth while in transit. These properties make the popular transit finding algorithm BLS almost ineffective so a modified version of BLS for the identification of CB planets was developed - CB-BLS. We show that using this algorithm it is possible to find CB planets in the residuals of light curves of eclipsing binaries that have noise levels of 1% and more - quality that is routinely achieved by current ground-based transit surveys. Previous searches for CB planets using variation of eclipse times minima of CM Dra and elsewhere are more closely related to radial velocity than to transit searches and so are quite distinct from CB-BLS. Detecting CB planets is expected to have significant impact on our understanding of exoplanets in general, and exoplanet formation in particular. Using CB-BLS will allow to easily harness the massive ground- and space- based photometric surveys in operation to look for these hard-to-find objects.

Roberto Saito <saito@astro.ufsc.br>

UFSC

Poster # 3

Observing exoplanets from Brazil: the first try

This project consists in mapping a 4 square degrees region searching for Exoplanets using transit methods. This "mini-survey" will be the first use of the 16" robotic telescope developed by Universidade
Federal de Santa Catarina (UFSC-Brazil) and Laboratório Nacional de Astrofísica (LNA/MCT-Brazil). The chosen region is over the Columba constellation and our first observations have shown that we have
enough signal-to-noise ratio to watch for transits on about 20,000 stars with ~ 13-16 mag I, a magnitude range between OGLE and HAT-North projects. Within star sample we expect to find until a dozen of
planets with transits duration of 1-3 hours and magnitude depth from 0.001 to 0.010 mag. As other projects, all information will became public as a VO service.

Andras Pal <apal@cfa.harvard.edu>

Harvard-Smithsonian Center for Astrophysics

Poster # 4

Determination of stellar, orbital and planetary parameters using complete Monte-Carlo analysis: the case of HAT-P-7

The recently discovered transiting very hot Jupiter, HAT-P-7, a planet detected by the telescopes of HATNet, turned out to be among the ones subjected to the highest irradiation from the parent star. As known, the combination of photometric and spectroscopic data for such an object yields the stellar, orbital and planetary parameters. In order to best characterize this particular planet, we carried out a complex analysis based on a complete and simultaneous Monte-Carlo solution using all available data. We included the discovery light curves, partial follow-up light curves, the radial velocity data, and we used the stellar evolution models to infer the stellar properties. This self-consistent way of modeling provides the most precise estimate of the a-posteriori distributions of all of the system parameters of interest, and avoids making assumptions on the values and uncertainties of any of the internally derived variables describing the system. This analysis demonstrates that even partial light curve information can be valuable. This may become very important for future discoveries of planets with longer periods -- and therefore longer transit durations -- where the chance of observing a full event is small.

Mauro Barbieri <mauro.barbieri@oamp.fr>

Laboratoire d'Astrophysique de Marseille

Poster # 5

GJ 436b and HD 17156b eccentric transiting planets: a progress report

We present an updated analysis of transiting eccentric planets GJ 436b and HD 17156b based on new photometric and radial velocity data. Transit of GJ 436 was observed in H band, these data permit to better characterize the orbital parameters of the planet and also to put limits on the presence of other planets in the system. New radial velocity and photometric measurements were obtained for HD 17156 during the transit. We present an updated orbital solution, an updated value for the planet radii, and also new insights on the alignment between the star and planet orbit axis.

Jean-Philippe Beaulieu <beaulieu@iap.fr>

Institut d'Astrophysique de Paris

Poster # 6

Primary transit observations of HD209458b with SPITZER at 3.6 and 5.8 microns

Beaulieu J.P., Carey S., Tinetti G., et al.

Water is predicted to be among the most abundant (if not the most abundant) molecular species after hydrogen in the atmospheres of close-in extrasolar giant planets (hot Jupiters). Several attempts have been made to detect water on such planets, but have either failed to find compelling evidence for it or led to claims that should be taken with caution. Here we report an analysis of recent SPITZER observations of the hot Jupiter HD 209458b taken during the transit, when the planet passed in front of its parent star.

Angelle Tanner <angelle.tanner@jpl.nasa.gov>

Jet Propulsion Laboratory

Poster # 7

Emission Spectroscopy of HD 209458 with Spitzer

In the past few years, we have swiftly moved beyond just detecting transiting hot Jupiters, to identifying organic molecules in their atmospheres. Many of these observations have been done with the Spitzer Space Telescope. Thus far, Spitzer IRS data has been used to successfully probe the atmospheres of HD209458b and HD189733b with intriguing results. Here, we will review a robust data reduction and analysis technique currently being applied to these data sets which increases their achievable absolute calibration precision and dynamic range. In the end, we will show the potential for these observations to estimate molecular abundances in the atmosphere of HD 209458b and will review what their presence reveals about the distribution of heat and atmospheric structure of the planet.

Pavel Machalek <pavel@jhu.edu>

STScI

Poster # 8

Spitzer IRAC Photometry of Extrasolar Planet XO-1b (TBD)

We estimate flux ratios of the extrasolar planet XO-1b to its host star XO-1 at 3.6, 4.5, 5.8 and 8.0-956m with the IRAC on the Spitzer Space Telescope. The fluxes are inconsistent with a canonical cloudless model for the thermal emission from a planet and suggest an atmosphere with a thermal inversion layer and a possible stratospheric absorber. A newly emerging correlation between the presence of a thermal inversion layer in the planetary atmosphere and stellar insolation of the planet is refined. The sub-stellar point flux from the parent star at XO-1b of 8764 0.49 109 erg/s/cm^2 sets a new lower limit for the occurrence a thermal inversion in a planetary atmosphere.

Philip Nutzman <pnutzman@cfa.harvard.edu>

Harvard-Smithsonian Center for Astrophysics

Poster # 9

Spitzer Photometry of a Transit of HD 149026

We present Spitzer 8 micron transit observations of the extrasolar planet HD 149026b. At this wavelength, transit light curves are weakly affected by stellar limb-darkening, allowing for a simpler and more accurate determination of planetary parameters. We measure a planet-star radius ratio of Rp/Rs = 0.0517 +/- 0.0009, and in combination with ground-based data and external constraints on the stellar mass and radius, we derive an orbital inclination of i = 85.2 +/- 0.9 degrees and a planet radius of 0.76 +/- 0.04 Rjup. These measurements are the most precise yet for HD 149026b and further support models of high heavy element abundance for the planet.

Eric Gaidos <gaidos@hawaii.edu>

University of Hawai'i

Poster # 10

Secondary eclipse mapping of a dynamically interacting planet

Eric Gaidos <gaidos@hawaii.edu>

University of Hawai'i

Poster # 11

Detecting the transient atmospheres of transiting hot Earths

Alexis Smith <amss@st-and.ac.uk>

University of St Andrews

Poster # 12

Radio cyclotron emission from extra-solar planets

We present results from an attempt to detect radio emission from the interaction between an extra-solar and its host star. Our observations are informed by a new model which predicts the flux from individual systems, including systems where the planet is predicted to lie within the stellar magnetosphere (Jardine Cameron, in prep.). We monitored the transiting extra-solar planet HD 189733b at a range of orbital phases using the Robert C. Byrd Green Bank Telescope (GBT) to observe over a 40 MHz bandpass centred on 327 MHz. This poster focusses on GBT data spanning ~5.5 hours which encompass the predicted 1h50m secondary eclipse, during which time the observed flux is expected to decrease to zero as the source of the radiation passes behind the star. We present the latest results of this deep search for radio emission from a transiting extra-solar planet.

Gerard Van Belle <gvanbell@eso.org>

European Southern Observatory

Poster # 13

Closure Phase Signatures of Planet Transit Events

Planet transit events present as attractive targets for the ultra-high-resolution capabilities afforded by optical interferometers. Herein is presented an evaluation of the possibility of detection of such events through measurement of high-precision closure phases with the MIRC instrument on the CHARA Array. Recovery of the transit position angle upon the sky appears readily achievable with the existing capabilities of the instrument, along with characterization of other system parameters, such as stellar radius, planet radius, and other parameters of the transit event.

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Max Planck Institute for Astronomy

Poster # 14

AstraLux high-resolution study of the environment around transit planet host stars

Blending of a target star with background stars or binary companions causes several problems in transit surveys. Aside from potentially yielding false positive detections (through eclipses unrelated to the target under study), the mere presence of such blends introduces a bias in the measured baseline brightness, which leads to an under-estimation of the radius of a transiting companion. Follow-up of transiting planet candidates with state-of-the-art high-resolution methods providing diffraction-limited images from the ground can strongly mitigate these problems. We present initial results from a survey with the AstraLux Lucky Imaging camera to search for close neighbours to known exoplanet hosts. So far, three stellar neighbours have been detected close to transiting planet hosts, only one of which was a previously known binary (WASP-2).

William Welsh <wfw@sciences.sdsu.edu>

San Diego State University

Poster # 15

The Transiting System HD 17156

We present an analysis of photometric and radial velocity observations of this long-period, high-eccentricity, high-density transiting planet.

Markus Rabus <mrabus@iac.es>

Instituto de Astrofisica de Canarias

Poster # 16

A search for star spots and variability in transit times in the exoplanet system TrES-1

We observed several transits of the exoplanet TrES-1 distributed over four years from 2004 to 2007. On the basis of these observations and additional published data, we present a study of flux variation inside the transit and a mid-transit time analysis. The aims are to find star spots, causing a increase in flux during the transit, and to find indications of the presence of a third body by analyzing the difference between the calculated and observed transit times.

Isabelle Boisse <iboisse@iap.fr>

Institut d Astrophysique de Paris

Poster # 17

Monitoring HD189733 activity during two rotation periods

Extra-solar planet search programs requiring high-precision velocity measurements need to study how to disentangle radial-velocity variation
due to Doppler motion to the noise induced by stellar activy related phenomena like spots in the photosphere region. We monitored spectroscopic measurements of the active K2V planet host dwarf HD 189733 and his planetary 2.2 -day orbital period companion. After subtracting the orbital motion of the known planet, we compare the variability of activity spectroscopic index to the evolution of the radial-velocity and the shape of spectral lines during two rotation periods of the star. We used the high-resolution spectograph SOPHIE mounted on the 1.93-m telescope at the Observatoire de Haute-Provence to obtain 55 spectra of HD 189733 during two months in order to measure radial velocities, bisectors lines and activity signatures. All these parameters present periodicity around the period star estimation and, moreover, we show that correlation between them is consistent with a model of a spotted stellar surface. So we can monitor activity at the stellar surface with spectroscopic measurements and afterwards subtract estimated radial velocity variation induced by stellar activity to reach a better precision in the search for exoplanetary systems.

Brice Demory <brice-olivier.demory@obs.unige.ch>

Observatoire astronomique de l'Université de Genève

Poster # 18

A 5-Earth-mass planet around GJ436: the power of transit timings

Guillermo Torres <gtorres@cfa.harvard.edu>

Harvard-Smithsonian Center for Astrophysics

Poster # 19

Toward a homogeneous set of transiting planet parameters

With more than 30 transiting exoplanets now known, the time is ripe to seek patterns and correlations among their observed properties, which may give important insights into planet formation, structure, and evolution. This task is made difficult by the widely different methodologies that have been applied to measure their properties in individual cases. Furthermore, in many systems our knowledge of the planet properties is limited by the knowledge of the properties of the parent stars. To address these difficulties we have undertaken the first comprehensive analysis of the data for 23 transiting planets using a uniform methodology. We revisit several of the recently proposed correlations, and find new ones involving the metallicity of the parent stars.

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Observatoire astronomique de l'Université de Genève

Poster # 20

Spectroscopy Photometry combined in a MCMC fitting code, Applications to HD17156b

Combining different types of data is important since the different parameters that are fitted respond differently. By combining some correlations are broken and a model can be created for the system that is consistent with every set. We revisit the detection of the misalignement of HD17156bs orbit with its stars equatorial place discovered by Narita et al. 2008 as an example of the method.

Andrew Carter <a.carter@open.ac.uk>

Open University

Poster # 21

Infra-Red Observations of WASP-2b and WASP-3b using NICMOS G141

We present the results of Hubble Space Telescope observations of the transiting extrasolar planet WASP2b, taken using NICMOS G141. By combining and adapting new techniques for both observation and data reduction, a signal-to-noise ratio of approximately 5000 has been achieved. From this precision, updated planetary parameters will be reported. We will also present results from our analysis of the wavelength dependence of the transit light-curve.

Leslie Hebb <leslie.hebb@st-andrews.ac.uk>

University of St Andrews

Poster # 22

WASP-12b: The hottest yet transiting planet

We report on the discovery of WASP-12b (Mp=1.3 M_J), the hottest yet transiting extra-solar planet. The planet is located in a 1.09 day orbit around its slightly evolved late-F type parent star (Teff=6200K). The incident stellar flux causes a bloated planet radius (Rp=1.7 R_J) and an equilibrium temperature of around 2300K. WASP-12 is likely to be a member of the class of hot Jupiters in which high altitude absorbing elements cause a temperature inversion in the stratosphere. This system is an excellent object for examining hot Jupiter atmospheres and for testing models of hot stratospheres in these objects.

Rodrigo Diaz <rodrigo@iafe.uba.ar>

IAFE

Poster # 23

Detection of period variations in extrasolar planetary companion OGLE-TR-111b.

Two consecutive transits of planetary companion OGLE-TR-111b were observed in the I band and the central times of the transits were measured. Combining these measurements with data from the literature, we find that the observations cannot be explained by a constant period, and that the variations cannot be originated by the presence of an exomoon. However, an exterior perturbing planet having the mass of the Earth could explain the observed effects if the orbit of OGLE-TR-111b is eccentric. The eccentricity needed to explain the observed effects is shown to be consistent with the radial velocity data in the literature.

William Clarkson <clarkson@stsci.edu>

STScI

Poster # 24

Kinematics of the SWEEPS Transiting Planet Candidates

In 2004 a deep sequence of HST images of the Bulge was used to demonstrate sixteen transiting extrasolar planet candidates (the SWEEPS candidates; Sahu et al. 2006), of which at least seven are likely true
planets. Of these, SWEEPS-4 is almost certainly in the disk, and was shown through radial velocity followup to contain a planetary companion; the identification of the remaining fifteen candidates (including at least six planet-hosts) was left undetermined.

We have used a repeat visit in 2006 to attach proper motions to some 180,000 objects, including all sixteen SWEEPS candidates. This has allowed us to build a sample of bulge stars to unprecedented purity. A
population of more than 13,000 bulge objects is kinematically isolated, with fewer than thirty disk contaminants. We use the mean bulge and disk populations to test the balance of kinematic associations for the sixteen SWEEPS candidates, and find that a population including 8-15 bulge objects is consistent with the observed distribution at the 1-sigma level. Assuming both the detectability and the astrophysical false-positive fraction to be similar for disk and bulge, we find the fraction of stars with planets in the bulge to be consistent with that in the disk.

Joseph Harrington <jh@physics.ucf.edu>

University of Central Florida

Poster # 25

A Representative Sample of Hot-Jupiter Secondary Eclipses

Eclipses observed with the Spitzer Space Telescope provide the highest-S/N direct measurements of exoplanets and thus give access to the largest number of planetary atmospheres of any current observing method. To provide direct constraints on models of exoplanetary atmospheres, we are using Spitzer to measure a representative sample of hot-Jupiter infrared brightness temperatures. Planets are selected based on predicted S/N, the quality of parameters not in our control (e.g., system distance), and their predicted temperatures. For the latter, we are populating a plot of predicted vs. observed temperatures. It was an anomaly in this plot that led to the current discussion of TiO and VO in highly-irradiated atmospheres. We present our latest measurements and discuss methods for combating Spitzers peculiar systematic effects.

Nikku Madhusudhan <nmadhu@mit.edu >

MIT

Poster # 26

Exotrojans: Trojan companions to transiting extrasolar planets.

N. Madhusudhan and Joshua N. Winn

Recent studies have indicated the possibility of finding terrestrial-mass Trojans in 1:1 resonance with extrasolar planets. We present an homogeneous search for Trojans in currently known transiting exoplanetary systems. We reanalyze existing radial velocities of known transiting systems, and search for the possibility of Trojans in systems with adequate data. We place 95 percent upper-limits on Trojan masses in the analyzed systems. For the most well-constrained systems, we find upper-limits of the order of 10 Earth masses. We present criteria for the amount and quality of data needed for reliable analyses. Placing significant constraints on the Trojan masses, we discuss possible future work in this direction, and the implications for theoretical models of planet formation.

Jason Barnes <jason@barnesos.net>

NASA Ames Research Center

Poster # 27

Detecting Extrasolar Moons with Kepler

In addition to Earth-sized planets, the Kepler mission has the potential to discover Earth-massed moons. We describe our approach to moon-finding, based on a fusion of the direct-transit and parent-planet-timing-wobble methods suggested by Sartoretti Schneider (1999). We also will present the results from initial tests of the algorithm, conducted with an eye toward understanding the requirements and limitations of the technique for Kepler specifically.

David Latham <dlatham@cfa.harvard.edu>

Harvard-Smithsonian Center for Astrophysics

Poster # 28

The Kepler Input Catalog

NASAs Kepler Mission will observe pre-selected targets. To assist with the selection of optimum targets, we have prepared a catalog of all known objects in the Kepler field of view. We have supplemented the existing JHKs photometry from the 2MASS Catalog with new ground-based photometry in the Sloan griz bands plus D51, a custom filter centered near the Mg b bands for gravity sensitivity. Preliminary builds of the Kepler Input Catalog are now being tested by selected users. Public release of the version that will be used for the selection of the initial target list is scheduled for August 2008.

Jennifer Yee <jyee@astronomy.ohio-state.edu>

The Ohio State University

Poster # 29

Getting More For Your Money: Identifying and Confirming Long-Period Planets with Kepler

Kepler will monitor a sufficient number of stars that it is likely to detect single transits of planets with periods longer than the mission lifetime. We show that by combining the exquisite Kepler photometry of such transits with precise radial velocity observations taken over a reasonable timescale (~ 6 months) after the transits, it is will be possible to estimate the masses and periods of these transiting planets to a factor of less than 2, for planets with radii greater than that of Neptune. Using a Fisher matrix analysis, we derive analytic estimates for the uncertainties in the velocity of the planet and acceleration of the star at the time of transit, which we then use to derive the uncertainties for the planet mass, radius, period, semimajor axis, and orbital inclination. Finally, we explore the impact of orbital eccentricity on the estimates of these quantities.

Akihiko Fukui <afukui@stelab.nagoya-u.ac.jp>

Nagoya University

Poster # 30

Transiting exo-planet search for MOA-I data

Microlensing Observations in Astrophysics (MOA) is one of the microlensing survey groups. Our large photometric data toward the Galactic Bulge taken by 61cm BC telescope at Mt. John observatory in New Zealand from 2000 until 2005 (MOA-I) are very useful for searching transiting objects. We have analyzed these data for detecting planetary transits using the Box-fitting Least Square (BLS) algorithm, and detected some interesting candidates including long period (6 days) and short period (1 day) transits. We present our observation, analysis, and these planetary candidates.

Jason Eastman <jdeast@astronomy.ohio-state.edu>

Ohio State University

Poster # 31

DEMONEX: The DEdicated MONitor of EXotransits

DEMONEX is a low-cost, 0.5 meter, robotic telescope assembled from commercially available parts that will be dedicated to obtaining precise photometry of bright stars with transiting planets. This photometry can be used to provide a homogeneous data set for all transits visible from its location at Winer Observatory in Sonoita, Arizona. In addition, it can be used to search for additional planets via transit timing variations, measure or place limits on the albedos from secondary eclipses, and systematically search known radial velocity planets for those that transit. Despite its modest size, the signal-to-noise ratio per transit will be comparable to that obtained with much larger, 1m-class telescopes because of its short readout time (5 seconds) and high z-band quantum efficiency (65%). However, its main strength is that it will be used every night for transit follow-up and gather an unprecedented data set on transiting planets. From the 30 known transiting and 261 radial velocity planets, 90% of all nights have at least one full event to observe.

Joel Hartman <jhartman@cfa.harvard.edu>

Harvard-Smithsonian Center for Astrophysics

Poster # 32

Deep MMT Transit Survey of the Open Cluster M37

This talk will present the results of a deep (15 < r < 23), 20 night survey for transiting planets in the 550 Myr open cluster M37 using the Megacam wide-field mosaic CCD camera on the 6.5m MMT. We find no candidate planets orbiting cluster members and use this null result to place an upper limit on the fraction of stars with planets as small as 0.5 R_J.

Kenneth Janes <janes@bu.edu>

Boston University

Poster # 33

Why have no transiting planets been found in star clusters

Kenneth Janes and Ji Hyun Kim
Boston University

Since the suggestion by Janes (1996) that star clusters might be attractive targets to search for transiting planets, there have been more than 20 searches in both open and globular clusters. To data, no confirmed hot Jupiter transiting planets have been found in clusters. We review the statistics for finding short-period planets and we summarize the open cluster work to date, including our own (so far negative) search in NGC 7789. While individually, the negative results are not surprising, the consistent failure to find planets in clusters may suggest differences in the formation or evolution of planetary systems in clusters.

Ji Hyun Kim <jhkim26@bu.edu>

Boston University

Poster # 34

Why have no transiting planets been found in star clusters

Kenneth Janes and Ji Hyun Kim
Boston University

Since the suggestion by Janes (1996) that star clusters might be attractive targets to search for transiting planets, there have been more than 20 searches in both open and globular clusters. To data, no confirmed hot Jupiter transiting planets have been found in clusters. We review the statistics for finding short-period planets and we summarize the open cluster work to date, including our own (so far negative) search in NGC 7789. While individually, the negative results are not surprising, the consistent failure to find planets in clusters may suggest differences in the formation or evolution of planetary systems in clusters.

Aldo Stefano Bonomo <aldo.bonomo@oact.inaf.it>

Universite di Catania - INAF

Poster # 35

Comparing the performance of variability filters for the detection of planetary transits in the presence of stellar variability

We have developed a new method to improve the transit detection of Earth-sized planets in front of solar-like stars by fitting stellar microvariability through a spot model. A large Monte Carlo numerical experiment has been designed to test the performance of our approach in comparison with other variability filters and fitting techniques for stars of different magnitudes and planets of different radius and orbital period, as observed by the space experiments CoRoT and Kepler.

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Centro de Astrobiologia, INTA-CSIC, Madrid

Poster # 36

EQUATIONS FOR THE ANALYSIS OF THE LIGHT CURVES OF TRANSITING PLANETS

Several approaches have been followed for the analysis of the light curves of transiting planets. From simple approximate algorithms, and synthetic models, to semi-analytical complete solutions. In this paper, the different alternatives are discussed with their strengths and weaknesses. Practical examples are shown to illustrate the validity range of each of the different set of equations. Furthermore, analytical expressions are used to provide a deeper insight into the main system parameters from the measurement of few strategic points describing the shape of the light curve.

Joshua Carter <carterja@mit.edu>

Massachusetts Institute of Technology

Poster # 37

Analytic Approximations for Transit Light Curve Observables, Uncertainties, and Covariances

The light curve of an exoplanetary transit can be used to estimate the planetary radius and other parameters of interest. Because accurate parameter estimation is a non-analytic and computationally intensive problem, it is often useful to have analytic approximations for the parameters as well as their uncertainties and covariances. Here we give such formulas, for the case of an exoplanet transiting a star with a uniform brightness distribution. We also explore the advantages of some relatively uncorrelated parameter sets for fitting actual data. When limb darkening is significant, our parameter sets are still useful, although our analytic formulas underpredict the covariances and uncertainties.

Tsevi Mazeh <mazeh@wise.tau.ac.il>

Tel Aviv University

Poster # 38

SysRem Analysis of CoRoT Lightcurves

Tsevi Mazeh, Ron Sabo, Suzanne Aigrain, Shay Zucker

We present a preliminary SysRem analysis of the CoRoT first long run LRc01, in order to remove systematic effects from the lightcurves.

SysRem identified a few systematic effects, some of which show autocorrelation of timescale of one day. Removing these effects reduces the RMS of the noise by 20% for the bright stars in the field, for which the noise is of about 0.001 mag. We show some correlation of the effects with the stellar position in the CoRoT field. We discuss the effectiveness of SysRem of the detection threshold of CoRoT.

Dae-Won Kim <dakim@cfa.harvard.edu>

Harvard-Smithsonian Center for Astrophysics

Poster # 39

De-Trending Time Series Data for Wide Field Variability Surveys

We present a new algorithm for removal of trends which are common to time series data of wide field survey. These trends could be caused by various noise sources like cloud passages, change of airmass, gradient of sky background due to the Moon. For a given star we preselect a subset of stars that is within the correlation length on the CCD plane. We then construct trends by selecting stars in that subset which are strongly correlated amongst themselves. Clustering algorithm is used to extract those highly correlated stars. Experimental results with simulated light curves which contain artificial trends are presented. Comparison of our method with other de-trending methods are presented as well. We show results XO-2b transit light curves observed with TAOS (Taiwan-American Occultation Survey) telescopes at 9th Feb. 2008. With our approach of de-trending, we successfully reconstructed the original signal of light curve blended with diverse noise sources.

Brandon Tingley <btingley@ulb.ac.be>

Institut d'Astronomie et d'Astrophysique / Universite Libre de Bruxelles

Poster # 40

Searching for transits in poorly sampled data

The Gaia mission will obtain on the order of 100 high-precision photometric observations over five years for nearly 1 billion stars. The vast number of red dwarves in this data set, with their correspondingly deep transits, makes it worthwhile to explore the possibility of detecting transits in such data. Searching for transits under these circumstances requires a very different approach to that used for a normal, high-sampling-rate transit survey if the search is to be performed in a reasonable amount of time. If the data is as stable and precise as promised, it should be possible to identify a significant percentage of the transiting Hot Jupiter/M dwarf systems in the data set.

Hans Deeg <hjdeeg@gmail.com>

Instituto de Astrofsica de Canarias

Poster # 41

UTM, a universal simulator for lightcurves of transiting systems

Hans J. Deeg (IAC), J. Schneider (Obs. Meudon)

The Universal Transit Modeller (UTM) is a light-curve simulator for all kinds of transiting or eclipsing configurations between arbitrary numbers of several types of objects, which may be stars, planets, planetary moons, and planetary rings. Applications of UTM to date have been mainly in the generation of lightcurves for the testing of detection algorithms. For the preparation of transit detection algorithms for the Corot Mission, a special version has been used to generate multi-color lightcurves in Corots passbands. A separate fitting program, UFIT (Universal Fitter) is part of the UTM distribution and may be used to derive best fits to lightcurves for any set of continuously variable parameters. The combination of UTM/UFIT was used for the fitting of model-curves to observed data of the HD209458 system. UTM/UFIT is written in IDL code and released in the pubic domain under the GNU General Public License. Planned extensions to UTM are the modeling of star-spots and the generation of eccentric orbits.

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Institut d'Astronomie et d'Astrophysique / Universite Libre de Bruxelles

Poster # 42

Towards a fully automated eclipsing binary solver for Gaia: a simple, fast detached binary simulator and a new interacting binary simulator

Gaia, an ESA cornerstone mission, will obtain on the order of 100 high-precision photometric observations over five years for around a billion stars -- several hundred thousand of which will be eclipsing binaries. In order to extract the characteristics of these systems, a fully automated code must be developed. During the process of this development, two tools that may be of use to the transit community have emerged: a very fast, simple detached eclipsing binary simulator/solver based on a new approach and an interacting eclipsing binary simulator with most of the features of the Wilson-Devinney and Nightfall codes, but fully documented and written in easy-to-follow and highly portable Java. Currently undergoing testing, this code includes an intuitive graphical interface and an optimizer for the estimation of the physical parameters of the system.

Scott Fleming <scfleming@astro.ufl.edu>

University of Florida

Poster # 43

Detecting "Temperate" Jupiters: The Prospects of Searching for Transiting Gas Giants in Habitability Zones

We investigate the effects of observing windows on detecting transiting planets by calculating the fraction of planets with a given period that have zero, one (single), two (double), or > 3 (multiple) transits occurring while observations are being taken. We also investigate the effects of collaboration by performing the same calculations with combined observing times from two wide-field transit survey groups. For a representative field of the 2004 observing season, both XO and SuperWASP experienced an increase in single and double transit events by up to 20-40% for planets with periods $14 < P < 150$ days when collaborating by sharing data. For the XO Project using its data alone, between 20-40% of planets with periods 14-150 days should have been observed at least once. For the SuperWASP Project, 50-90% of planets with periods between 14-150 days should have been observed at least once. If XO and SuperWASP combined their observations, 50-100% of planets with periods less than 20 days should be observed three or more times. We find that in general wide-field transit surveys have selected appropriate observing strategies to observe a significant fraction of transiting giant planets with semimajor axes larger than the Hot Jupiter regime. The actual number of intermediate-period transiting planets that are detected depends upon their true semimajor axis distribution and the signal-to-noise of the data.

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Poster # 44

Exoplanets search and characterization with the SOPHIE consortium

The SOPHIE consortium started a large program of exoplanets search and characterization in the Northern hemisphere with the new spectrograph SOPHIE at the 1.93-m telescope of Haute-Provence Observatory, France. SOPHIE is an environmentally stabilized echelle spectrograph dedicated to high-precision radial velocity measurements to carry out systematic searches for exoplanets. The objectives of this program are to characterize the zoo of exoplanets and to bring strong constraints on their processes of formation and evolution using the radial velocity technique. First results of this program are presented, including a hint of detection of a transverse Rossiter-McLaughlin effect, i.e. a star-planet system with a possible spin-orbit misalignment.

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Southwest Research Institute

Poster # 45

Mass and Orbit Determination from TTV

We describe how the short-period variations in the transit timing signal can be used to determine properties of the non-transiting planet such as its mass and orbit. Our method is based on the perturbation theory and requires modest computer resources.

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Université de Provence

Poster # 46

From Stars To Planets : an automated software for the spectral analysis of the stellar population in the CoRoT/Exoplanet fields

A large program of multi-fiber (Flames) spectroscopic observations of the stellar population in the CoRoT/Exoplanet field with the GIRAFFE/VLT, will start in spring 2008. With about 5000 stars observed per semester, it aims at characterizing the brightest dwarf population to carry out the statistical analysis of the planetary population found by CoRoT. To perform such an ambitious analysis, we will use an automated software based on the MATISSE algorithm, originally designed for the GAIA/RVS spectral analysis. This software derives the atmospheric stellar parameters: Effective Temperature, Surface Gravity and the Global Metallicity. Further improvements are foreseen in order to measure also individual abundances. By comparing the main physical and chemical properties of the host stars to those of the stellar population they belong to, this will bring new insights into the formation and evolution of exoplanetary systems and the star-planet connection.

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STScI

Poster # 47

Impact of Orbital Eccentricity on the Detection of Transiting Extrasolar Planets

For extrasolar planets with orbital periods, P < 10 days, radial velocity surveys find non-circular orbital eccentricities are common, e~0.3. Future surveys for extrasolar planets using the transit technique will also have sensitivity to detect these longer period planets. Orbital eccentricity affects the detection of extrasolar planets using the transit technique in two opposing ways: an enhancement in the probability for the planet to transit near pericenter and a reduction in the detectability of the transit due to a shorter transit duration. For an eccentricity distribution matching the currently known extrasolar planets with P10 day, the probability for the planet to transit is ~1.25 times higher than the equivalent circular orbit and the average transit duration is ~0.88 times shorter than the equivalent circular orbit. Since the Kepler search for Earth-sized planets in the habitable zone of a Solar-type star is limited by intrinsic variability, the Kepler mission is expected to have a ~25% higher planet yield than that predicted for circular orbits if the Earth-sized planets have an orbital eccentricity distribution similar to the currently known Jupiter-mass planets.

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Poster # 48

Observability of the General Relativistic Precession of Periastra in Exoplanets.

The general relativistic precession rate of periastra in close-in exoplanets can be orders of magnitude larger than the magnitude of the same effect in Mercury. The realization that some of the close-in exoplanets have significant eccentricities raises the possibility of detecting this precession on time-scales of ~10 years. We show that a measurement of periastra precession can be achieved on this timescale with current observational capabilities by: (1) measuring radial velocity curves with ~100 datapoints at each of two epochs for super-massive, close-in exoplanets orbiting inactive stars (2) measuring the change in the primary transit duration or in the time difference between primary and secondary transits. A combination of radial velocity and transit light curve observations are needed in order to contrast a measurement with the predictions of general relativity and to rule out low-mass companions that may cause changes in the periastra of comparable magnitude as general relativity.

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Poster # 49

The impact of stellar jitter on the radial velocity confirmation of transiting exoplanet candidates around Solar-like stars

The radial velocity technique is commonly used to classify transiting exoplanet candidates. However, intrinsic stellar noise in measured radial velocity (jitter) from a variety of sources over different time scales limits the ability of this technique to characterize transiting terrestrial exoplanet candidates. We use Monte Carlo simulations to test the limits of the radial velocity technique for use in classifying transiting exoplanet candidates for three different observing schemes: radial velocity extrema monitoring, a dedicated single-site campaign, and continuous monitoring. The simulations use models of stellar jitter which can generate both photometry and radial velocity consistent with SOHO/GOLF and SOHO/VIRGO for timescales longer than hours. We demonstrate that the confirmation of an Earth-Sun twin would require approximately a decade of monitoring, regardless of photon noise limits, instrument stability, or the presence of additional planets. We conclude that the classification of transiting terrestrial exoplanet candidates is significantly complicated by intrinsic radial velocity jitter, even in a relatively quiescent star like the Sun.

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Poster # 50

Astro-comb: revolutionizing precision spectroscopy in astrophysics

Searches for extrasolar planets using the periodic Doppler shift of stellar spectral lines have recently achieved a precision better than 60 cm/s. To find a 1-Earth mass planet in an Earth-like orbit, a precision of ~5 cm/s is necessary. The combination of a laser frequency comb with a Fabry-Perot filtering cavity has been suggested as a promising approach to achieve such Doppler shift resolution via improved spectrograph wavelength calibration. Here we report the fabrication of such a filtered laser comb with up to 40 GHz (~1 Angstrom) line spacing, generated from a 1 GHz repetition-rate source, without compromising long-term stability, reproducibility or spectral resolution. This wide-line-spacing comb (astro-comb) is well matched to the resolving power of high-resolution astrophysical spectrographs. The astrocomb shoud allow a precision as high as 1 cm/ s in astronomical readial velocity measurements.

Marie Hrudkova <mariehrudkova@gmail.com>

Charles University

Poster # 51

Searching for transit timing variations in transiting exoplanet systems

Transit timing variations (TTVs) of exoplanetary systems may be indicative of the existence of additional bodies in such systems. Here I investigate TTVs in the transiting systems TrES-1, WASP-1 and WASP-2.

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University of Florida

Poster # 52

Identifying Non-transiting Terrestrial Planets with Transit Timing Data

Both ground- and space-based transit observatories are poised to significantly increase the number of known transiting planets and the number of precisely measured transit times. A planet's transit times represent a clock that can be used to infer the presence of additional planets. Although modeling the transit time variations (TTVs) of a known system is simple, interpreting those variations in terms of the mass and orbital elements of a perturbing planet is much more challenging. Because mutual planetary perturbations are often the dominant source of TTVs, the observable signal can be extremely complex. We have developed a computationally efficient surrogate Bayesian model to assist the interpretation of TTV observations, and report early results from applying our method to systems containing a hot Jupiter and an exterior, less-massive planet. We combine our Bayesian surrogate model with analytic approximations and n-body integrations in order to establish the sensitivity of TTV observations to terrestrial-like planets as a function of the system architecture. Besides aiding the interpretation of future transit timing observations, our results can help maximize the productivity of transit timing follow-up campaigns by guiding survey design decisions such as the choice of targets, required precision, and desired number/time span of TTV observations.

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Michelson Science Center

Poster # 53

Transit Detection of Radial Velocity Planets

Of the known transiting extra-solar planets, a few have been detected through photometric follow-up observations of radial velocity planets. Based upon the known period distribution and radial velocity survey biases, the geometric transit probability leads to an estimate of the expected transit yields from radial velocity surveys. In particular, the radial velocity information can be used to construct an effective photometric follow-up strategy which will provide optimal detection of possible transits. Since the planet-harbouring stars are already known in this case, one is only limited by the photometric precision achievable by the chosen telescope/instrument. The radial velocity modelling code presented here automatically produces a transit ephemeris for each planet dataset fitted by the program. Since the transit duration is brief compared with the fitted period, we calculate the maximum window for obtaining photometric transit observations after the radial velocity data have been obtained, generalizing for eccentric orbits. Finally, we describe how these methods are currently being applied through follow-up observations of transit candidates and southern radial velocity planets.

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Las Cumbres Observatory Global Telescope

Poster # 54

LCOGT Search for Transit-Timing Variations

We use four telescopes at four sites to observe transits of known planets, in search for timing variations caused by additional companions. We describe our observations and analysis methods, and provide preliminary results for the planets TrES-3, WASP-1b and GJ436b.

Veronica Miller <vrl16@student.canterbury.ac.nz>

University of Canterbury

Poster # 55

A survey for transiting planets in the Galactic Plane

We have carried out a deep survey for transiting extrasolar planets in a 1 square degree field in the Galactic Plane. The images were taken using the Wide Field Imager on the ESO 2.2m telescope at La Silla. We present details of the analysis and initial results from the survey.

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STScI

Poster # 56

The XO Constellation

The XO Constellation expands the original XO project (McCullough et al. 2005) from one to three robotic telescopes, for a total of six cameras.

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Cornell University

Poster # 57

Searching for Planets Orbiting Late-type Stars with the TripleSpec Externally Dispersed Interferometer

The TripleSpec Externally Dispersed Interferometer (T-EDI) is a near-infrared spectrograph of moderate resolution with a Michelson interferometer placed before the dispersing element, all attached to the Cassegrain mount of the Palomar 200 Hale Telescope. This novel use of interferometry preserves the Doppler content of narrow spectral features otherwise lost to the point-spread-function of the spectrograph. Together, the spectrograph and interferometer will measure precise radial velocities of late-type stars too faint in the visible for optical radial velocity surveys of planetary companions. The instrument will also serve as an important complement to transit surveys of late-type stars.

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Landessternwarte, Universitat Heidelberg

Poster # 58

PLANETS AROUND GIANT STARS: RESULTS AND PROSPECTS FOR TRANSITS

Since 1999, we have been conducting a radial velocity survey of 179 K giants using the Coude Auxiliary Telescope at Lick Observatory, with 20 to 100 measurements per star obtained until today. The results from this survey indicate that massive planets are much more common around K giants than around G/K main sequence stars, indicating a dependence of the planet mass function on the mass of the parent star. Transits of these planets should be common - but shallow - because of the large sizes of the stars. I will discuss possibilities for giant star transit searches, and what we can learn from them.

Rachael Street <rstreet@lcogt.net>

Las Cumbres Observatory Global Telescope

Poster # 59

Co-ordinated Robotic Follow-Up of Transiting Planet Candidates

Large scale photometric surveys for transiting planets are now able to monitor virtually the entire sky from both hemispheres, producing hundreds of candidate transiting objects. However the problem of distinguishing genuine planetary transits from a host of false positives remains. The wide distribution of the candidates positions necessitates a continuous follow-up program throughout the year, which must be executed on telescopes spread widely both in latitude and longitude. The continual updates to the lists of top candidates and their ephemerides means that the follow-up campaign must be responsive and flexible. Starting in 2007, we have employed robotically scheduled telescopes in an extensive (and ongoing) photometric follow-up campaign of candidates from the SuperWASP project. The facilities of LCOGTN, complemented by the robotic Tenagra 32in telescope, have proven to be well adapted for this task, effectively preselecting targets for concerted radial velocity observations which have confirmed 10 new transiting planets so far. We describe the results of our follow-up to date, noting lessons learnt which will guide the
future development of the LCOGT network.

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The Ohio State University

Poster # 60

The Kilodegree Extremely Little Telescope (KELT)

KELT is a survey for transiting planets orbiting bright stars. Using high-end off-the-shelf devices, we have constructed a very wide-field (26 deg x 26 deg), remotely-operated observing system with which we monitor a large area (~40%) of the northern sky. Current operations are tailored to detect transiting planets around V~8-12 magnitude stars. I summarize the amount of data currently in hand, outline the reduction pipeline, and present the first variables from the main transit survey.

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Caltech

Poster # 61

The NStED Exoplanet Transit Survey Service

The NASA Star and Exoplanet Database (NStED) is a general purpose stellar archive with the aim of providing support for NASAs planet finding and characterization goals, stellar astrophysics, and the planning of NASA and other space missions. There are two principal components of NStED: a database of 140,000 nearby stars and exoplanet-hosting stars, and an archive dedicated to high precision photometric surveys for transiting exoplanets. We present a summary of the NStED Exoplanet Transit Survey Service (NStED-ETSS) content, functionality, tools, and user interface. NStED-ETSS currently serves data from the TrES Survey of the Kepler Field as well as dedicated photometric surveys of four stellar clusters. NStED-ETSS aims to serve both the surveys and the broader astronomical community by archiving these data and making them available in a homogeneous format. Examples of usability of ETSS include investigation of any time-variable phenomena in data sets not studied by the original survey team, application of different techniques or algorithms for planet transit detections, combination of data from different surveys for given objects, statistical studies, etc. We illustrate the use of ETSS and show examples of the data contained in the database.

Solange Ramirez <solange@ipac.caltech.edu>

IPAC

Poster # 62

The NASA Star and Exoplanet Database: Nearby and Exoplanet hosting star Service

Solange Ramirez, B. Ali, G. B. Berriman, N. Chiu, D. Ciardi, J. Good, S. R. Kane, A. C. Laity, D. L . McElroy, S. Monlewitz, A. N. Payne, M. Schmitz, J. Stauffer, K. von Braun, P, Wyatt, A. Zhang

The NASA Star and Exoplanet Database (NStED) is a general purpose stellar archive with the aim of providing support for NASAs planet finding and characterization goals, stellar astrophysics, and the planning of NASA and other space missions. There are two principal components of NStED: a database of 140,000 nearby stars and exoplanet-hosting stars, and an archive dedicated to high precision photometric surveys for transiting exoplanets. We present a summary of the NStED stellar database, functionality, tools, and user interface. NStED currently serves the following kinds of data for 140,000 stars (where available): coordinates, multiplicity, proper motion, parallax, spectral type, multiband photometry, radial velocity, metallicity, chromospheric and coronal activity index, rotation velocity/period, infrared excess, etc.Furthermore, the following derived quantities are given wherever possible: distance, effective temperature, mass, radius, luminosity, age, space motions, and physical/angular dimensions of habitable zone. Queries to NStED can be made using constraints on any combination of the above parameters. In addition, NStED provides tools to derive specific inferred quantities for the stars in the database, cross-referenced with available extra-solar planetary data for those host stars.

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Poster # 63

The WHAT Project

A. Shporer, G. Bakos, T. Mazeh, G. Kovacs, B. Sipocz

WHAT is a small-aperture short focal length automated telescope with an 8.2 x 8.2 deg field of view, located at the Wise Observatory, Israel. The system is similar to the members of HATNet (http://cfa-www.harvard.edu/~gbakos/HAT/) and is aimed at searching for transiting extrasolar planets and variable objects. Operational since 2004, WHAT has accumulated ~100000 exposures, of several fields and was part of the discovery of the transiting planet HD147506b. Further description of WHAT can be found at: http://wise-obs.tau.ac.il/~what.

Stefanie Raetz <straetz@astro.uni-jena.de>

AIU Jena

Poster # 64

Planetary transit observation with the AIU Jena telescope in Groschwabhausen

We have started high precision photometric monitoring observations at the AIU Jena observatory in Groschwabhausen near Jena in fall 2006. Therefore we used the 25.4 cm Cassegrain telescope equipped with an optical CCD-camera mounted picky-pack on a 90 cm telescope. To test the obtainable photometric precision, we observed stars with known transiting planets. We could recover all planetary transits observed by us. We observed the parent star of the transiting planet TrES-2 over a longer period in Groschwabhausen. Between March and November 2007 seven different transit and almost a complete orbital period was analyzed. Overall, in 31 nights of observation 3423 exposures (in total 57.05h of observation) of the TrES-2 parent star were taken. Here, we present our methods and the resulting light curves. Using our observations we could improve the orbital parameters of the system.

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RSAA, Australian National University

Poster # 65

THE SUPERLUPUS DEEP SOUTHERN SURVEY

The SuperLupus project is a deep southern transit survey which will expand the existing Lupus Survey by doubling the number of images (from 1700 to 3400) of the Galactic Plane field (0.66 sq degrees at b=11). This expansion will give us sensitivity to detect planets with periods out to six days and planetary radii down to 0.75 Jupiter radii. It will provide near complete recovery for many transit periods which will allow us to put statistical limits on the numbers of Hot Jupiters in the Galactic Plane. The SuperLupus survey is being conducted in March, April and May 2008 using the ANU 1m telescope at Siding Spring Observatory in Australia. We will detail the increase in sensitivity we will achieve by expanding the original Lupus Survey, contrast the use of aperture photometry with Difference Imaging Analysis for our field, and provide an progress update for the 2008 observations.

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University of Arizona

Poster # 66

Burrell-Optical-Kepler Survey (BOKS): Exo-planet Search In Cygnus

We present results from over 20, continuous days of time series photometric observations of a 1.0 sq. deg field in Cygnus centered on the NASA Kepler Mission field of view. Using the Case Western Burrell Schmidt telescope located at Kitt Peak National Observatory we gathered a dataset containing light curves of almost 35000 stars between 14r19. We have statistically examined each the light curve for each of these to test for variability, periodicity, and unusual light curve trends including exo-planet occultations. We discuss our potential exo-planet candidates. We also present a summary of our photometric project, including many examples of eclipsing binaries and characterization the level and content of stellar variability in this portion of the Kepler field.

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Thüringer Landessternwarte Tautenburg

Poster # 67

The Tautenburg Exoplanet Search Telescope - TEST

Philipp Eigmueller and Jochen Eisloeffel, Thueringer Landessternwarte Tautenburg, Sternwarte 5, D-07778 Tautenburg, Germany

The Tautenburg Exoplanet Search Telescope (TEST) is a robotic telescope system. The telescope uses a folded Schmidt Camera with a 300mm main mirror. The focal length is 940mm and it gives a 2.2 x 2.2 field of view. Dome, mount, and CCD cameras are controlled by a software bundle made by Software Bisque. The automation of the telescope includes selection of the night observing program from a given framework, taking darks and skyflats, field identification, guiding, data taking, and archiving. For the search for exoplanets an automated psf photometry based on IRAF and a lightcurve analysis based on ESO-Midas are conducted. The images and the results are managed using a PostgreSQL database. We will present results on data obtained with this system.

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Observatoire de la Cote d'Azur

Poster # 68

ASTEP South: An Antarctic Search for Transiting Planets around the celestial South pole

Crouzet N., Agabi K., Blazit A., Bonhomme S., Fantei Y., Fressin F., Guillot T., Schmider F.-X., Valbousquet F., Abe L., Daban J.-B., Gouvret C. and the ASTEP team

ASTEP South is the first phase of the ASTEP project that aims to determine the quality of Dome C as a site for future photometric searches for transiting exoplanets and discover extrasolar planets from the Concordia base in Antarctica. ASTEP South consists of a front-illuminated 4k x 4k CCD camera, a 10 cm refractor, and a simple mount in a thermalized enclosure. A double-glass window is used to reduce temperature variations and its accompanying turbulence on the optical path. The telescope is fixed and observes a 4 x 4 field centered on the celestial South pole. With this design, A STEP South should be very stable and observes with low and constant airmass, both being important issues for photometric precision. We present the project, the noise budget, an analysis of test observations around the celestial North pole done in Calern as well as first observations from Concordia.

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Harvard-Smithsonian Center for Astrophysics

Poster # 69

HAT-South, a 3-station global network of small automated telescopes to detect and characterize a large number of transiting exoplanets

Gaspar Bakos, Cristina Afonso, Thomas Henning, Matthew J. Holman, Andres Jordan, Robert W. Noyes, Penny Sackett

HAT-South is a joint effort of the Harvard-Smithsonian Center for Astrophysics (CfA), the Australian National University (ANU) and Max Planck Institute for Astronomy (MPIA) to operate a global network on the Southern hemisphere to detect a large number of relatively bright transiting extrasolar planets. Through its unique capabilities, such as identical instrumentation on the different sites, large field of view (128 square degrees on 16K x 8K pixels per site), and 24-hour data stream, HAT-South will explore the diversity of such systems by finding long-period (up to 15--20 days) and/or shallow transits (down to hot-Neptune size), and other rare phenomena in planetary astrophysics.

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Institut d'Astrophysique de Paris

Poster # 70

HST- STIS/Nicmos observations of the prototype hot-Jupiters: determination of atmospheric constituents and structure

I present a combined re-analysis of the existing HST/STIS observations of HD209458b, yielding a high S/N optical transmission spectrum. Analysis of the observed features can provide detailed atmospheric properties at the terminator of the planet. I will discuss results from this study, which include high altitude depletion of atomic Na, H2 Rayleigh scattering, T-P profile, temperature inversions, and TiO/VO. Details of limb-darkening corrections using 1D stellar models will be presented. In addition, an ongoing Nicmos filter photometry program to detect atmospheric water on HD189733b will also be discussed.

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Poster # 71

Atmospheric profile, Rayleigh scattering, Sodium, TiO and VO abundances in the atmosphere of HD209458b

Using archived time series on STIS, we searched for the presence of TiO and VO species in the atmosphere of HD209458b by comparing a model for the planets transmitted spectrum to multi-wavelength eclipse-depth measurements (from 300 nm to 1000 nm). Depending on the atmospheric profile considered, these molecules were evaluated to match reasonably well the data in abundances from ten to thousand times below solar ones. I will first present the observations which lead to the reevaluation of Sodium abundances in the atmosphere as well as measurements of Rayleigh scattering. This, therefore, allows for the derivation of an atmospheric profile. Secondly, I will present our transmission spectroscopic model at the limb, and discuss the implications of the detections of TiO/VO on the atmosphere and on the characteristics of the planet itself.

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INAF - Osservatorio Astronomico di Palermo

Poster # 72

ON THE FORMATION AND LOSS OF EXOSPHERES OF SHORT-PERIODIC GIANT

The formation of planetary atmospheres and the subsequent thermal loss processes are investigated. We estimate an exosphere formation time which depends on the protoplanetary nebula conditions. In an undisturbed cosmic environment, the formation time for a planetary exosphere ranges between 30 and 180 Myr. This time can be seen as the starting point for atmospheric mass loss. Since the high energy radiation from the host star is most intense during these early stages, the exosphere formation time is a crucial parameter for the atmospheric evolution of close in exoplanets around G stars. For a Jupiter mass planet at 0.02 AU and an exosphere formation time of 30 Myr, 23 % of these planets might be evaporated over 4 Gyr, while this value decreases to 5 % for an exosphere formation time of 180 Myr. The corresponding values for a Neptune mass planet are 45 % and 17 %, respectively. We apply our approach to an initial mass distribution and found that it is consistent with the observed mass distribution of close in gas giants.

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Poster # 73

A Computational Tool to Interpret the Bulk Composition of Solid Exoplanets based on Mass and Radius Measurements

Li Zeng and S. Seager
(Massachusetts Institute of Technology, 77 Massachusetts Ave., Cambridge, MA 02139)

The prospects for finding transiting exoplanets in the range of a few to 20 $M_{\oplus}$ is growing rapidly with both ground-based and spaced-based efforts. We describe a publically available computer code to compute and quantify the compositional ambiguities for differentiated solid exoplanets with a measured mass and radius, including the mass and radius uncertainties.

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Massachusetts Institute of Technology

Poster # 74

An Astrophysical View of the Mass-Radius Relationship for Solid Exoplanets

We show that solid exoplanets have a mass-radius relationship that follows a generic functional form that is not a simple power law: log10 (Rs)=k1+1/3log10(Ms)-k2Msk3 for up to Mp~20 M, where Ms and Rs are scaled mass and radius values. This functional form arises because the common building blocks of solid planets all have equations of state that are well approximated by a modified polytrope of the form =0+cPn. For planets made primarily of iron, silicates, water, and above a few Earth masses, we find that highly detailed planet interior models, including temperature structure and phase changes, are not necessary to derive solid exoplanet bulk composition from mass and radius measurements. From Seager, Kuchner, Hier-Majumder, Militzer, ApJ, 2007.

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University of Arizona

Poster # 75

Formation and Evolution of Planetary Systems: Spitzer Space Telescope Observations Confront Theory

Michael R. Meyer and the FEPS Team (http://feps.as.arizona.edu)

We summarize recent results from the Legacy Science Program entitled Formation and Evolution of Planetary Systems (Meyer et al. 2006). Utilizing all three instruments on the Spitzer Space Telescope, our team observed over 300 sun-like stars (0.7 < M_star < 2.2 Msun) with ages ranging from 3 Myr to 3 Gyr old in order to study the evolution of gas and dust in the circumstellar environment and thus place constraints on theories of planet formation. Results that we will describe include:
1) gas-rich primordial disks from which giant planets form persist 10 Myr (Pascucci et al. 2006)
2) the evolution of hot dust within 1 AU is extremely rapid (Silverstone et al. 2006)
3) processes that are thought to lead to the formation of terrestrial planets could be quite common (Meyer et al. 2008)
4) diverse debris disks surround 10-20 % of sun-like stars (Hillenbrand et al. 2008) and
5) although some stars known to host gas giant planets also sport debris, the physics connecting these phenomenon is unclear (Moro-Martin et al. 2007).

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Columbia University

Poster # 76

Hot Jupiters are complex and varied beasts

While some hot Jupiters seem to maintain the day-night temperature gradient imposed by their asymmetric stellar irradiation, others show evidence of efficient heat redistribution. Several dynamical models have been developed for these atmospheres, showing that complex weather patterns may exist, requiring an understanding beyond a simple parameterization of heat redistribution. One of the brightest hot Jupiters, HD 189733b, seems to have a generally static global temperature structure, based on the similarity between the 8 and 24 micron phase curves (Knutson et al. 2007, 2008), whose observations were separated by a year. However, Charbonneau et al. (2008) found a 2.3 sigma difference between these data and another 8 micron secondary eclipse measurement, which may indicate that this planet has a low level of atmospheric variability superimposed on the static structure. We present similar evidence for low-level variability on another bright hot Jupiter, HD 209458b. We compare analyses of two 24 micron secondary eclipses, with both aperture and optimal photometry. Using the pipeline developed by our team to maximize the signal-to-noise, we find a difference in dayside emission of ~2 sigma. Variability, even at a small level, may provide useful constraints on the climates of these planets.

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University of Florida

Poster # 77

Formation of the Planets and Debris Disk of HD 69830

Matthew J. Payne, Eric B. Ford, Mark Wyatt, Mark C. Booth

The planetary system of HD 69830 is uniquely constrained by observations of (i) an infrared excess indicative of a debris disk with warm dust and (ii) radial velocity variations indicative of three planets. This presents a valuable opportunity to test planet formation models by integrating dynamical models of planetary formation and migration with those for the sculpting of a dust-producing planetesimal disk. We perform n-body simulations and investigate the excitation of both planet and planetesimal eccentricities, the accretion of planetesimals onto the planets, and the clearing of a planetesimal disk by the planets as they grow in mass and migrate through the disk. In simulations tuned to closely follow previous semi-analytic models for the growth and migration of the planets, we find that the inner planet accretes significantly more planetesimals than previously estimated. We find that eccentricity excitation due to mutual planetary perturbations during and after the migration do not naturally produce the observed eccentricities. Our simulations suggest that this discrepancy may be reduced or possibly reconciled, if the planets are significantly more massive (possible if the planetary systems angular momentum were nearly parallel to our line of sight). Even if the planets are significantly more massive than previously assumed, we find that the migrating planets are inefficient at clearing the outer planetesimal disk and that a significant fraction of the planetesimal population beyond 1 AU remains bound on moderately eccentric and inclined orbits. While much of the remaining planetesimal belt would have eroded via a collisional cascade and radiation pressure, we explore whether some of the highly excited plantesimals may be able to persist producing the dust observed in the HD 69830 system for the age of the star.

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Poster # 78

Photometric Follow-up of the Corot Mission

H. J. Deeg and the Corot Photometric Follow-Up Team

The ground-based photometric follow-up plays an important role in the characterization of planet candidates found by the Corot spacecraft. Its principal reason arises from the much higher spatial
resolution of common ground-based telescopes in comparison to Corot's cameras. This allows the recognition of many transit candidates as originating from eclipsing binaries that are contaminating Corot's
lightcurves. For the ground observations, 'on'-'off' photometry is now largely employed, in which only short timeseries during a transit and outside a transit are observed and compared photometrically. During
the first year of Corot's operation, the follow-up has been performed by a dedicated team with access to telescopes with sizes ranging from 1 to 8m, and several examples from this work will be shown.
Experiences and techniques from this work may also be of interest to other transit-detection experiments, when the discovery instrument obtains data with a relatively low spatial resolution.

Lisa Kaltenegger <lkaltene@cfa.harvard.edu>

Harvard-Smithsonian Center of Astrophysics

Poster # 79

Transit Signatures from Super Earth to Earth-like planets

Kaltenegger, L.(1), Segura, A.(2)
(1)Harvard Smithsonian Center for Astrophysics, Cambridge, USA
(2)Instituto de Ciencias Nucleares, Universidad Nacional Autónoma de México

The detection of the first Super Earth planets around Gl581 suggest that super Earths are common. What signatures we can detect on such planets in transit? Can we determine if they are habitable from their transmission spectra? We investigate what signatures can be detected in the atmosphere of transiting rocky Super Earths to Earth like planets around different stellar types and what future instruments would be capable of detecting them.

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Poster # 80

MOST Spacebased Photometry of the Transiting Exoplanet System HD 189733: Precise Timing Measurements for Transits Across an Active Star

We have measured transit times for HD 189733b passing in front of its bright (V = 7.67) chromospherically active and spotted parent star. Nearly continuous broadband optical photometry of this system was obtained with the {\it MOST} (Microvariability \& Oscillations of STars) space telescope during 21 days in August 2006, monitoring 10 consecutive transits. We discuss complications in measuring transit times for a planet that transits an active star with large star spots, and how the transits can help constrain and test spot models. This has implications for the large number of such systems expected to be discovered by the CoRoT and Kepler missions.

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Poster # 81

Searching for Planetary Companions to Ultracool Dwarfs

As a result of their small masses and radii, Ultra Cool Dwarfs (UCDs) may represent excellent targets for searches for extrasolar planets. The precise measurements necessary to detect extrasolar planets orbiting UCDs represent a major challenge. I will discuss two efforts to obtain precise measurements of UCDs in the Near Infrared (NIR). The first involves the robotic NIR observatory PAIRITEL and attempts to obtain photometric precision sufficient for the detection of terrestrial planets transiting UCDs. I will outline the current performance of this systems as well as prospects for milli-mag photometry in the NIR and sensitivity to Earth-mass planets. The second effort involves precise radial velocity measurements of UCDs in the NIR. I will discuss a survey undertaken with the NIRSPEC spectrograph on Keck, the techniques currently employed to obtain radial velocity precision of 200 m/s, and the prospects for improved precision and sensitivity to large terrestrial planets. Lastly, I will describe other important science that can be explored with these data including UCD "weather" and the physical properties of UCDs in spectroscopic binaries.

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TLS Tautenberg

Poster # 82

Planet Formation and the CoRoT planet-population: The launch prediction and first discoveries

The planet populations in the discovery window of the CoRoT space-telescope were studied before its launch on December 27th 2006. We deduce a theoretical prediction of masses and radii based on first principles calculations of planet formation and evolution in the framework of the planetesimal hypothesis but do not a-priori exclude physically possible planets with negligible core. The planetary initial mass functions are determined for the entire range of sensitivity of the CoRoT instrument, i.e. for all giant planets and down to terrestrial planet masses. We construct a comprehensive set of static complete-equilibrium core-envelope protoplanets with detailed equations of state and opacity and energy transfer by convection and radiation. Protoplanets are calculated for host-star masses of 0.8 to 2 solar masses and orbital periods of 1 to 16 days. We subsequently check the stability of the planetary population by a series of methods. We find the static planetary populations to be stable and thus a plausible ensemble to predict the planetary initial mass function for orbital periods in the specified range. Consequently we mix the planetary populations for the various stellar masses according to the distributions found in CoRoTs star-fields to arrive at the prediction for CoRoTs planets.
We predict bimodal planetary initial mass functions with shapes depending on orbital period. The two main maxima are around one Jupiter mass and about 50 Earth masses. We predict an abundant population of Hot Neptunes and a large population of planets that fill the solar system gap of planetary masses between Neptune and Saturn. The theoretical planetary mass distributions are compared to the first discoveries of CoRoT.

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Leiden University

Poster # 83

Groundbased detection of sodium absorption by the atmosphere of the transiting exoplanet HD209458b.

In this talk I will present the first ground-based detection of sodium in the transmission spectrum of HD209458. The results are consistent with those of STIS/HST by Charbonneau (2002). Further we show that the absorption is partly resolved out in narrow band-passes. New observations using UVES/VLT indicate that planetary absorption towards the blue line of the Na D doublet is stronger than towards the red line. I will also present preliminary results on the potassium absorption in HD209458b.

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I. Physikalisches Institut, University of Cologne

Poster # 84

Phase-differential NIR integral field spectroscopy of transiting Hot Jupiters

Transiting exoplanets provide a unique opportunity for follow up exploration through phase-differential observation of their emission and transmission spectra. From such spectra immediate clues about the atmospheric composition and the planets chemistry can be drawn. Such information is of imminent importance for the theory of the formation of planets in general as well as for their particular evolution. Ground-based spectroscopy of exoplanet transits is a needful extension of results already obtained through space-based observations. We present results of an exploratory study to use near-infrared integral field spectroscopy to observe extrasolar planets. We demonstrate how adaptive optics- assisted integral field spectroscopy compares with other spectroscopic techniques currently applied. An advanced reduction method using elements of a spectral-differential decorrelation method is also discussed. We have tested our concept with a K-Band time series observations of HD209458b and HD189733b obtained with SINFONI at the VLT and OSIRIS at Keck during secondary transits.

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Max Planck Institute for Astronomy

Poster # 85

THE IMPACT OF TRANSITING PLANET SCIENCE ON THE NEXT GENERATION OF DIRECT-IMAGING PLANET SEARCHES

Within the next five years, a number of direct-imaging planet search instruments, like the VLT SPHERE instrument, will be coming online. To successfully carry out their programs, these instruments will rely heavily on a priori information on planet composition, atmosphere, and evolution. Transiting planet surveys, while covering a different semi-major axis regime, have the potential to provide critical foundations for these next-generation surveys. For example, improved information on planetary evolutionary tracks may significantly impact the insights that can be drawn from direct-imaging statistical data. Other high-impact results from transiting planet science include information on mass-to-radius relationships as well as atmospheric absorption bands. The marriage of transiting planet and direct-imaging results may eventually give us the first complete picture of planet migration, multiplicity, and general evolution.

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Poster # 86

Inverting Phase Functions to Map Exoplanets

We describe how to generate a longitudinal brightness map for an exoplanet from its phase function light curve. We introduce two models: longitudinal slices of uniform brightness, and sinusoidally varying
maps. The sinusoidal model provides a better fit to the planet's underlying brightness map, although the slice model is more appropriate for light curves which only span a fraction of the planet's orbit.
Regardless of which model is used, we find that there is a maximum of ~5 free parameters which can be meaningfully fit based on a full phase function light curve, due to the insensitivity of the latter to certain modes of the map.

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NASA Postdoctoral Program

Poster # 87

Detection of Planetary Emission from TrES-2 using Spitzer/IRAC

We present here the results of observations of TrES-2 using the nfrared Array Camera on the Spitzer Space Telescope. We monitored this transiting system during two secondary eclipses, when the planetary emission is blocked by the star. The resulting decrease in flux is 0.135 ±0.036%, 0.245±0.027%, 0.162±0.064%, and 0.295±0.066%, at 3.6-µm, 4.5-µm, 5.8-µm, and 8.0-µm, respectively. We do not find evidence for a temperature inversion in the atmosphere of TrES-2, which is predicted by Fortney and collaborators based on the proposed importance of TiO and VO opacities for this highly irradiated gas
giant. We also find the time of the center of the eclipse to be consistent with predictions from transit timing observations of TrES-2. This implies that TrES-2 mostly likely has a circular orbit, and thus does not obtain additional thermal energy from tidal dissipation of a non-zero orbital eccentricity, a proposed explanation of the large planetary radius.

Neale Gibson <ngibson07@qub.ac.uk>

Queen's University

Poster # 88

A search for Earth-sized exoplanets using transit timing

The Transit Timing Method is capable of detecting Earth mass planets around existing Hot Jupiter systems, and is particularly sensitive to those in resonant orbits. I will present high-time resolution transits of HD189733 from the NOT and LT - resulting in timing accuracy approaching 10s. Techniques for fitting the light curves and modeling 3 body systems will be discussed, with an aim to highlight the relative ease with which a TTM signal may be detected, but the difficulty in trying to determine the nature of a third body. First results from RISE (a new fast CCD camera on the Liverpool Telescope designed primarily for Transit Timing) might also be presented.

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Poster # 89

A time-dependent radiative model for the atmosphere of eccentric planets

Out of the 34 transiting planets discovered so far (circa April 2008), 7 have an non-zero-eccentricity. The variation in the planet-star distance can have a large consequence in the stellar flux received by the planet.

We present a time-dependent radiative model for the atmosphere of extrasolar planets in which we take into account the insolation variation around the orbit.

We will investigate the temporal variation of the thermal structure as well as the observable flux.

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Massachusetts Institute of Technology

Poster # 90

A Method to quantify the uncertainties in the interior composition of super Earth and super Neptune exoplanets

Several transiting super-Earths are expected to be discovered in the coming few years. While tools to model the interior structure of transiting planets exist, inferences about the composition are fraught with ambiguities. We present a new approach to quantify the degeneracy in super-Earth and super-Neptune interior compositions. Our model for the interior structure of a differentiated terrestrial planet includes four layers (a core, a mantle, a water ocean, and a gas layer). Coupling this model to a Monte-Carlo scheme, we generate a large statistical ensemble of planet compositions that are consistent with a measured planet mass and radius. By modeling an ensemble rather than a single planet makeup, we can provide the full range of plausible interior compositions for a planet of a measured mass and radius, including uncertainties in the model and the data. Furthermore, our model gives probability distribution functions for internal planet properties of interest (such as core mass fraction, atmospheric surface pressure, or water mass fraction) and can quantify the effect of model priors. We demonstrate our approach with an application to GJ 436b and a putative 10 Earth-mass, 2 Earth-radii super Earth.

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Poster # 91

Preliminary Results on TrES-3 and HAT-P-4 from the NASA EPOXI Mission

S. Ballard (CfA), D. Deming (GSFC), M. AHearn (U. Maryland), R. Barry (GSFC), D. Charbonneau (CfA), J. Christiansen (CfA), D. Hampton (U. Alaska), T. Hewagama (U. Maryland), M. Holman (CfA), K. Klassen (JPL), M. Kuchner (GSFC), C. Lisse (JHU), T. Livengood (NCESSE and GSFC), V. Meadows (U. Washington), J. Pedelty (GSFC), A. Schultz (GSFC), S. Seager (M.I.T.), J. Sunshine (U. Maryland), J. Veverka (Cornell), D. Weldrake (CfA), D. Wellnitz (U. Maryland)

The EPOCh (Extrasolar Planet Observation and Characterization) component of the NASA EPOXI mission, on board the Deep Impact spacecraft, will observe a total of five transiting exoplanet systems. Each of these targets will be observed for several weeks each. The high-precision time series produced from the EPOCh observations, with their substantial phase coverage, may contain evidence for transit timing variations, planetary rings or moons, and transits caused by additional planets. We present preliminary lightcurves spanning times for five secondary eclipses of TrES-3, which has a 31-hour orbital period and hence is a particularly favorable target for attempts to detect the reflected starlight and constrain the geometric albedo. We also examine seven transits of planet HAT-P-4b to search for variations in the times of center of transit that might indicate the presence of a third body in the system. We discuss our characterizations of these planets from their light curves, as well as the limiting factors currently affecting the precision.

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Poster # 92

The EPOXI/EPOCh Investigation of Transiting Planets

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Poster # 93

An Algorithm for the Detection of Transits of Planets Around Eclipsing Binaries

Almenara, J.M. and Deeg, H.J.

We present a matched filter algorithm to detect transits of planets that orbit both components of close eclipsing binaries in CoRoT targets. The formation of binary systems surrounded by disks is one of the most common outcome of stellar formation; their detection would therefore constitute an important discovery. In an eclipsing binary system, the binary-planet alignment gives raised transit probabilities and the special transit shapes from circumbinary planets provide a unique identifier for their planetary nature;
the problematics of false alarms is largely avoided. The data of CoRoT have unprecedent time coverage and photometric precision that make them especially suitable for the search of transits of planets across eclipsing binaries.

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Poster # 94

Application of the TRUFAS detection algorithm to the first two runs of CoRoT.

J. M. Almenara, C. Régulo, H. J. Deeg

TRUFAS is a wavelet-based algorithm developed for the rapid detection of planetary transits in the frame of the COROT space mission (Regulo et al, 2007). We present the application of this algorithm to the first two observing fields of CoRoT data. In these, CoRoT has observed a total of about 20000 stars. The first CoRoT observing run, IRa01, covers 2 months, February and March 2007, followed by the 5 months long run named LRc01. TRUFAS is a very fast algorithm delivering reliable detections. Here we show the results when TRUFAS was applied to these first two sets of data. In the first run, IRa01, TRUFAS found 10 planet candidates and 143 eclipsing binaries and in the LRc01 10 planet candidates and 124 binaries, with a processing that lasted only one night.

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European Space Agency

Poster # 95

The PLATO mission - lessons from CoRoT and Kepler

Exoplanetary research is an integral part of the European Space Agency's Cosmic Vision Plan. One of the first three candidates for a mission is PLATO - a project that for the first time integrates asteroseismology and exoplanetary transits by observing the same objects. Through a proper calibration of the asteroseismological information, and using the data from the GAIA astrometric mission it will be possible to determine exoplanetary radii and masses down to 1-2% (and possibly ages to 300My) for 100000 (nearby) solar type stars, and for a further 500000 stars to somewhat lesser precision. This mission builds on and will build on the experiences and results of CoRoT and Kepler. Planned for a flight in 2017 (and a 6 year mission life time) it is currently being studied industrially in Europe. This paper give some basic information about this mission.

Diana Valencia <>

DEPS Harvard University

Poster # 96

The role of transiting searches in determining super-Earths planetary type

Super-Earths can be either rocky or ocean-like and the first task for understanding these objects is to distinguish between those two possibilities. In this regard, transit searches are going to be essential by providing high precision radius measurements For a given mass, there is a terrestrial threshold radius above which super-Earths are necessarily ocean-like, below this radius, they may be terrestrial. I will talk about the precision that is needed in radius to determine planetary type, and how to properly interpret mass and radius measurements for super-Earths.

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Poster # 97

Observing the evaporation of extrasolar planet(s)

Atomic hydrogen escaping from the planet HD209458b provides the largest observational signature ever detected for an extrasolar planet atmosphere. In fact, the upper atmosphere of this planet is in a hydrodynamical blow-off state; this phenomenon blows the atmosphere beyond the Roche lobe of the planet, thus enhancing its detectability. However, the Space Telescope Imaging Spectrograph (STIS) used in previous studies to detect this effect is not available anymore, whereas the question remains whether the atmospheric escape seen in HD209458b exist in other `hot Jupiters'. The Advanced Camera for Survey (ACS) on board the Hubble Space Telescope (HST) provides an alternative way to study the evaporation of hot Jupiters. A new detection of the evaporation of HD209458b would provide a benchmark observation for other transiting planets, such as HD189733b, in the frame of a comparative study of the evaporation process of hot Jupiters. We report the ACS observations, confirm the evaporating status of HD209458b and compare the results to predictive models of the evaporation.

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Poster # 98

Follow up observations of transiting planet XO-2

We present four full z-band transit light curves for the extrasolar planet XO-2 obtained with KeplerCam and the FLWO 1.2m telescope. The system parameters were determined fitting the data to the transit
models of Mandel and Agol (2002) using a Markov Chain Monte Carlo simulation (MCMC). The main results presented in this poster are revised values for the parameters Rp/Rs, a/Rp and b.

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Poster # 99

Eccentric Planets & Transit Time Variation

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Poster # 100

Transit observation at the observatory in Grossschwabhausen: XO-1 and TrES-1

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Poster # 101

Transiting exoplanet light curve solution by Phoebe code