Abstract booklet

«Detection and dynamics of transiting exoplanets»

23-27 August 2010, Observatoire de Haute Provence

Abstracts for talks

David Charbonneau (inv)
Institute: Harvard Smithsonian Center for Astrophysics, Cambridge

Title 2010: The Year We Make (Second) Contact

Abstract:
The landscale surrounding ground-based surveys for transiting exoplanets has changed dramatically: Eighty transiting exoplanets have been published, dozens more wait in the wings, and both the Corot and Kepler Missions are regularly making new discoveries. The time may soon come when the number of transiting planets discovered from space eclipses that from the ground. I will begin with a review of the recent progress in both ground-based efforts to discover transiting planets, and efforts from both ground and space to characterize these systems. I will then motivate investigations that appear ripe for progress in the coming 5 years, and consider the role of ground-based discovery efforts during this exciting epoch.

Coel Hellier and Francesca Faedi
Institute: Keele University & Queen's University Belfast

Title: New transiting exoplanets and the status of the WASP project.

Abstract:
We present the current status of the WASP search for transiting exoplanets, focusing on recent planet discoveries from WASP-North, WASP-South and the joint equatorial region, and discuss how these contribute to our understanding of planet parameters and their diversity. We report the results of ongoing monitoring of WASP planets, together with observations of the Rossiter-McLaughlin effect and ground-based and space-based detections of the secondary eclipses.

Gaspar Bakos
Institute : Harvard-Smithsonian Center for Astrophysics

Title : Planets from the HATNet project

Abstract :
I will summarize the contribution of the HATNet project to transiting extrasolar planet science, highlighting published planets (HAT-P-1b through HAT-P-16b) as well as new discoveries. I will also brief on operations, data analysis, candidate selection and confirmation.

Isabelle Boisse
Institute : Institut d'Astrophysique de Paris

Title: Disentangling stellar activity and planetary signals

Abstract :
RV planet search surveys as well as follow-up of photometric transit surveys require a deeper understanding and characterization of the effects of stellar activities to disentangle it from planetary signals.
We simulate dark spots on a rotating stellar photosphere. The variations of the photometry, RV and spectral line shapes are characterized and analyzed according to the stellar inclination, the latitude and the number of spots.
The Lomb-Scargle periodograms of the RV variations induced by activity present power at the rotational period Prot of the star and its two-first harmonics Prot/2 and Prot/3. Three adjusted sinusoids fixed at the fundamental period and its two-first harmonics allow to remove about 90% of the RV jitter amplitude. We apply and validate our approach on four known active planet-host stars: HD189733, GJ674, CoRoT-7 and iotaHor.

Joel Hartman
Institute : Harvard-Smithsonian CfA, Cambridge

Title : Blend Analysis of Transiting Planet Candidates

Abstract :
Candidate transiting planet systems discovered by wide-field ground-based surveys must go through an intensive follow-up procedure to distinguish the true transiting planets from the much more common false positives. Especially pernicious are configurations of three or more stars which produce radial velocity and light curves that are consistent with single stars transited by a planet. In this contribution I will describe the methods used by the HATNet team to reject these blends, focusing on the cases of HAT-P-11, HAT-P-12 and a few other systems.

Eike W. Guenther, Andrew Collier Cameron, Iain McDonald
Institute : Thueringer Landessternwarte Tautenburg

Title : A very hot, transiting planet rapidly-rotating A5 star

Abstract:
Up to now, most of the known extrasolar planets orbit slowly-rotating F, G or K stars. In here we report on the detection of a transiting planet orbiting the bright, rapidly rotating A5 star HD15082 (WASP-33, m sini i = 86 km/s). recently made by SuperWASP. Time-resolved spectroscopic observations taken during transit show a hump caused by the planet crossing the line profile. From the analysis of the spectra, we derive the radius of the planet and find that it is orbiting retrograde in respect to the spin of the star. Because of its small distance from an A5 star (the orbital period is only 1.22 days), the equilibrium temperature of the planet is estimated to be 2700 K. The planet is thus one of the hottest planets known. Because of the large UV-flux it receives, and its low density, this planet is presumably also one with a large evaporation rate.

Magali Deleuil (inv)
Institute: Laboratoire d'Astrophysique de Marseille

Title: The CoRoT Exoplanet program : status & results

Abstract:
Transiting extrasolar planets are powerful probes for understanding the properties and physics of these fascinating new worlds. The CoRoT satellite, in full operation since the very beginning of February 2007, is the first instrument hunting for planets from space. The first CoRoT planets exhibit a fascinating diversity in their properties from the first Super-Earth, CoRoT-7b, whose density is similar to the Earth's one to CoRoT-9b, the first temperate hot Jupiter.
CoRoT is also populating the mass-radius diagram of the so-called brown-dwarf desert with the discovery of two transiting companions in the theoretical mass domain of brown dwarfs. Probing the physical properties of such objects could bring the missing clues to understand the link between the population of planets and low-mass stars.
We will review the status of the CoRoT/Exoplanet program, including some elements of the associated follow-up observations. We will then present the CoRoT exoplanetary systems and how they widen the range of properties of the close-in low mass population and contribute to our understanding of the properties of planets.

Juan Cabrera
Institute : Deutsches Zentrum für Luft- und Raumfahrt (DLR)

Title : Factors influencing the number of detections in the CoRoT transit survey

Abstract :
The CoRoT space mission, launched on December 27th 2006, has been developed and is operated by CNES, with the contribution of Austria, Belgium, Brazil , ESA (RSSD and Science Programme), Germany and Spain. CoRoT is a space telescope devoted to the search of transiting planets and the study of asteroseismology.
CoRoT is observing two defined regions of the sky, the CoRoT eyes, one towards the galactic center and another in the opposite direction. We have studied the impact on the number of detections of eclipsing binary stars and planetary transit candidates that has the subjacent stellar population in the different pointings and we have compared this impact with the number of detections as a function of the length of the observations. The published results of CoRoT observations will be presented and analyzed.

Suzanne Aigrain
Institute : University of Oxford

Title: Low-level stellar variability in CoRoT and Kepler data: implications for transit and RV planet detection

Abstract :
Stellar variability is a major issue for planet detection and characterisation in both transit and radial velocity searches. Whilst early results from Kepler (Basri et al. 2010) indicate

that the majority of stars are not more variable than the Sun, there is increasing evidence that activity-induced RV variations will be a limiting factor for the detection of Earth-like planets (see e.g. Meunier et al. 2010a,b). I will present the results of an ongoing analysis of CoRoT and Kepler light curves of hundreds of stars. First, I will describe a range of simple statistics used to characterise their variability level and the associated timescales, and compare them to the stellar properties (spectral type and, where available, activity level). I will then describe a new technique (Aigrain et al. in prep.) to evaluate the likely RV jitter signal for these stars from the light curves alone, without relying on detailed spot modelling. Whilst approximate, this technique is adequate to explore the RV jitter of a population of stars in the statistical sense. I will present the results of its application to the aforementioned sample of CoRoT and Kepler light curves, and discuss implications for small planet detection.

Tsevi Mazeh & Simchon Faigler
Institute: Tel Aviv University

Title: Detection of the ellipsoidal and the relativistic beaming modulations induced by the transiting massive planet/brown dwarf in the CoRoT-3 lightcurve

Abstract:
CoRoT-3b is a 21 Jupiter-mass massive-planet/brown-dwarf object, orbiting an F3-star with a period of 4.2 days. We analyzed the out-of-transit CoRoT-3 red lightcurve and detected the ellipsoidal modulation, with relative amplitude of 6×10^{-5} and half the orbital period, and the relativistic beaming effect, with amplitude of 3×10^{-5} and the orbital period. Phases and amplitudes of both modulations are as predicted by the theory. As both modulations are linear in the mass of the transiting object, and the photometric relativistic beaming effect is proportional to the stellar radial-velocity, the detection of the two modulations in the CoRoT lightcurves can replace in some future cases the necessity for spectroscopic Doppler follow-up observations.

Artie Hatzes
Institute: Thueringer Landessternwarte Tautenburg

Title: The radial-velocity follow-up of CoRoT transiting planets

Abstract:
We report on the results from the radial-velocity follow-up program, performed to establish the planetary nature and characterize the transiting candidates discovered by the space mission CoRoT. We have used the OHP/SOPHIE, ESO/HARPS and KeckI/HIRES spectrographs to collect spectra and highly precise radial velocity (RV) measurements for several dozens different candidates from CoRoT. We have measured the Rossiter-McLaughlin effect of several confirmed planets, especially CoRoT-1b which revealed that it is another highly inclined system. Such high-precision RV data are necessary to the discovery of new CoRoT planets. Furthermore, several low mass planet candidates have emerged from our Keck and HARPS data.

Richard K. Barry
Institute: NASA

Title : Exoplanet HAT–P–11b Secondary Transit Observations

Abstract:
We have conducted secondary eclipse observations of exoplanet HAT–P–11b, recently discovered by proposal G. Bakos and his colleagues. HAT–P–11b is one of the smallest transiting extrasolar planet yet found and one of only two known exo–Neptunes. We have observed the system at 3.6 microns for a period of 22 hours centered on the anticipated secondary eclipse time, to detect the eclipse and determine its phase. Once the secondary eclipse is located through analysis of the data, we will make a more focused series of observations in both the 3.6 and 4.5 micron bands to fully characterize it. HAT–P–11b has a period of 4.8878 days, radius of 0.422 RJ, mass of 0.081 MJ and semi–major axis 0.053 AU. Measurements of the secondary eclipse will clarify two key issues; 1) the planetary brightness temperature and the nature of its atmosphere, and 2) the eccentricity of its orbit, with implications for its dynamical evolution. A precise determination of the orbit phase for the secondary eclipse will also be of great utility for Kepler observations of this system at visible wavelengths.

Christophe Lovis
Institute: Geneva Observatory

Title: A new low-mass multi-planet system

Abstract:
The HARPS survey of nearby FGK stars has unveiled a new low-mass planetary system comprising more planets than any other known system. In this talk we will describe the properties of this system and discuss the implications of this discovery for planet-formation models. We will also highlight some emerging trends related to the Neptune/super-Earth population.

Diana Valencia (inv)
Institute: Observatoire de la Côte d'Azur

Title: Composition and Structure of Super-Earths

Abstract:
Within the research field of exoplanets, we have now formally entered the realm of super-Earths with the discoveries of CoRoT-7b and GJ1214b reported last year. These are the first of many low-mass detections to come in the near future. The first step into characterizing this type of planets is to infer their composition from the available data: masses, radii, orbital distances and irradiation values. I will present results on the structure and composition of these two planets. Owing to the degenerate character of inferring composition, we provide limits to the compositional end-members (amount of H/He, H2O, silicate mantles and iron cores). This information needs to then be reconciled with a formation and evolutionary scenario, thus providing further constraints. While we favor a rocky composition for CoRoT-7b (it has a density of 5.6 g/cc), the presence of an envelope of water vapor above a terrestrial nucleus cannot be discarded. By exploring the fate of its atmosphere we argue that it could have formed as a terrestrial planet or as a giant planet that subsequently suffered atmospheric stripping due to intense irradiation. For GJ1214b's,

we show that given it's mass (of 6.55 earth-masses), its size indicates this is not a solid planet and instead has a large component of volatiles (H/He and/or H2O).

Brice-Olivier Demory
Institute : Massachusetts Institute of Technology

Title: Kepler planet secondary eclipses: detection, statistics, and interpretation.

Abstract :
Secondary eclipses of two dozen transiting Hot Jupiters have been observed at infrared wavelengths with Spitzer so far. Those strongly irradiated objects show temperatures that largely exceed 1000 K. This fact implies that they efficiently absorb visible light from their host stars. The reflected component of the energy budget of Hot Jupiters is thus critical to constrain, by providing insights into their atmospheric properties.
We will present a census of secondary eclipses measurements obtained in the visible with Kepler. We theoretically investigate to what extent we can disentangle contributions from reflected light, thermal reemission from the star incident flux and internal emission from the planet itself, and explore what this can tell us about the population of Kepler planets that show secondary eclipses.

Jean-Michel Desert
Institute : CfA - Harvard Smithsonian

Title: Warm Spitzer studies of the atmospheres of Kepler-detected exoplanets and GJ1214

Abstract :
We propose to present two ongoing projects which aim at characterizing transiting extrasolar planets atmospheres using near-infrared transmission and emission photometric observations with Warm-Spitzer Telescope. We will first briefly review the instrumental performance of the Warm Spitzer mission for exoplanet measurements.
We will then focus the presentation on atmospheric studies of the highly irradiated transiting hot-Jupiters Kepler-5b and Kepler-6b. These targets currently provide amongst of the bests opportunities for studying planetary emission in the optical since they are continuously monitored by the Kepler Space Telescope. By combining secondary eclipse measurements, albedos with Kepler and thermal emissions with Warm-Spitzer, we are able to derive the energy budget of these objects.
Finally, we will present observations obtained with Warm-Spitzer which are used to constrain the atmospheric composition of the transiting Super-Earth GJ1214. We gathered transit light curves at 3.6 and 4.5 microns in order to look for a wavelength dependence to the planetary radius, and more specifically, to search for the presence of water-vapor absorption. These observations should help to distinguish between an hydrogen rich or poor atmosphere, a fundamental question for understanding the nature of this object.

Rosemary Mardling (inv)
Institute: School of Mathematical Sciences, Monash University

Title: Tides and dynamics: an exoplanet treasure trove

Abstract:

Tidal interactions between exoplanets and their host stars are proving to be play an extremely important role in our knowledge and understanding of the origin, internal structure and dynamical evolution of short-period planets and their companions. The current state of a system encodes such information; accurate measurements of key quantities such as the stellar obliquity (the Rossiter-McLaughlin angle), the eccentricity of the shortest-period planet (via Spitzer measurements of the secondary eclipse), and the planet radius therefore tell a story far richer than we dared imagine even a few years ago. I will give a general overview of star-planet tidal evolution, and discuss the influence of companion stars and planets on the observable state of a system. The talk will touch on the theory of tidal inflation, evolution of coplanar systems (fixed-point theory) and mutually inclined systems (Kozai and limit-cycle theory), all of which depend vitally on the so-called Q-values of the short-period planet and star.

Claire Moutou, D. Cebron, M. Le Bars, R. Farès, P. Maubert, P. Le Gal
Institute: Laboratoire d'Astrophysique de Marseille

Title: Tidal instability in planetary systems' evolution

Abstract:
A new element is proposed to play a role in the evolution of extrasolar planetary systems: the elliptical instability. It comes from a parametric resonance and takes place in any rotating fluid whose streamlines are (even slightly) elliptically deformed. Based on theoretical, experimental and numerical work, we estimated the amplitude of the instability for hot-jupiter systems, when the rotation period of the star is known.
We will present the physical process, its application to stars, and preliminary results obtained on a few dozen systems, summarized in the form of a stability diagram. Most of the systems are trapped in the "forbidden zone", where the instability cannot grow anymore. In some systems, the elliptical instability is able to grow, at timescales that are short compared to the system evolution. Implications are discussed in the framework of mis-aligned transiting systems, as the rotational axis of the star would be instable in systems where this elliptical instability grows.

Jeremy Leconte
Institute : CRAL/ENS Lyon

Title: Is tidal heating sufficient to explain Hot Jupiters?: consistent tidal/thermal calculations accounting for finite initial eccentricity.

Abstract :
Based on consistent calculations coupling gravothermal evolution of the planet with complete tidal equations, we revisit the viability of the tidal heating hypothesis to explain the anomalously large radius of transiting giant planets.
We demonstrate, both analytically and numerically, that calculations based on tidal models truncated at second order in eccentricity, as done in all previous studies, lead to quantitatively, and sometimes even qualitatively, erroneous tidal evolutions, with characteristic timescales for the various orbital parameters being wrong by up to three orders in magnitude, leading accordingly to severely erroneous tidal energy dissipation rates during the planet's evolution.
Although tidal heating provides a substantial contribution to the planet heat budget and can explain some of the moderately bloated hot-Jupiters, this mechanism can not explain

alone all the inflated planet properties, mainly because orbit circularization occurs too early in the system's lifetime. Other potential pieces needed to solve the abnormally large exoplanet puzzle are discussed.

David Ehrenreich
Institute: Laboratoire d'astrophysique de Grenoble

Title: Evaporation of Hot-Jupiters: HST observations and models

Abstract:
Among the four hundreds extra-solar planets known, almost 30% orbit closer than 0.1 AU from their parent star. We will review the observations and the corresponding models of the evaporation of these "Hot-Jupiters". The observations started with the discovery made with HST that the planet orbiting HD209458 has an extended atmosphere of escaping hydrogen. Subsequent observations obtained with HST/STIS and HST/ACS confirm the escape of the gas. And, even more, oxygen and carbon have been shown to be present at very high altitude in the upper atmosphere. Observations of other targets like HD189733b and Wasp-12 show that evaporation is a general phenomenon which could contribute to the evolution of planets orbiting close to their parent stars. To interpret these observations, we developed models to quantify the escape rate from the measured occultation depths. Numerous models have also been published to investigate mechanisms which can lead to the estimated escape rate. In general, the high temperature of the upper atmosphere heated by the far and extreme UV combined with the tidal forces allow a very efficient evaporation of the upper atmosphere. We will review the different models and their implications.

Peter Wheatley
Institute : University of Warwick

Title : X-ray/EUV irradiation and the evaporation of transiting planets

Abstract :
I will present X-ray and extreme-ultraviolet observations of the host stars of transiting planets. By making direct measurements of the X-ray irradiation of planets with measured mass loss rates, it is possible to determine the efficiency of planetary evaporation. The systems studied to date include planets known to be undergoing mass loss: HD209458b and HD189733b.
I will also present X-ray monitoring observations designed to search for interactions between the planetary magnetosphere and the corona of the star. Finally, I will present the first X-ray transit observations of a exoplanet.

Christoph Mordasini (inv)
Institute: Max Planck Institute for Astronomy, Heidelberg

Title: Planet formation: comparing theory and observation

Abstract
A review is given of the current understanding how (extrasolar) planets form, focussing mainly on the core accretion paradigm. First, classical models describing the formation of

giant planets are presented. Then, recent developments of this theory are discussed, like the inclusion of migration. Finally, theoretical results are compared with observational data, e.g. for the planetary mass function. Special attention is payed to observational results coming from transiting planets, and how they constrain theoretical formation models.

Gwenaël Boué
Institute: Observatoire de Paris - IMCCE

Title: A collisionless scenario for Uranus tilting

Abstract:
The origin of the high inclination of Uranus' spin-axis (Uranus' obliquity) is one of the great unanswered questions about the solar system. Giant planets are believed to form with nearly zero obliquity, and it has been shown that the present behavior of Uranus' spin is essentially stable. Several attempts were made in order to solve this problem. Here we report numerical simulations showing that Uranus' axis can be tilted during the planetary migration, without the need of a giant impact, provided that the planet had an additional satellite and a temporary large inclination. This might have happened during the giant planet instability phase described in the Nice model. In our scenario, the satellite is ejected after the tilt by a close encounter at the end of the migration. This model can both explain Uranus' large obliquity and bring new constraints on the planet orbital evolution.

Karen Lewis
Institute: Monash University

Title: Moon formation and orbital evolution in extrasolar planetary systems - A literature review

Abstract:
With over 450 extrasolar planets detected, the possibility of searching for moons of these planets is starting to be investigated. In order to make efficient use of limited observing resources, it would be useful if the types of moons that a given planet is likely to host was known prior to detection. Fortunately, informed by simulations of moon formation in our own solar system, as well as more general theoretical investigations of moon orbital evolution, such information is now available. I present a review of literature results concerning the likely physical and orbital properties of extra-solar moons, and how these properties are predicted to vary with the properties of their host planet.

Aurélien CRIDA (inv)
Institute : Université de Nice Sophia-antiplois / CNRS / O.C.A.

Title : Migration scenarii in extrasolar systems

Abstract :
Planets form in protoplanetary gaseous disks. Their gravitational interaction with the latter leads to their orbital migration. This process shapes the planetary systems.
After a short review of the different migration types and the latest discoveries, I will focus on the migration of pairs of planets in resonance. This case is most interesting, as it leads to eccentricity and/or mutual inclination excitation, which could affect the stability of the

system. In addition, under some circumstances, the migration of a pair of planets proceeds outwards, which maybe explains some extrasolar systems like HR8799.

Dr Matthew Payne
Institute : University of Florida

Title : The Formation of Retrograde Planetary Orbits

Abstract :
We consider the growing number of observations of the Rossiter-McLaughlin effect in transiting planets, which seem to suggest that at least 10% of transiting planets are in highly inclined retrograde orbits. We want to investigate the mechanisms that could lead to the formation of such highly inclined planetary orbits. We consider the dense cluster environment in which stars are born and investigate whether perturbations from passing stars can drive planetary systems into retrograde configurations. Our investigation is multifaceted, consisting of (i) Large N simulations of stellar cluster evolution (star-only simulations), (ii) Multiple, detailed simulations of scattering encounters between a multi-planet system and one or more perturbing stars, and (iii) Direct, intermediate-N, simulations of stellar clusters, where each star has an accompanying planetary system and in which all stars and planets in the cluster are modeled as fully interacting massive particles. We find that both multiple encounters and intermediate impact-parameter encounters can result in significantly more inclination excitation than might naively be expected from impulse approximations, leading to several percent of stellar systems possessing planets in retrograde orbits.

Joshua Winn (inv)
Institute: Massachusetts Institute of Technology, Cambridge

Title: The Rossiter-McLaughlin effect for exoplanets

Abstract:
There are now more than 30 cases of stars with transiting planets for which the stellar obliquity - or more precisely its sky projection - has been measured via the eponymous effect of Rossiter and McLaughlin. The history of these measurements is perplexing. For 8 years a case was gradually building that the orbits of hot Jupiters are always well-aligned with the rotation of their parent stars. Then in a sudden reversal, many misaligned systems were found, and it now seems that even retrograde systems are not uncommon. I will review the measurement technique underlying these discoveries, the patterns that have emerged from the data, and the implications for theories of planet formation and migration.

Guillaume Hébrard
Institute : Institut d'Astrophysique de Paris

Title : Exoplanets search and characterization with the SOPHIE spectrograph at OHP

Abstract :
Several programs of exoplanets search and characterization in the Northern hemisphere have been started 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. The objectives of these programs include systematic searches for exoplanets around different types of stars, characterizations of planet-host stars, studies of transiting planets through Rossiter effect, follow-up observations of photometric surveys. Latest SOPHIE results will be presented.

Davide Gandolfi
Institute: Research and Scientific Support Department, ESTEC/ESA

Title: The CoRoT-11 system: a fairly massive hot-Jupiter orbiting a rapidly rotating F6 V star and its peculiar tidal evolution

Abstract:

CoRoT-11b is fairly massive hot-Jupiter (Mp=2.33 MJup) in a 2.99 days orbit around a F6 V star with an age of about 2.0 Gyr. The relatively high vsini=40±5 km/s places CoRoT-11 among the most rapidly rotating planet-hosting stars discovered so far. Assuming that the star is seen almost equator-on, the vsini value and the star radius (R*=1.37 Rsun) translate into a stellar rotation period between 1.5 and 2.0 days, with the planet orbital period close to the 2:1 or 2:3 resonance. This peculiar planet/star configuration offers an unique opportunity to study the tidal evolution of the system. Considering the model for the angular momentum evolution of planet-hosting stars recently presented by Lanza (2010), we conjecture that the star CoRoT-11 suffered a negligible angular momentum loss during its main-sequence lifetime thanks to the presence of its hot-Jupiter. The star-planet interaction led to a compact corona with mainly closed field lines, producing a very small loss of angular momentum through the stellar wind. Owing to the strong tidal interaction, the planet would have moved outwards, from a starting semi-major axis of 0.026 AU corresponding to a 1:1 resonance with the rotation period of the star, to its actual distance. We find that the orbital period of the planet increases at a rate of 0.1 millisecond/year, if the the modified stellar quality factor is Q'=106, leading to a potentially observable transit time variation in about 30 years.

Alexandre Correia (inv)
Institute: Dep. Fisica Univ. Aveiro

Title: Detection and dynamics of multi-planet systems

Abstract:
Stars with more than one planet are among the most interesting systems to be studied, as they resemble more to our Solar System and are very good candidates to host planets like the Earth. However, the exact orbital parameters of these systems are difficult to determine, since the radial velocities signatures overlap. In addition, sometimes the interactions between the planets are strong and the orbits deviate from the traditional Keplerian ellipses, in particular when mean motion resonances are present. Dynamical studies are then very important to fully understand and characterize these systems. The most striking example is the determination of the true masses of the planets, instead of the minimal ones. In this talk we present some techniques used to analyze such complex systems, illustrating with some real examples.

Amaury Triaud

Institute: Observatoire Astronomique de l'Université de Genève

Title: Spin Orbit Angles: Reflections of Dynamics in Systems

Abstract :
I will present recent observations following up targets produced by the WASP consortium using the spectrograph Harps and the Euler Swiss Telescope. Amongst these observations are Rossiter-McLaughlin effects. This effect allows the measurement of the projection on the sky of the spin orbit angle. This angle is a new observable parameter for transiting planets, which is helpful at gaining an insight into the formation and evolution of objects with respect to their probable creation in a disc.
The results show a large variety in the geometry of systems, just like the other observables (orbital eccentricity, orbital separation, planetary mass and planetary densities) cover a large span of values. We have to adjust - again - our models of formation and evolution of systems. The observations will notably allow to probe the relation between circularisation of orbits and coplanarisation.

Darin Ragozzine
Institute : Smithsonian Astrophysical Observatory

Title : The Value of Systems with Multiple Transiting Planets

Abstract :
An anticipated breakthrough in the detection and dynamics of transiting planets is the discovery and characterization of systems with multiple transiting planets. However, the study of transiting exoplanets thus far has focused almost exclusively on systems with only one planet, except for considering the influence of an additional unseen planet on the timing of the transits of the known planet. For the first time, we will discuss in detail the value of systems where multiple planets are seen to transit the same star. In anticipation of their eventual discovery, we show that high-precision lightcurves, such as those now being returned from the Kepler satellite, have the potential to determine the orbital and physical parameters of these multi-transiting systems to high precision. Some of these systems can reveal parameters not otherwise attainable including dynamical masses, true mutual inclinations, and planetary surface brightness variations. In all, we propose that multi-transiting systems will be the most information-rich multi-planet systems besides our own solar system.

Hans J. Deeg (1) and Laurance Doyle (2)
Institute : (1) Instituto de Astrofísica de Canarias , (2) SETI Institute

Title : Detection of planets around binary stars from eclipse reflection

Abstract :
A photometric method to detect planets orbiting around short-periodic binary stars, both eclipsing and non-eclipsing, is presented. It assumes that the planetary orbits are not far from coplanarity with the binary orbit, so that the binary is eclipsing from the position of the planet. An external observer may then recognize the eclipses in the planet's reflected light, with the eclipse amplitudes varying with the amount of reflected light, in dependance on the orbital phase of the planet around the binary. We note that the binary does not have to

be eclipsing for the observer, though more favorable constellations for planet detectability are given for binaries that are eclipsing for both the observer and the planet. These reflected eclipses will occur with a period that is distinct from the binary eclipses. Furthermore, the period of the reflected eclipses will vary slightly due to variations in the light-travel time of the eclipse signal, in dependence on the planet's orbital phase. Some example systems will be shown and their detectability with current and future high-precision photometric surveys be discussed.

Szilard Csizmadia, Tamas Borkovits
Institute : DLR, Institut for Planetary Research, Berlin

Title : Gravitational Perturbations in Exoplanetary Systems

Abstract :
Most of the exoplanets is believed to be lonely planet, but few real planetary systems are also known. Probably there are more planets and small bodies in every system just we did not detected them yet.

To find additional objects in the systems, one promising technique is the so-called transit timing variation method which measures the tiny orbital period changes of a transiting exoplanet and it tries to reconstruct the origin of these changes.

Here I summarize the types of gravitational perturbations in a planetary system, the role of Kozai-resonance in the formation and evolution of the systems. I also present our results about the transiting exoplanet CoRoT-1b.

Norio Narita
Institute : National Astronomical Observatory of Japan

Title : Good Combination of Rossiter-McLaughlin Measurements and Direct Imaging Observations

Abstract :
Among transiting exoplanets, eccentric or highly tilted planets are very interesting targets to study their migration mechanisms by observations. Since such planets are considered to have migrated through planet-planet scattering or Kozai processes, other massive bodies (e.g., massive planets, brown dwarfs, or a binary star) should exist around these planets. In addition, since one cannot tell planet-planet scattering and the Kozai migration by eccentricities nor spin-orbit alignment angles alone, direct imaging gives us useful additional information to distinguish between the two migration mechanisms for these planets. We here present our recent Rossiter-McLaughlin measurements and direct imaging observations with Subaru, including HAT-P-7.

Rudolf Dvorak, J. Schneider and V. Eybl
Institutes : Inst.of Astronomie and Observatoire astronomique de Paris-Meudon

Title: On possibly inclined planets in the system CoRoT-7

Abstract :

The planet CoRoT-7b was discovered due to transit observations from the satellite CoRoT. The system hosts one more planet (CoRoT-7c) and possibly another one. The small eccentricity values deduced from observations do not mean that the other planets are moving in (almost) the same plane with just larger semimajor axes. We postulate that other planets my move on inclined orbits up to retrograde ones and compute how this would influence the duration of the transit (TDV) of CoRoT-7b within the next years. Because this very special extrasolar system has such close in planets the dynamical evolution is quite fast and we may still during the 'life-time ' of the satellite CoRoT observe a TDV of its innermost planet.

Nader Haghighipour
Institute : Institute for Astronomy, University of Hawaii

Title : Constraints From Planet Formation and Migration On The Detection Of Terrestrial Planets Around M Stars using The Transit Timing Variation Method

Abstract :
We have studied the efficiency of the TTV method in detecting terrestrial planets around M stars and have identified regions where habitable super-Earths and habitable moons of giant planets produce high TTV signals. As the strength of TTV signals strongly depend on the orbital architecture of the two planets and intensifies at mean-motion resonances, to determine the probability of the occurrence of such resonant orbits, we have also studied the formation of terrestrial planets during giant planet migration around M stars. Results point to high probabilities for the occurrence only a few resonances and put strong constraints on the efficiency of TTV in detecting terrestrial planets in terms of the mass of the protoplanetary disk, and the mass and rate of the migration of the giant planet. I present the details of our simulations and discuss the implication of the results.

Nicolas Crouzet
Institute: Observatoire de la Côte d'Azur

Title : ASTEP: Towards the detection and characterization of exoplanets from Dome C

Abstract:
The Concordia base in Dome C, Antarctica, is an extremely promising site for photometric astronomy due to the 3-month long night during the Antarctic winter, favorable weather conditions, and low scintillation. The ASTEP project (Antarctic Search for Transiting ExoPlanets) is a pilot project to discover transiting planets, and understand the limits of visible photometry from this site. ASTEP South is the first phase of the project. The instrument is a fixed 10 cm refractor with a 4k x 4k CCD camera in a thermalized box, pointing continuously a 3.88° x 3.88° field of view centered on the celestial south pole. The instrument observed nearly continuously during the 2008 and 2009 Antarctic winters, and the data are of good quality. The weather conditions are estimated from the number of stars detected in the field. For the 2008 winter, the statistics are between 56.3% and 68.4% of excellent weather, 17.9% to 30% of veiled weather and 13.7% of bad weather. Using these results, we show that the detection efficiency of transiting exoplanets in one given field is improved at Dome C compared to a temperate site such as La Silla (Crouzet et al. A&A 2010). The second phase of the project is ASTEP 400, an equatorial 40 cm telescope entirely designed and built for photometry under the extreme conditions of the

Antarctic winter. The instrument is now installed at Concordia. First tests showed that the PSFs are well in the specifications across the field of view. ASTEP 400 has been functioning nominally since the beginning of the first campaign in March 2010, and continuous observations have been carried out. We obtain a dispersion close to 200 ppm for 12 magnitude stars for 1 month lightcurves folded over ~1 day. This shows the high potential of Dome C for photometry, future planet discoveries and planet characterization.

Matthew Holman (inv)
Institute: Harvard-Smithsonian Center for Astrophysics

Title: Dynamics and constraints from transit timing variations of the Kepler planets

Abstract:
For a transiting planet following a fixed Keplerian ellipse, observers would measure a constant interval between successive transits. Orbital precession induced by GR or stellar oblateness could result in a variation of the transit interval for a planet with an eccentric or inclined orbit. Furthermore, tidal dissipation should alter the orbital period of the planet. These slow effects can only be detected over several years. However, the gravitational influence of other planets in the system can yield a detectable change in the transit interval over much shorter time scales. With the precision and continuous monitoring provided by Kepler photometry, the presence of sub-Earth mass planets in resonance, as well as larger planets at a wide range of orbital periods could, in principle, be readily detected. I will present the results of searches for transit timing variations in exoplanet systems observed by Kepler.

Daniel Fabrycky (inv)
Institute: Harvard University, Cambridge

Title:Transit Timing: Detections and Interpretation

In the decade following the discovery of HD 209458b's transits, timing became a big observational business. One reason was that theorists promised the this method would discover small planets and reveal the dynamics of planetary systems. Frustratingly, much of the promise is still future.

First, I show that the blame for the lack of detections in hot Jupiters can be pinned on tidal dissipation, which tends to break mean-motion resonances, the cause of the biggest timing variations. As transit surveys discover planets with larger periapses, the TTV method will take off.

Second, I review and extend the theory of TTV. Tens papers have considered perturbing bodies in various dynamical niches which cause mid-time, duration, and depth variation of various magnitudes. There are several techniques for inverting the observables to learn about the perturbers, but a unique inversion will be very difficult in practice. I emphasize that systems of three or more planets deserve serious future investigation, and they mix even more uncertainty into the inversion effort.

Finally, I discuss the systems with believable TTV that are public by August 2010. I forecast what dynamics we can learn from these systems with future monitoring.

Abstracts for posters

1.Rodrigo F. Díaz
Institute: Institut d'Astrophysique de Paris / Observatoire de Haute Provence

Title: Three new massive companions in the planet-brown dwarf boundary observed with SOPHIE

Abstract:
Only a handful of brown dwarves transiting in front of a stellar primary have been detected so far (Corot-3, Corot-15, NLTT41135). These are precious objects for which the mass and the radius can be -at least in principle- directly measured. On the other hand, the number of objects detected by radial velocity with minimum masses in the brown dwarf regime is only slowly growing. Increasing the statistic of brown dwarfs and massive planets is crucial to understanding planet formation in the high-mass limit.
We report the detection of three massive companions to main-sequence stars based on precise radial velocities obtained with the SOPHIE spectrograph, as part of an ongoing programme to search for extrasolar planets. The minimum masses of the detected companions range from around 16 Mjup to around 60 Mjup, and therefore lie at both sides of the boundary between massive extrasolar planets and brown dwarves.
Additionally, one of the objects (HD22781) exhibits radial velocity variations in excess of the measurement errors, which could be caused by an additional planet in the system.

2.Nuno C. Santos (et al.)
Institute : Centro de Astrofisica, Universidade do Porto

Title : Global results from the HARPS metal-poor sample

Abstract :
In this paper we present the global results of a HARPS-GTO program to search for planets orbiting a sample of metal-poor stars. The finding of this program, namely the detection of three giant planets in long period orbits, will be discussed in the context of the metallicity-giant planet correlation. Implications for models of planet formation and evolution will be presented.

3.Jassur,D.M.;Saeedi,N
Institute: Faculty of physics,Tabriz University,Tabriz-Iran

Title: Analytical computation of photometric elements of exoplanets

Abstract:
Photometric observations of an exoplanet –transit furnish ,in general, a series of discrete measurements of instantaneous brightness changes of host star .Analyzing the data provides information about the photometric elements of the planet and host star. The aim of present paper is to present an analytical computation of the elements based on Fourier

transform technique. An accurate treatment of the light curve was provided using non-linear law for limb darkening of host star and proximity effect including the reflected light from the planet .The method was applied to couple of exoplanets transits.

4.Brigitta Sipocz
Institute : University of Hertfordshire

Title: WFCAM Transit Survey Follow-up Strategy

Abstract :
The WFCAM Transit Survey (WTS) has been obtaining data on the United Kingdom Infrared Telescope since 2007. The WTS targets about 6,000 M dwarfs over several square degrees of sky, and aims to find planets, down to the size of the Earth, transiting M dwarf stars with periods up to a few days. Photometrical follow-up studies are important to verify transit candidates and to obtain high cadence, high signal to noise light curves in the optical band. Low and high resolution spectroscopy is also essential to distinguish planetary and eclipsing binary star systems and to measure planet properties. In my poster I present an overview of our follow-up strategy and summarize the status of the candidates.

5.Kai Ueltzhöffer
Institute : Max-Planck Institut für Astronomie, Heidelberg

Title: Realistic estimation of transit recovery efficiencies only from image timestamps.

Abstract :
Due to the large amount of data and the high complexity of observations and data reduction for transit surveys, the assessment of the expected transit recovery efficiency as function of the physical parameters as well as of the observational strategy (time sampling/ field coverage) is often necessary before the actual light curves are available. This is lead to the development of a graphical tool to assess the recovery efficiencies only from the time sampling scheme of the observations. This was done by simulating realistic light curves with given white and red noise on the timestamps and then using the algorithm given by Pont et al. (2006) to calculate the red signal-to-noise-ratio (SNR) for an ensemble of possible transit parameters. By combining this with "hard" (minimum three transits observed with a given number of points per transit) transit criteria, realistic estimates for the probability of recovering a transit with a given time sampling scheme can be calculated.

6.Michaël Gillon
Institute : University of Liège, Belgium

Title: TRAPPIST: a robotic telescope dedicated to the study of planetary systems.

Abstract:
Transiting exoplanets play a key role in our understanding of the vast population of planets hosted by our Galaxy. Except for the planets of our own solar system, transiting exoplanets are the only ones with accurate estimates of mass, radius, and, by inference, constraints on internal composition. Furthermore, their special geometrical configuration

gives us the opportunity to study directly their atmospheres without the challenging need to spatially resolve their light from that of their host star. On their side, comets provide us with rich insights about the formation of our own solar system.

The poster will present a new project dedicated to the photometric study of these two classes of astronomical objects. Called TRAPPIST (TRAnsiting Planets and PlanetesImals Small Telescope), this project is leaded by the University of Liège (Belgium) , in close collaboration with the Observatory of Geneva (Switzerland). It consists of a 60cm robotic telescope equipped with a high-precision CCD camera. TRAPPIST has been very recently installed at ESO La Silla Observatory in Chile, and is presently in its commissioning phase. The scientific objectives of the project, its design, its status, and some of its first results will be presented.

7.Stephen Kane
Institute: NASA Exoplanet Science Institute

Title: Improving Transit Predictions of Known Exoplanets with TERMS

Abstract :
Thus far, transiting planet discoveries have been largely restricted to the low-periastron distance regime due to the bias inherent in the geometric transit probability. Monitoring known radial velocity planets at predicted transit times is a proven method of detecting transits, and presents an avenue through which to explore the mass-radius relationship of exoplanets in new regions of period/periastron space. Here we describe the refinement of transit ephemerides for known radial velocity planets, the calculation of transit windows, and present results for radial velocity planets which have been successfully monitored during predicted transit times. These methods are currently being implemented by the Transit Ephemeris Refinement and Monitoring Survey (TERMS).

8.**Kaspar von Braun** (1), Stephen R. Kane (1), Suvrath Mahadevan (2), G. Laughlin (3), A. Howard (4), David R. Ciardi (1)
Institute : (1): California Institute of Technology, (2) Penn State University, (3) UC Santa Cruz, (4) UC Berkeley

Title : System Geometries and Transit/Eclipse Probabilities

Abstract :
Transiting exoplanets provide access to data to study mass-radius relation and internal structure of extrasolar planets. Long-period transiting planets allow insight into planetary environments similar to the Solar System where, in contrast to hot Jupiters, planets are not constantly exposed to the intense radiation of their parent stars. Observations of secondary eclipses additionally permit studies of exoplanet temperatures and large-scale exo-atmospheric properties. We show how transit and eclipse probabilities are related to planet-star system geometries, particularly for long-period, eccentric orbits. We illustrate resulting target selection and observational strategies involved in our photometric survey of known radial-velocity planets with the aim of detecting transit signatures (TERMS). In addition to the effects of system geometry, we elaborate on the conditional probability of detecting a transit/eclipse in the presence/absence of its respective counterpart.

9.Daniel Bayliss
Institute : Mt Stromlo Observatory, Australia

Title : The Frequency of Hot Jupiters around Galactic Dwarf Stars

Abstract :
We calculate the frequency of Hot Jupiter planets around Galactic dwarf stars using the results from the SuperLupus transit survey. This survey monitored a single field just off the galactic plane for approximately 100 nights spread over 3 years. The frequency of Hot Jupiters is derived using actual survey results and a realistic Monte Carlo simulation of the survey. We find that just 0.15\% of Galactic dwarf stars host a Hot Jupiter. This frequency is lower than reported by radial velocity surveys, but in close agreement to other transit surveys which have attempted to derive this statistic. The differences between frequencies derived from transit survey and radial velocity surveys are most probably due to the monitoring of slightly different stellar populations.

10.David R. Ciardi
Institute : NExScI/Caltech

Title : Searching for the Youngest Jupiters

Abstract :
Little is known about the distribution and frequency of planets around stars that are 1-100 Myr old -- the time frame in which the giant planets are expected to form and migrate into the inner regions of the stellar systems. We have begun a ground-based program to search for transiting Jupiters in the Orion OB1a region which is 5-10 Myr old. The project is part of the Palomar Transient Factory (PTF) program and has been assigned 40 consecutive nights per year for three years. The project utilizes the Palomar 48" Schmidt telescope and a 12-ccd detector which covers 7 square degrees at 1" per pixel resolution. In the era of CoRoT and Kepler which are revolutionizing our view of exoplanets, ground-based transit studies can still play a vital role in understanding different and unexplored areas of exoplanetary astrophysics.

11.Aviv Ofir
Institute : Tel Aviv University, Israel

Title : The Simultaneous Additive and Relative Sysrem Algorithm

Abstract :
We present the SARS algorithm, which is a generalization of the popular SysRem detrending technique. This generalization allows including multiple external parameters in a simultaneous solution with the unknown effects. Using SARS allowed us to show that the magnitude-dependent systematic effect discovered by Mazeh et al. in the CoRoT data is probably caused by an additive - rather then relative - noise source. A post-processing scheme based on SARS performs well and indeed allows for the detection of new transit-like signals that were not previously detected.

12.**Maximiliano Leonardo Moyano D'Angelo**

Institute : Max Planck Institute for Astronomy

Title : Identification of transiting planet candidates in the LAIWO Survey

Abstract :
We present preliminary results for two fields ("LAIWOIV" and "LAIWOVI") that were monitored during the year 2009 for the search for transiting extrasolar planets, using the new-wide field CCD camera LAIWO (Large Area Imager at the Wise Observatory). LAIWO was built at MPIA in Heidelberg, Germany and it is installed at the Wise Observatory in the Negev desert, Israel. Its total field of view is 59' x 59'. We expect to discover a handful of Hot-jupiters around main-sequence stars with magnitudes down to V=17 in this first year of the survey.

13.Nikolay Nikolov
Institute :Max Planck Institute For Astronomy, Heidelberg

Title: The Search For Planetary Transits With The LAIWO Instrument

Abstract :
The LAIWO (Large Area Imager for the Wise Observatory) project is a deep photometric survey, aiming to detect and characterize transiting extrasolar planets using the 1m Ritchey-Chretien telescope at the Wise Observatory, Israel. We describe the instruments and strategies used by our team, which has been working since 2009. We summarize our detections for two of the observed fields and the difficulties we encountered during the years which include the selection of the most promising candidates and the many astrophysical false positives. Furthermore, we discuss the near future follow up strategy for our best selections.

14.Aldo Stefano Bonomo
Institute : Laboratoire d'Astrophysique de Marseille

Title : Detection of shallow planetary candidates in CoRoT data

Abstract :
The CoRoT space mission searches for planetary transits by monitoring the optical flux of thousands of stars in several fields of view. With the discovery of CoRoT-7b, the first transiting Super-Earth, it has shown the capability to detect short-period rocky planets around solar-like stars. By performing a blind test, which consists in simulating transits of super-Earths and Neptunes in real CoRoT light curves and searching for them blindly, we are able to establish the detection threshold of small size planets in CoRoT data. We investigate the main obstacles to the detection of transiting Super-Earths in CoRoT data, notably the presence of hot pixels and stellar variability of fast rotators. Moreover, we can infer some statistics on the presence of short-period transiting super-Earths and Neptunes in the CoRoT fields of view.

15.Alexandre Santerne
Institute : Laboratoire d'Astrophysique de Marseille

Title : On specific issues of the radial velocity follow-up of CoRoT transiting exoplanets

Abstract :
The current space mission CoRoT is detecting many transiting exoplanets candidates every semester that need ground-based observations with high accuracy spectrographs to follow them up in order to establish their planetary nature and characterize them. Fifteen transiting planets have been confirmed sofar, out of hundreds of blended eclipsing binairies, which mimics planetary transit. These must be discarded by the follow-up observations, including particularly radial-velocity measurements. Moreover, some systematic effects or blended binaries could also mimic planetary variations in radial velocity measurements. I will present specific issues of the radial velocity follow-up of CoRoT transiting exoplanets obtained with OHP/SOPHIE and ESO/HARPS, from the correction of some (strong) systematic effects to the identification of complex blended binaries. I will particularly show some results of a binary blended by a background eclipsing binary or radial velocity measurements of planets affected by the Moon background light.

16.Stanislav Poddaný
Institute : Astronomical Institute, Charles Univesity, V Holešovičkách 2, Prague, Czech Republic

Title : Exoplanet Transit Database

Abstract :
We demonstrate the newly developed resource for exoplanet researchers – The Exoplanet Transit Database. This database is designed to be a web application and it is open for any exoplanet observer. It came on-line in September 2008. The ETD consists of three individual sections. One serves for predictions of the transits, the second one for processing and uploading new data from the observers. We use a simple analytical model of the transit to calculate the central time of transit, its duration and the depth of the transit. These values are then plotted into the observed–computed diagrams (O–C), that represent the last part of the application.
The number of the light curves in the database grow very quickly. After one year of the existence of the database one can found here more than one thousand light curves. Because of this ETD became the largest database of the transiting light curves all around the world and as we hope also a powerful tool for exoplanet researchers. More information about ETD can be found in recently published paper Poddaný et al. (2010).

17.Karen Lewis
Institute: Monash University

Title: Effect of realistic and filtered stellar photometric noise on the detection of moons using photometric transit timing

Abstract:
The photometric transit timing technique was proposed by Szabó et.al. (2006) as a method for discovering moons of transiting extrasolar planets. In the preliminary analysis of this

technique, it was assumed that the noise in the transit lightcurve was well described by uncorrelated white noise, however, this assumption is not necessarily realistic. To determine the effect of using more realistic lightcurves, transit timing uncertainties are calculated for the case of white noise, measured solar photometric noise and measured solar photometric noise that has been filtered. It is found that for light curves contaminated with realistic photometric noise, the transit timing uncertainties are dramatically increased (and thus moon detection dramatically reduced). In addition, we find that while filtering reduced this problem, it did not negate it.

18.Ivanov, V.D., Caceres, C., Minniti, D., et al.
Institute: ESO, Chile

Title: High-Cadence Transit Timing Variation Monitoring of Extrasolar Planets

Abstract:
We carry out a program to measure the transit timing variations of about half a dozen extrasolar planets with high-cadence near-infrared observations. This observing mode allow to achieve more than 90-95 percent of shatter time, increasing the signal-to-noise during the finite-time transits. The short integrations times (0.1-1 sec) allow to avoid defocusing of the telescope and minimize the contamination from the background and nearby stars. The typical accuracy in the timing of an individual transit is 15-20 sec. We report the timing measurements of the observed systems.

Despite its success, this mode of observation exhibits a number of systematic and instrumental effects that constitute its current limitation. Here we present an analysis of these effects as well as an overview of the past and future efforts to solve these problems and improve the precision of the HE mode. These include developing data analysis tools to correct for these effects as well as instrumental improvements to the spectrograph itself.

19.Stefanie Raetz
Institute : Astrophysical Institute and University Observatory

Title : Transit timing, transit depth, and transit duration variation in exoplanet TrES-2?

Abstract :
We report on our ongoing search for timing, duration, and depth variations caused by additional perturbing planets and/or stellar spots and/or moons in the exoplanet TrES-2. In Raetz et al. 2009 we already presented ten different transits obtained with the Cassegrain-Teleskop-Kamera at the University Observatory Jena. Between November 2008 and April 2010 ten additional transits were observed partly with our new Schmidt-Teleskop-Kamera installed in summer 2009 in the Schmidt focus of the 90cm telescope. The timing, depth and duration of each individual event was analyzed and is presented here. We will continue observing TrES-2 to check for timing, depth, and duration variation for the next few years to decades.

20.Gracjan Maciejewski, Ralph Neuhaeuser, et al.
Institute : AIU Jena

Title: Towards the Rosetta Stone of planet formation

Abstract :
Transiting exoplanets (TEPs) observed just a few Myrs after formation of their host systems may serve as the Rosetta Stone for planet formation theories. They would give strong constraints on several aspects of planet formation, e.g. time-scales (planet formation would then be possible within 10 Myrs), the radius of the planet could indicate whether planets form by gravitational collapse (being larger when young) or accretion growth (being smaller when young). We presents a survey which main goal is to find and then characterise TEPs in very young open clusters.

21.David Ehrenreich
Institute: Laboratoire d'astrophysique de Grenoble, Université Joseph Fourier // CNRS

Title: Finding the architects of misaligned planetary systems with deep imaging

Abstract:
The existence of `hot Jupiters' implies a migration mechanism of uncertain nature. Recent measurements of spin-orbit alignment angles in transiting planetary systems suggest that a surprisingly high number of planetary systems could be sculpted by Kozai oscillations, a secular interaction involving a third perturbing body on an inclined orbit. We have started a systematic search for such perturbing companions using high contrast and high angular resolution imaging of planetary systems with different configurations (eccentricity, spin-orbit alignment). Our ideal culprits are brown dwarfs or low-mass stars at distances ranging from 20 to 200AU from the target stars. Their detections (or non-detection!) would bring strong constraints on the origin and formation of planetary systems.

22.**Teruyuki Hirano**
Institute : The University of Tokyo

Title : New Analysis Routine for the Rossiter-McLaughlin Effect

Abstract :
We report the development of a new data analysis routine for the Rossiter-McLaughlin (RM) effect. The radial velocities during transits have been computed with the analysis routines developed for analyzing spectra outside the transits. During a planetary transit, however, lines in a spectrum are distorted due to the partial occultation of a rotating stellar disk. We show that our new RM analysis routine is capable of precisely modeling the spectrum during a transit and extracting the position of the planet on the stellar disk directly from the observed spectrum. Our new routine will not only shorten the time needed to analyze the observation data, but also can remove the systematic errors lurking in the previous analysis of the RM effect.

23.Günther Wuchterl
Institute: Thüringer Landessternwarte Tautenburg, Germany

Title: Planet masses and radii from physical principles

Abstract:
Masses and radii are the primary observables to characterise exoplanets today. A self-consistent theoretical approach is presented that allows to calculate mass- and radii-distributions of exoplanet populations from basic physical principles and avoids the usual parametrisation of a multitude of processes.

The theoretical strategy has two steps:
1) Calculate all planetary equilibria that can satisfy hydrostatic and thermal equilibria in arbitrary but gravitationally stable protoplanetary nebulae and with planetesimal accretion as energy source;
2) Calculate the quasi-hydrostatic evolution of the ensemble of planets found in step one, to the ages that are relevant for observations.

Results are presented for host star masses of 0.4 to 2 times the one of the Sun and orbital periods from 1 to 128 days.

(1) The bi-modality of the mass-distributions is enhanced by the planetary evolution from the formation era into the present.
(2) The observed planetary radii can be explained without the assumption of extra, non-standard energy sources.
(3) A wide gap is found between the transit signals of Pegasi-planets (Hot Jupiters) and the next population towards smaller radii: the Hot Neptunes.

A comparison with CoRoT, Kepler and ground-based results gives a first hint that the approach is useful to understand the observed planets.

24.Hannu Parviainen
Institute : Instituto de Astrofísica de Canarias

Title : Searching for the signs of sping-orbits misalignment from the transit light curve

Abstract:
We investigate whether the transit light curve of CoRoT-11b, a planet transiting a rapidly rotating F star, shows asymmetry over the transit center attributable to spin-orbit misalignment.
Rapidly rotating oblate stars feature an intensity gradient from the stellar equator to the pole due to the gravity darkening. This pole-to-equator gradient breaks the spherical symmetry of the star, and gives us the possibility to gain information about the orbit geometry from the transit light curve not obtainable from transit light curves of spherical stars.
In our analysis we use the original photometric data obtained by the CoRoT satellite. Nevertheless, despite the high accuracy of the data, we are unable to confirm asymmetry detectable within the error limits.

25.Gracjan Maciejewski et al.
Institute : AIU Jena

Title : A search for the transit timing variation

Abstract :
Photometric follow-ups of transiting exoplanets (TEPs) may lead to discoveries of additional, less massive bodies in extrasolar systems. This is possible by detecting and then analysing variations in transit timing of transiting exoplanets (TTV). In 2009 we launched an international observing campaign which aim is to detect and characterise a TTV signal in selected transiting exoplanets. The programme is realised by collecting data from 0.6--2.2-m telescopes spread worldwide at different longitudes. We present our observing strategy and summarise first results for selected TEPs, e.g. we show the TTV signal in WASP-3b with evidence for a 15 Earth-mass perturber in an outer 2:1 orbital resonance (Maciejewski et al., MNRAS in press).

26.Zlatan Tsvetanov
Institute: Johns Hopkins University, Baltimore, MD 21218, USA

Title: Space-based Search for Exoplanets Transiting Bright Stars

Abstract:
I will present a project that uses data from the currently operating space mission STEREO to search for exoplanets transiting bright stars. It will provide a complete survey of all bright stars (<10m) for 18% of the sky. The photometric data series have the sensitivity to detect all transiting hot Jupiters and other gas giants with periods up to ~20 days and even some Neptune size planets orbiting bright and/or late type stars. In my presentation I will describe the capabilities and limitations of the project, will demonstrate the utility of the images for searching for transiting exoplanets, and will describe the existing data for RV discovered planets.

27.Claudio Maccone
Institute : International Academy of Astronautics (IAA) - Paris - France.

Title : Exoplanet Searches by Future Deep Space Missions

Abstract :
The search for extrasolar planets could greatly benefit from gravitational lensing if we could just get to 550 AU from the Sun. This is where the focal sphere of the gravitational lens of the Sun is found in all directions away from the Sun. The Sun's lens would highly intensify there any weak electromagnetic wave reaching the solar system from distant exoplanets in the Galaxy, as shown by this author in his 2009 book "Deep Space Flight and Communications". In this paper, we study this magnifying lens effect for exoplanet searches by future deep space missions.
Reference: C. Maccone, "Deep Space Flight and Communications – Exploiting the Sun as a Gravitational Lens", Springer-Praxis, 2009, ISBN 978-3-540-72942-6.