ExoPlanet News
An Electronic Newsletter

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Contents

1 Editorial

Welcome to the thirty-eighth edition of ExoPlanet News. I think this month's edition may contain a record number of abstracts and figures – thanks for sending so many in. We also have a good selection of conference announcements, so please check those out too.
Remember that past editions of this newsletter, submission templates and other information can be found at the ExoPlanet News website: http://exoplanet.open.ac.uk.
The next edition is planned for the beginning of May 2011. Please send anything relevant to exoplanet@open.ac.uk, and it will appear then.

Best wishes
Andrew Norton & Glenn White
The Open University

2 Abstracts of refereed papers

Are falling planets spinning up their host stars?

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Monthly Notices of the Royal Astronomical Society, in press (arXiv:1103.3599)

We investigate the effects of tidal interactions on the planetary orbits and stellar spin rates of the WASP-18 and WASP-19 planetary systems using a forward integration scheme. By fitting the resulting evolutionary tracks to the observed eccentricity, semi-major axis and stellar rotation rate, and to the stellar age derived from isochronal fitting, we are able to place constraints on the stellar and planetary reduced tidal quality factors, Q'_s and Q'_p. We find that for WASP-18, $\log(Q'_s) = 8.21^{+0.90}_{-0.52}$ and $\log(Q'_p) = 7.77^{+1.54}_{-1.25}$, implying a system age of $0.579^{+0.305}_{-0.250}$ Gyr. For WASP-19 we obtain values of $\log(Q'_s) = 6.47^{+2.19}_{-0.95}$ and $\log(Q'_p) = 6.75^{+1.86}_{-1.77}$, implying a system age of $1.60^{+2.84}_{-0.79}$ Gyr and a remaining lifetime of $0.0067^{+1.1073}_{-0.0061}$ Gyr. We investigate a range of evolutionary histories consistent with these results and the observed parameters for both systems, finding that the majority imply that the stars have been spun up through tidal interactions as the planets spiral towards their Roche limits. We examine a variety of evidence for WASP-19 A's age, both for the value above and for a younger age consistent with gyrochronology, and conclude that the older estimate is more likely to be correct. This suggests that WASP-19 b might be in the final stages of the spiral-in process, although we are unable to rule out the possibility that it has a substantial remaining lifetime.

Download/Website: `http://arxiv.org/abs/1103.3599`

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STEREO observations of stars and the search for exoplanets

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Monthly Notices of the Royal Astronomical Society, accepted for publication (2011arXiv1103.0911W)

The feasibility of using data from the NASA *STEREO* mission for variable star and asteroseismology studies has been examined. A data analysis pipeline has been developed that is able to apply selected algorithms to the entire database of nearly a million stars to search for signs of variability. An analysis limited to stars of magnitude 10.5 has been carried out, which has resulted in the extraction of 263 eclipsing binaries (EBs), of which 122 are not recorded as such in the SIMBAD online database. The characteristics of the *STEREO* observations are shown to be extremely well-suited to variable star studies with the ability to provide continuous phase coverage for extended periods as well as repeated visits that allow both short and long term variability to be observed. This will greatly inform studies of particular stars, such as the pre-cataclysmic variable V471 Tau, as well as entire classes of stars, including many forms of rotational variability. The high-precision photometry has also revealed a potentially substellar companion to a bright (R = 7.5 mag) nearby star (HD 213597), detected with 5 σ significance. This would provide a significant contribution to exoplanet research if follow-up observations ascertain the mass to be within the planetary domain. Some particularly unusual EBs from the recovered sample are discussed, including a possible reclassification of a well-known star as an EB rather than a rotational variable (HR 7355) and several particularly eccentric systems, including very long-period EBs.

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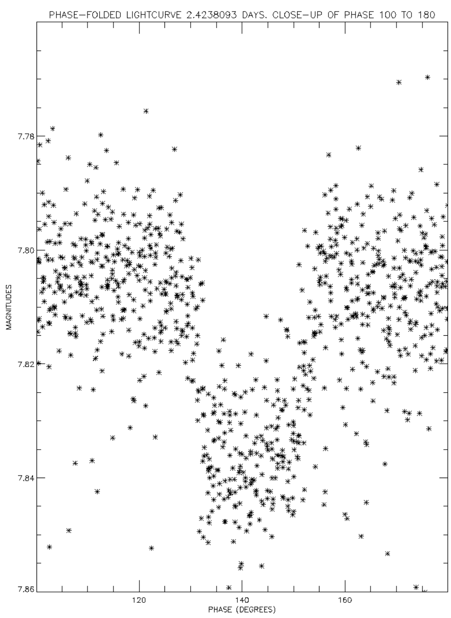

Figure 1: (Wraight et al.) Close-up of the transit of HD 213597, phase-folded on a period of 2.4238 days. This lightcurve was constructed using the latest data available, including updated flat-fields as well as data from *STEREO*/HI-1B

Transit surveys for Earths in the habitable zones of white dwarfs

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Astrophysical Journal Letters, published (2011ApJ...731L..31A/arXiv:1103.2791)

To date the search for habitable Earth-like planets has primarily focused on nuclear burning stars. I propose that this search should be expanded to cool white dwarf stars that have expended their nuclear fuel. I define the continuously habitable zone of white dwarfs, and show that it extends from ≈0.005 to 0.02 AU for white dwarfs with masses from 0.4 to 0.9 $M_\odot$, temperatures less than $\approx 10^4$ K, and habitable durations of at least 3 Gyr. As they are similar in size to Earth, white dwarfs may be deeply eclipsed by terrestrial planets that orbit edge-on, which can easily be detected with ground-based telescopes. If planets can migrate inward or reform near white dwarfs, I show that a global robotic telescope network could carry out a transit survey of nearby white dwarfs placing interesting constraints on the presence of habitable Earths. If planets were detected, I show that the survey would favor detection of planets similar to Earth: similar size, temperature, rotation period, and host star temperatures similar to the Sun. The Large Synoptic Survey Telescope could place even tighter constraints on the frequency of habitable Earths around white dwarfs. The confirmation and characterization of these planets might be carried out with large ground and space telescopes.

Download/Website: `http://arxiv.org/abs/1103.2791`

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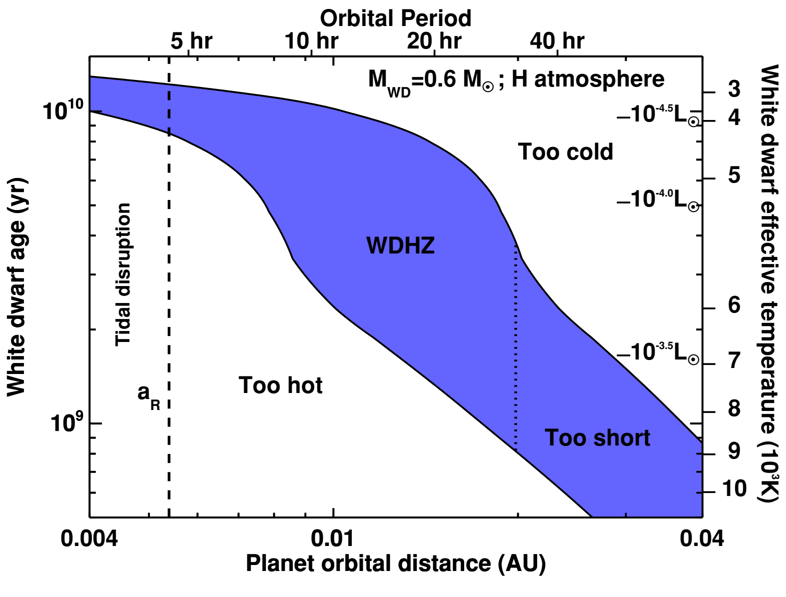

Figure 2: (Agol) White dwarf habitable zone (WDHZ) for $M_{\rm WD} = 0.6 M_\odot$ a CO white dwarf with hydrogen atmosphere vs. white dwarf age and planet orbital distance. Blue region denotes the WDHZ. Dashed line is Roche limit for Earth-density planets. Planets to right of dotted line are in the WDHZ for less than 3 Gyr. WDHZ is based on cooling tracks of Bergeron et al. (2001) and the maximum habitable zone versus effective temperature and flux of Kasting et al. (1993). Planet orbital period is indicated on the top axis; and white dwarf effective temperature on the right axis. Luminosity of the white dwarf at different ages are indicated on right.

***HST*/STIS Lyman-α observations of the quiet M dwarf GJ 436: Predictions for the exospheric transit signature of the hot neptune GJ 436b**

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Astronomy & Astrophysics, in press (arXiv:1103.0009)

Lyman-α (Lyα) emission of neutral hydrogen (λ1 215.67 Å) is the main contributor to the ultraviolet flux of low-mass stars such as M dwarfs. It is also the main light source used in studies of the evaporating upper atmospheres of transiting extrasolar planets with ultraviolet transmission spectroscopy. However, there are very few observations of the Lyα emissions of quiet M dwarfs, and none exist for those hosting exoplanets. Here, we present Lyα observations of the hot-neptune host star GJ 436 with the *Hubble Space Telescope* Imaging Spectrograph (*HST*/STIS). We detect bright emission in the first resolved and high quality spectrum of a quiet M dwarf at Lyα. Using an energy diagram for exoplanets and an N-body particle simulation, this detection enables the possible exospheric signature of the hot neptune to be estimated as a $\sim 11\%$ absorption in the Lyα stellar emission, for a typical mass-loss rate of 10^{10} g s^{-1}. The atmosphere of the planet GJ 436b is found to be stable to evaporation, and should be readily observable with *HST*. We also derive a correlation between X-ray and Lyα emissions for M dwarfs. This correlation will be useful for predicting the evaporation signatures of planets transiting other quiet M dwarfs.

Download/Website: `http://arxiv.org/abs/1103.0009`

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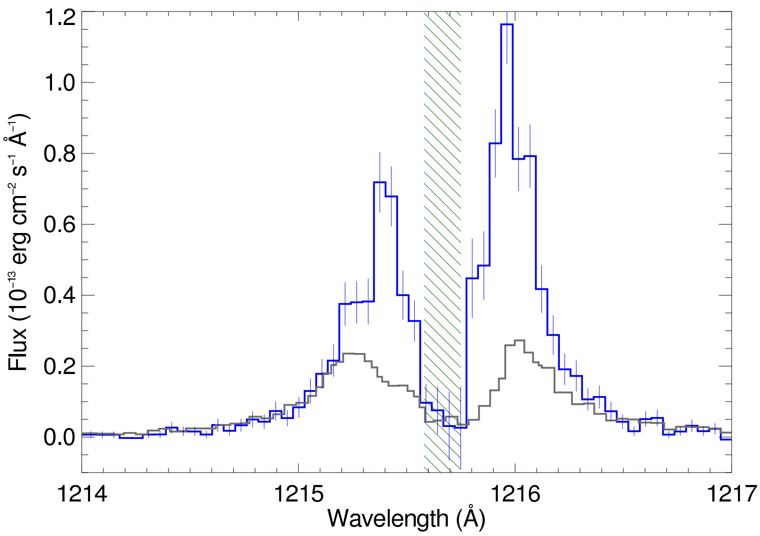

Figure 3: (Ehrenreich et al.) The Lyα line of GJ 436 measured with STIS/G140M with error bars from the STIS pipeline (blue curve). The STIS spectrum of HD 209458 obtained by Vidal-Madjar et al. (2003) is shown for comparison (grey curve). As seen from Earth, the nearby M dwarf clearly shows a more intense stellar emission and a narrower ISM absorption. The location of the air glow (subtracted here) is indicated by green hatches.

Mass-loss rates for transiting exoplanets

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Astronomy & Astrophysics, in press (arXiv:1103.0011)

Exoplanets at small orbital distances from their host stars are submitted to intense levels of energetic radiations, X-rays, and extreme ultraviolet (EUV). Depending on the masses and densities of the planets and on the atmospheric heating efficiencies, the stellar energetic inputs can lead to atmospheric mass loss. These evaporation processes are observable in the ultraviolet during planetary transits. The aim of the present work is to quantify the mass-loss rates ($\dot{m}$), heating efficiencies (η), and lifetimes for the whole sample of transiting exoplanets, now including hot jupiters, hot neptunes, and hot super-earths. The mass-loss rates and lifetimes are estimated from an "energy diagram" for exoplanets, which compares the planet gravitational potential energy to the stellar X/EUV energy deposited in the atmosphere. We estimate the mass-loss rates of all detected transiting planets to be within 10^6 to 10^{13} g s^{-1} for various conservative assumptions. High heating efficiencies would imply that hot exoplanets such the gas giants WASP-12b and WASP-17b could be completely evaporated within 1 Gyr. We also show that the heating efficiency can be constrained when $\dot{m}$ is inferred from observations and the stellar X/EUV luminosity is known. This leads us to suggest that $\eta \approx 100\%$ in the atmosphere of the hot jupiter HD 209458b, while it could be lower for HD 189733b. Simultaneous observations of transits in the ultraviolet and X-rays are necessary to further constrain the exospheric properties of exoplanets.

Download/Website: `http://arxiv.org/abs/1103.0011`

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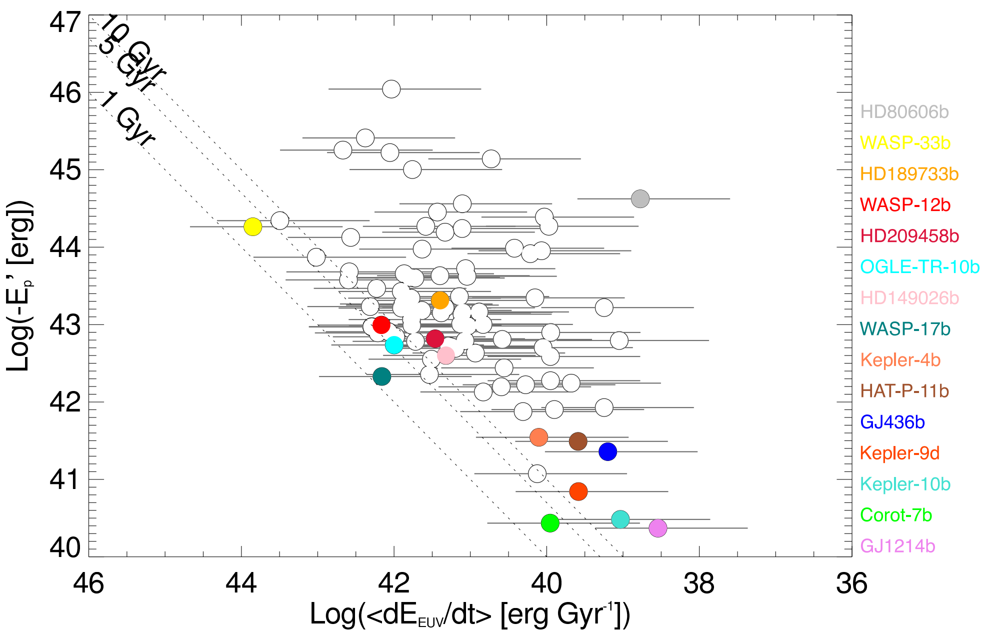

Figure 4: (Ehrenreich & Désert) A "lifetime diagram" for $\sim$ 100 transiting planets: the energy needed to escape the whole planet mass versus the average X/EUV flux received per billion year. The dotted lines represent constant lifetimes of 1, 5, and 10 Gyr (from bottom to top). Data points are calculated with a heating efficiency of $\eta = 0.15$. Variations of η between 0.01 and 1 are represented as horizontal grey error bars.

Planet Occurrence within 0.25 AU of Solar-type Stars from *Kepler*

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Astrophysical Journal, submitted (arXiv:1103.2541)

We report the distribution of planets as a function of planet radius, orbital period, and stellar effective temperature for orbital periods less than 50 days around Solar-type (GK) stars. These results are based on the 1,235 planets (formally "planet candidates") from the *Kepler* mission that include a nearly complete set of detected planets as small as 2 $R_\oplus$. For each of the 156,000 target stars we assess the detectability of planets as a function of planet radius, R_p, and orbital period, P, using a measure of the detection efficiency for each star. We also correct for the geometric probability of transit, $R_\star/a$. We consider first *Kepler* target stars within the "solar subset" having T_eff = 4100–6100 K, $\log g$ = 4.0–4.9, and Kepler magnitude $\mathrm{Kp} < 15$ mag, i.e. bright, main sequence GK stars. We include only those stars having photometric noise low enough to permit detection of planets down to 2 $R_\oplus$. We count planets in small domains of R_p and P and divide by the included target stars to calculate planet occurrence in each domain. The resulting occurrence of planets varies by more than three orders of magnitude in the radius-orbital period plane and increases substantially down to the smallest radius (2 $R_\oplus$) and out to the longest orbital period (50 days, $\sim$0.25

AU) in our study. For $P < 50$ days, the distribution of planet radii is given by a power law, $\mathrm{d}f/\mathrm{d}\log R = k_R R^{\alpha}$ with k_R = $2.9^{+0.5}_{-0.4}$, α = -1.92 ± 0.11, and $R \equiv R_{\mathrm{p}}/R_{\oplus}$. This rapid increase in planet occurrence with decreasing planet size agrees with the prediction of core-accretion formation, but disagrees with population synthesis models that predict a desert at super-Earth and Neptune sizes for close-in orbits. Planets with orbital periods shorter than 2 days are extremely rare; for $R_{\mathrm{p}} > 2\ R_{\oplus}$ we measure an occurrence of less than 0.001 planets per star. For all planets with orbital periods less than 50 days, we measure occurrence of 0.130 ± 0.008, 0.023 ± 0.003, and 0.013 ± 0.002 planets per star for planets with radii 2–4, 4–8, and 8–32 $R_{\oplus}$, in agreement with Doppler surveys. We fit occurrence as a function of P to a power law model with an exponential cutoff below a critical period P_0. For smaller planets, P_0 has larger values, suggesting that the "parking distance" for migrating planets moves outward with decreasing planet size. We also measured planet occurrence over a broader stellar T_{eff} range of 3600–7100 K, spanning M0 to F2 dwarfs. Over this range, the occurrence of 2–4 $R_{\oplus}$ planets in the *Kepler* field increases with decreasing T_{eff}, with these small planets being seven times more abundant around cool stars (3600–4100 K) than the hottest stars in our sample (6600–7100 K).

Download/Website: `http://exoplanet.open.ac.uk/`

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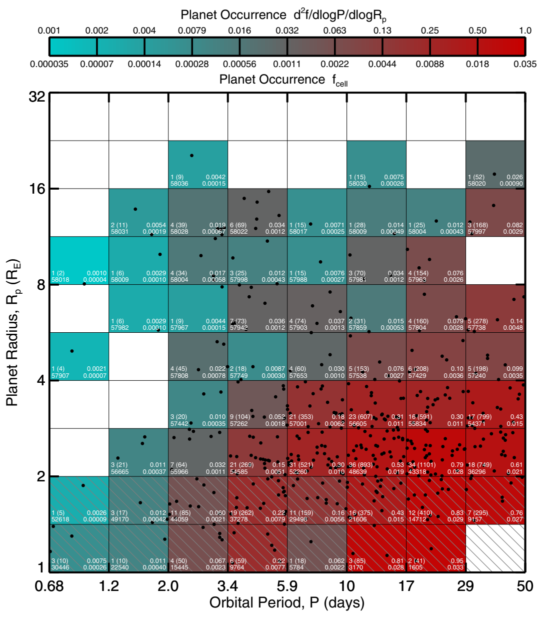

Figure 5: (Howard et al.) Planet occurrence as a function of planet radius and orbital period for $P < 50$ days. Planet occurrence spans more than three orders of magnitude and increases substantially for longer orbital periods and smaller planet radii. Planets detected by *Kepler* having SNR > 10 are shown as black dots. The phase space is divided into a grid of logarithmically spaced cells within which planet occurrence is computed. Only stars in the "solar subset" (see selection criteria in Table 1) were used to compute occurrence. Cell color indicates planet occurrence with the color scale on the top in two sets of units, occurrence per cell and occurrence per logarithmic area unit. White cells contain no detected planets. Planet occurrence measurements are incomplete and likely contain systematic errors in the hatched region ($R_{\mathrm{p}} < 2\ R_{\oplus}$). Annotations in white text within each cell list occurrence statistics: *upper left*—the number of detected planets with SNR > 10, $n_{\mathrm{pl,cell}}$, and in parentheses the number of augmented planets correcting for non-transiting geometries, $n_{\mathrm{pl,aug,cell}}$; *lower left*—the number of stars surveyed by *Kepler* around which a hypothetical transiting planet with R_{p} and P values from the middle of the cell could be detected with SNR > 10; *lower right*—f_{cell}, planet occurrence, corrected for geometry and detection incompleteness; *upper right*—$d^2 f/\mathrm{d}\log_{10} P/\mathrm{d}\log_{10} R_{\mathrm{p}}$, planet occurrence per logarithmic area unit ($\mathrm{d}\log_{10} P\ \mathrm{d}\log_{10} R_{\mathrm{p}}$ = 28.5 grid cells).

High-resolution simulations of planetesimal formation in turbulent protoplanetary discs

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Astronomy & Astrophysics, in press (arXiv:1010.4757)

planetesimal formation in turbulence generated by the magnetorotational instability. We show that the turbulent viscosity associated with magnetorotational turbulence in a non-stratified shearing box increases when going from 256^3 to 512^3 grid points in the presence of a weak imposed magnetic field, yielding a turbulent viscosity of $\alpha \approx 0.003$ at high resolution. Particles representing approximately meter-sized boulders concentrate in large-scale high-pressure regions in the simulation box. The appearance of zonal flows and particle concentration in pressure bumps is relatively similar at moderate (256^3) and high (512^3) resolution. In the moderate-resolution simulation we activate particle self-gravity at a time when there is little particle concentration, in contrast with previous simulations where particle self-gravity was activated during a concentration event. We observe that bound clumps form over the next ten orbits, with initial birth masses of a few times the dwarf planet Ceres. At high resolution we activate self-gravity during a particle concentration event, leading to a burst of planetesimal formation, with clump masses ranging from a significant fraction of to several times the mass of Ceres. We present a new domain decomposition algorithm for particle-mesh schemes. Particles are spread evenly among the processors and the local gas velocity field and assigned drag forces are exchanged between a domain-decomposed mesh and discrete blocks of particles. We obtain good load balancing on up to 4096 cores even in simulations where particles sediment to the mid-plane and concentrate in pressure bumps.

Download/Website: `http://arxiv.org/abs/1010.4757`

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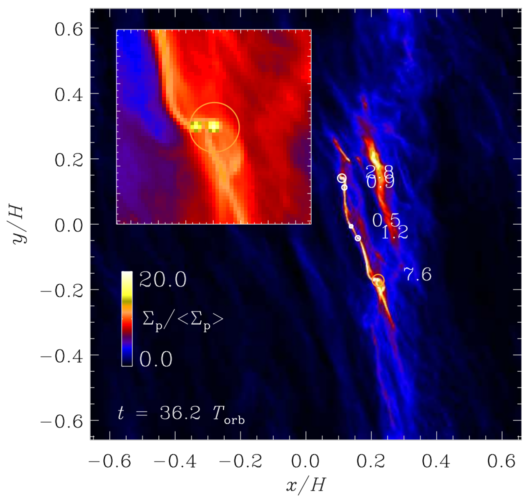

Figure 6: (Johansen et al.) 512^3 simulation showing the gravitational contraction of overdense particle sheets and the formation of discrete clumps.

Refining Parameters of the XO-5 Planetary System with High-Precision Transit Photometry

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Acta Astronomica, in press (astro-ph/1103.1325)

Studies of transiting extrasolar planets offer an unique opportunity to get to know the internal structure of those worlds. The transiting exoplanet XO-5b was found to have an anomalously high Safronov number and surface gravity. Our aim was to refine parameters of this intriguing system and search for signs of transit timing variations. We gathered high-precision light curves of two transits of XO-5b. Assuming three different limb darkening laws, we found the best-fitting model and redetermined parameters of the system, including planet-to-star radius ratio, impact parameter and central time of transits. Error estimates were derived by the prayer bead method and Monte Carlo simulations. Although system's parameters obtained by us were found to agree with previous studies within 1σ, the planet was found to be notable smaller with the radius of $1.03^{+0.06}_{-0.05}$ $\mathrm{R_J}$. Our results confirm the high Safronov number and surface gravity of the planet. With two new mid-transit times, the ephemeris was refined to $\mathrm{BJD_{TDB}} = (2454485.66842 \pm 0.00028) + (4.1877537 \pm 0.000017)E$. No significant transit timing variation was detected.

Download/Website: http://arxiv.org/abs/1103.1325

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Warm dust resolved in the cold disk around T Cha with VLTI/AMBER

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Astronomy & Astrophysics Letters, 528, April 2011, L6

The transition between massive Class II circumstellar disks and Class III debris disks, with dust residuals, has not yet been clearly understood. Disks are expected to dissipate with time, and dust clearing in the inner regions can be the consequence of several mechanisms. Planetary formation is one of them that will possibly open a gap inside the disk. According to recent models based on photometric observations, T Cha is expected to present a large gap within its disk, meaning that an inner dusty disk is supposed to have survived close to the star. We investigate this scenario with new near-infrared interferometric observations. We observed T Cha in the H and K bands using the AMBER instrument at VLTI and used the MCFOST radiative transfer code to model the SED of T Cha and the interferometric observations simultaneously and to test the scenario of an inner dusty structure. We also used a toy model of a binary to check that a companion close to the star can reproduce our observations. The scenario of a close (few mas) companion cannot satisfactorily reproduce the visibilities and SED, while a disk model with a large gap and an inner ring producing the bulk of the emission (in H and K-bands) close to 0.1 AU is able to account for all the observations. With this study, the presence of an optically thick inner dusty disk close to the star and dominating the H and $K-$ bands emission is confirmed. According to our model, the large gap extends up to $\sim$7.5 AU. This points toward a companion (located at several AU) gap-opening scenario to explain the morphology of T Cha.

Download/Website: http://adsabs.harvard.edu/abs/2011A%26A...528L...6O

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On planetary mass determination in the case of super-Earths orbiting active stars. The case of the CoRoT-7 system

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Astronomy & Astrophysics, in press (ArXiv 1011.2144)

This investigation used the excellent HARPS radial velocity measurements of CoRoT-7 to re-determine the planets masses and to explore techniques able to determine mass and elements of planets discovered around active stars when the relative variation of the radial velocity due to the star activity cannot be considered as just noise and can exceed the variation due to the planets. The main technique used here is a self-consistent version of the high-pass filter used by Queloz et al. (2009) in the first mass determination of CoRoT-7b and CoRoT-7c. The results are compared to those given by two alternative techniques: (1) The approach proposed by Hatzes et al. (2010) using only those nights in which 2 or 3 observations were done; (2) A pure Fourier analysis. In all cases, the eccentricities are taken equal to zero as indicated by the study of the tidal evolution of the system; the periods are also kept fixed at the values given by Queloz et al. Only the observations done in the time interval BJD 2,454,847 – 873 are used because they include many nights with multiple observations; otherwise it is not possible to separate the effects of the rotation fourth harmonic (5.91d = $P_{\mathrm{rot}}/4$) from the alias of the orbital period of CoRoT-7b (0.853585 d). The results of the various approaches were combined to give for the planet masses the values 8.0 ± 1.2 $\mathrm{M_{Earth}}$ for CoRoT-7b and 13.6 ± 1.4 $\mathrm{M_{Earth}}$ for CoRoT 7c. An estimation of the variation of the radial velocity of the star due to its activity is also given (see figure). The results obtained with 3 different approaches agree to give masses larger than those found in previous determinations. From the existing internal structure models, they indicate that CoRoT-7b is a much denser super-Earth. The bulk density is 11$\pm$ 3.5 g.cm^{-3}. CoRoT-7b may be rocky with a large iron core.

Download/Website: `http://arxiv.org/abs/1011.2144`

Contact: `sylvio@astro.iag.usp.br`

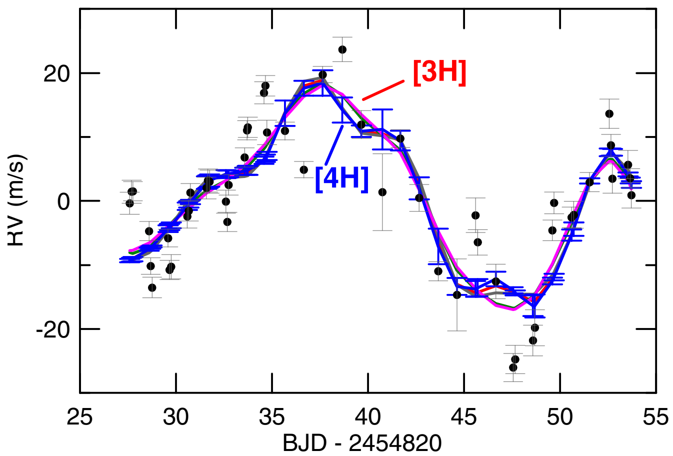

Figure 7: (Ferraz Mello et al.) Activity of CoRoT-7 in the time interval BJD 2,454,847 – 873 obtained as residual radial velocities from the high-pass filter. The labels [4H] and [3H] indicate the results obtained using resp. 4 and 3 harmonics in the filter. The dots indicate the measured radial velocities. The error bars of the activity estimated with the 4 harmonics high-pass filter are also shown.

HD 5388 b is a $69\,\mathrm{M_{Jup}}$ companion instead of a planet

J. Sahlmann, C. Lovis, D. Queloz, D. Ségransan
Observatoire de Genève, Université de Genève, 51 Chemin Des Maillettes, 1290 Sauverny, Switzerland

Astronomy & Astrophysics Letters, published (2011A&A...528L...8S)

We examined six exoplanet host stars with non-standard Hipparcos astrometric solution, which may be indicative of unrecognised orbital motion. Using Hipparcos intermediate astrometric data, we detected the astrometric orbit of HD 5388 at a significance level of 99.4 % ($2.7\,\sigma$). HD 5388 is a metal-deficient star and hosts a planet candidate with a minimum mass of $1.96\,M_\mathrm{J}$ discovered in 2010. We determined its orbit inclination to be $i = 178.3^{+0.4\circ}_{-0.7}$ and the corresponding mass of its companion HD 5388 b to be $M_2 = 69 \pm 20\,M_\mathrm{J}$. The orbit is seen almost face-on and the companion mass lies at the upper end of the brown-dwarf mass range. A mass lower than $13\,M_\mathrm{J}$ was excluded at the $3\,\sigma$-level. The astrometric motions of the five other stars had been investigated by other authors revealing two planetary companions, one stellar companion, and two statistically insignificant orbits. We conclude that HD 5388 b is not a planet but most likely a brown-dwarf companion. In addition, we find that the inclinations of the stellar rotation axis and the companion's orbital axis differ significantly.

Download/Website: `http://www.aanda.org/articles/aa/pdf/2011/04/aa16533-11.pdf`

Contact: `Johannes.Sahlmann@unige.ch`

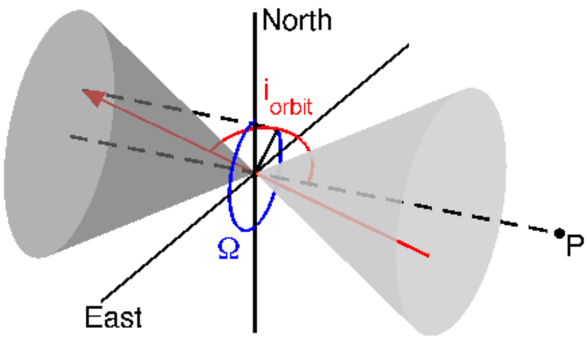

Figure 8: (Sahlmann et al.) Possible spin-orbit configurations of HD 5388. The astrometric motion in the sky plane defined by the north and east axes is observed from location P. The orbit orientation vector (red arrow) is defined by the angles $i_\mathrm{orbit} = 178.3^{+0.4\circ}_{-0.7}$ and Ω. The stellar spin orientation vector can lie on either the dark-grey cone (prograde configurations) or the light-grey cone (retrograde configurations) with identical opening angles.

Search for brown-dwarf companions of stars

J. Sahlmann[1,2], *D. Ségransan*[1], *D. Queloz*[1], *S. Udry*[1], *N.C. Santos*[3,4], *M. Marmier*[1], *M. Mayor*[1], *D. Naef*[1], *F. Pepe*[1], *S. Zucker*[5]

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Astronomy & Astrophysics, published (2011A&A...525A..95S)

The discovery of 9 new brown-dwarf candidates orbiting stars in the CORALIE and HARPS radial-velocity surveys is reported. New CORALIE radial velocities yielding accurate orbits of 6 previously-known hosts of potential brown-dwarf companions are presented. Including targets selected from the literature, 33 hosts of potential brown-dwarf companions are examined. Employing innovative methods, we use the new reduction of the Hipparcos data to fully characterise the astrometric orbits of 6 objects, revealing M-dwarf companions with masses between 90 M_{Jup} and 0.52 M_{Sun}. Additionally, the masses of two companions can be restricted to the stellar domain. The companion to HD 137510 is found to be a brown dwarf. At 95 % confidence, the companion of HD 190228 is also a brown dwarf. The remaining 23 companions persist as brown-dwarf candidates. Based on the CORALIE planet-search sample, we obtain an upper limit of 0.6 % for the frequency of brown-dwarf companions around Sun-like stars. We find that the companion-mass distribution function is rising at the lower end of the brown-dwarf mass range, suggesting that in fact we are detecting the high-mass tail of the planetary distribution.

Download/Website: `http://www.aanda.org/articles/aa/pdf/2011/01/aa15427-10.pdf`

Contact: `Johannes.Sahlmann@unige.ch`

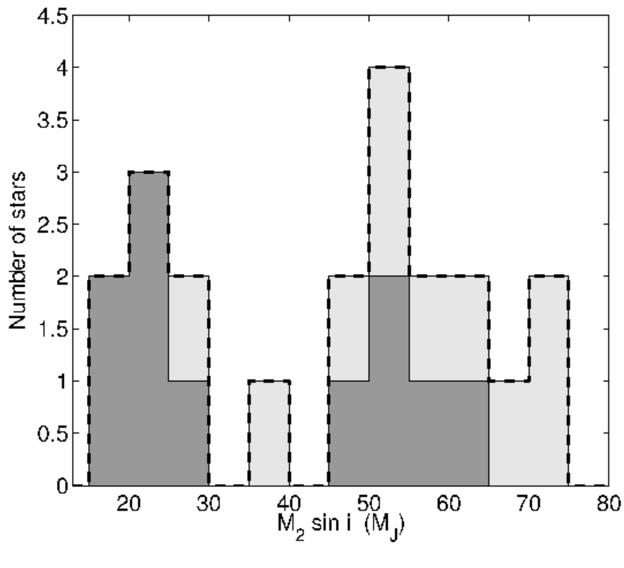

Figure 9: (Sahlmann et al.) Histogram of minimum masses of potential close brown-dwarf companions in the CORALIE survey. The light-grey histogram shows the distribution of all 21 candidates. The dark-grey histogram shows the distribution of the 11 remaining candidates after removal of the 10 stellar companions.

Abundances of stars with planets: trends with condensation temperature

S.C. Schuler[1], *D. Flateau*[2], *K. Cunha*[1,3,4], *J.R. King*[5], *L. Ghezzi*[3,6], *V.V. Smith*[1]

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Astrophysical Journal, in press (arXiv:1103.0757)

Precise abundances of 18 elements have been derived for ten stars known to host giant planets from high signal-to-noise ratio, high-resolution echelle spectroscopy. Internal uncertainties in the derived abundances are typically ≤ 0.05 dex. The stars in our sample have all been previously shown to have abundances that correlate with the condensation temperature ($T_{\rm c}$) of the elements in the sense of increasing abundances with increasing $T_{\rm c}$; these trends have been interpreted as evidence that the stars may have accreted H-depleted planetary material. Our newly derived abundances also correlate positively with $T_{\rm c}$, although slopes of linear least-square fits to the [m/H]-$T_{\rm c}$ relations for all but two stars are smaller here than in previous studies. When considering the refractory elements ($T_{\rm c} > 900$ K) only, which may be more sensitive to planet formation processes, the sample can be separated into a group with positive slopes (four stars) and a group with flat or negative slopes (six stars). The four stars with positive slopes have very close-in giant planets (three at 0.05 AU) and slopes that fall above the general Galactic chemical evolution trend. We suggest that these stars have accreted refractory-rich planet material but not to the extent that would increase significantly the overall stellar metallicity. The flat or negative slopes of the remaining six stars are consistent with recent suggestions of a planet formation signature, although we show that the trends may be the result of Galactic chemical evolution.

Against of all odds? Forming the planet of the HD196885 binary

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Celestial Mechanics and Dynamical Astronomy (Special issue on EXOPLANETS), in press (2011arXiv1103.3900T)

HD196885Ab is the most extreme planet-in-a-binary discovered to date, whose orbit places it at the limit for orbital stability. The presence of a planet in such a highly perturbed region poses a clear challenge to planet-formation scenarios. We investigate this issue by focusing on the planet-formation stage that is arguably the most sensitive to binary perturbations: the mutual accretion of kilometer- sized planetesimals. To this effect we numerically estimate the impact velocities dv amongst a population of circumprimary planetesimals. We find that most of the circumprimary disc is strongly hostile to planetesimal accretion, especially the region around 2.6AU (the planets location) where binary perturbations induce planetesimal shattering dv of more than 1km/s. Possible solutions to the paradox of having a planet in such accretion-hostile regions are 1) that initial planetesimals were very big, at least 250km, 2) that the binary had an initial orbit at least twice the present one, and was later compacted due to early stellar encounters, 3) that planetesimals did not grow by mutual impacts but by sweeping of dust (the snowball growth mode identified by Xie et al., 2010b), or 4) that HD196885Ab was formed not by core-accretion but by the concurrent disc instability mechanism. All of these 4 scenarios remain however highly conjectural

Download/Website: http://fr.arxiv.org/abs/1103.3900

Contact: philippe.thebault@obspm.fr

Hubble Space Telescope Transmission Spectroscopy of the Exoplanet HD 189733b: High-altitude atmospheric haze in the optical and near-UV with STIS

D. K. Sing[1], *F. Pont*[1], *S. Aigrain*[2], *D. Charbonneau*[3], *J.-M. Désert*[3], *N. Gibson*[2], *R. Gilliland*[4], *W. Hayek*[1], *G. Henry*[5], *H. Knutson*[6], *A. Lecavelier des Etangs*[7], *T. Mazeh*[8], *Avi Shporer*[8]

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Monthly Notices of the Royal Astronomical Society, submitted (arXiv:1103.0026)

We present *Hubble Space Telescope* optical and near-ultraviolet transmission spectra of the transiting hot-Jupiter HD189733b, taken with the repaired Space Telescope Imaging Spectrograph (STIS) instrument. The resulting spectra cover the range 2900-5700 Å and reach per-exposure signal-to-noise levels greater than 11,000 within a 500 Å bandwidth. We used time series spectra obtained during two transit events to determine the wavelength dependance of the planetary radius and measure the exoplanet's atmospheric transmission spectrum for the first time over this wavelength range. Our measurements, in conjunction with existing HST spectra, now provides a broadband transmission spectrum covering the full optical regime. We find a planetary transmission spectrum in good agreement with that of Rayleigh scattering from a high-altitude atmospheric haze as previously found from HST ACS camera. The STIS data also shows unambiguous evidence of a large occulted stellar spot during one of our transit events, which we use to place constraints on the characteristics of the K dwarf's stellar spots, estimating spot temperatures around $T_{\rm eff}$ ~4250 K. With contemporaneous ground-based photometric monitoring of the stellar variability, we also measure the correlation between the stellar activity level and transit-measured planet-to-star radius contrast, which is in good agreement with predictions. The high-altitude haze is now found to cover the entire optical regime and is well characterised by Rayleigh scattering. These findings suggest that haze may be a globally dominant atmospheric feature of the planet which would result in a high optical albedo at shorter optical wavelengths.

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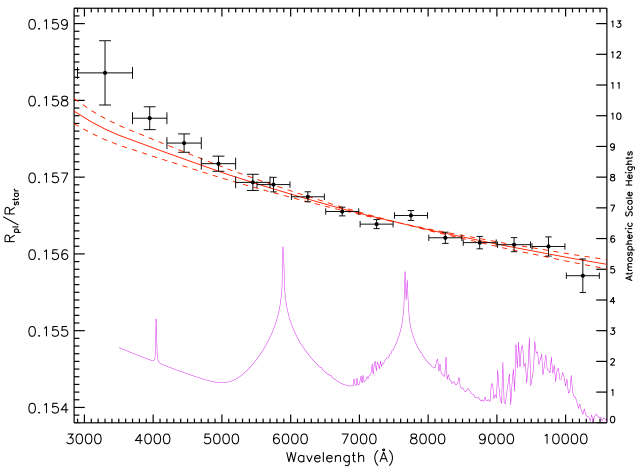

Figure 10: (Sing et al.) STIS and ACS transmission spectra for HD189733b. Plotted blueward of 5600 Å is the STIS G430L measurements with the ACS measurements from Pont et al. (2008) red-ward of 5600 Å. The wavelength bins are indicated by the X-axis error bars and the 1-σ error is indicated by the Y-axis error bars. The right Y-axis is labeled in units of estimated atmospheric scale heights, assuming T=1340 K (H=0.0004 R_{pl}/R_{star}). The prediction from ACS Rayleigh scattering (solid and dashed lines) is also shown, as is a haze-free model atmosphere for HD 189733b from Fortney et al. (2010) which uses a planet-wide average T-P profile, and is normalized to the radii at infrared wavelengths.

Heating and Cooling Protostellar Disks

S. Hirose[1] *& N. J. Turner*[2]

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Astrophysical Journal Letters, in press (arXiv:1104.0004)

We examine heating and cooling in protostellar disks using 3-D radiation-MHD calculations of a patch of the Solar nebula at 1 AU, employing the shearing-box and flux-limited radiation diffusion approximations. The disk atmosphere is ionized by stellar X-rays, well-coupled to magnetic fields, and sustains a turbulent accretion flow driven by magneto-rotational instability, while the interior is resistive and magnetically dead.

The turbulent layers heat by absorbing the light from the central star and by dissipating the magnetic fields. They are optically-thin to their own radiation and cool inefficiently. The optically-thick interior in contrast is heated only weakly, by re-emission from the atmosphere. The interior is colder than a classical viscous model, and isothermal.

The magnetic fields support an extended atmosphere that absorbs the starlight 1.5 times higher than the hydrostatic viscous model. The disk thickness thus measures not the internal temperature, but the magnetic field strength. Fluctuations in the fields move the starlight-absorbing surface up and down. The height ranges between 13% and 24% of the radius over timescales of several orbits, with implications for infrared variability.

The fields are buoyant, so the accretion heating occurs higher in the atmosphere than the stresses. The heating is localized around current sheets, caused by magneto-rotational instability at lower elevations and by Parker instability at higher elevations. Gas in the sheets is heated above the stellar irradiation temperature, even though accretion is much less than irradiation power when volume-averaged. The hot optically-thin current sheets might be detectable through their line emission.

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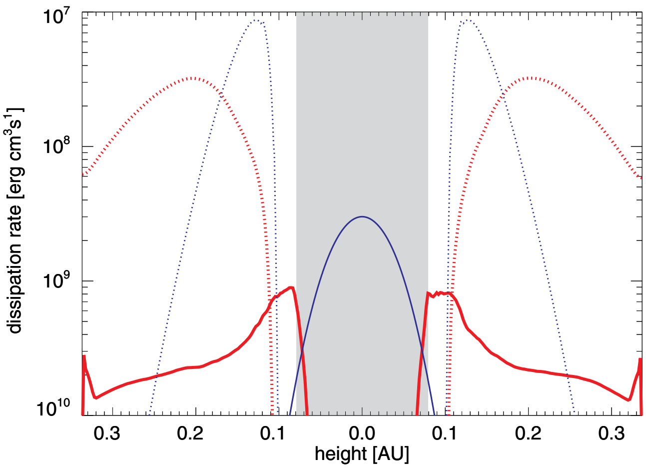

Figure 11: (Hirose & Turner) Heating profiles in the MHD calculation (red) and the classical viscous model with the same surface density and accretion rate (blue). Both have contributions from stellar irradiation (dotted) and turbulent or viscous dissipation (solid). The turbulent dissipation involves both magnetic and kinetic energy. All are averaged horizontally and over time from 50 to 200 orbits. A grey band marks the dead zone.

On the alignment of debris disks and their host stars' rotation axis – implications for spin-orbit misalignment in exoplanetary systems

C. Watson[1], *S. Littlefair*[2], *C. Diamond*[1], *A. Collier Cameron*[3], *A. Fitzsimmons*[1], *E. Simpson*[1], *V. Moulds*[1], *D. Pollacco*[1]

[1] Astrophysics Research Centre, Queen's University Belfast, Belfast, BT7 1NN, UK
[2] Department of Physics and Astronomy, University of Sheffield, Sheffield, S3 7RH, UK
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Letters of the Monthly Notices of the Royal Astronomical Society, in press (arXiv:1009.4132)

It has been widely thought that measuring the misalignment angle between the orbital plane of a transiting exoplanet and the spin of its host star was a good discriminator between different migration processes for hot-Jupiters. Specifically, well-aligned hot-Jupiter systems (as measured by the Rossiter-McLaughlin effect) were thought to have formed via migration through interaction with a viscous disk, while misaligned systems were thought to have undergone a more violent dynamical history. These conclusions were based on the assumption that the planet-forming disk was well-aligned with the host star. Recent work by a number of authors has challenged this assumption by proposing mechanisms that act to drive the star-disk interaction out of alignment during the pre-main sequence phase. We have estimated the stellar rotation axis of a sample of stars which host spatially resolved debris disks. Comparison of our derived stellar rotation axis inclination angles with the geometrically measured debris-disk inclinations shows no evidence for a misalignment between the two.

Download/Website: `http://arxiv.org/abs/1009.4132`

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Transit Variability in Bow Shock-Hosting Planets

A. A. Vidotto, M. Jardine, Ch. Helling

SUPA, Schoold of Physics and Astronomy, University of St Andrews, North Haugh, St Andrews, KY16 9SS, UK

MNRAS, in press (2011arXiv1102.1559V)

We investigate the formation of bow shocks around exoplanets as a result of the interaction of the planet with the coronal material of the host star, focusing on physical causes that can lead to temporal variations in the shock characteristics. We recently suggested that WASP-12b may host a bow shock around its magnetosphere, similarly to the one observed around the Earth (see attached figure). For WASP12b, the shock is detected in the near-UV transit light curve. Observational follow-up suggests that the near-UV light curve presents temporal variations, which may indicate that the stand-off distance between the shock and the planet is varying. This implies that the size of the planet's magnetosphere is adjusting itself in response to variations in the surrounding ambient medium. We investigate possible causes of shock variations for the known eccentric ($e > 0.3$) transiting planets. We show that, because the distance from the star changes along the orbit of an eccentric planet, the shock characteristics are modulated by orbital phase. During phases where the planet lies inside (outside) the corotation radius of its host star, shock is formed ahead of (behind) the planetary motion. We predict time offsets between the beginnings of the near-UV and optical light curves that are, in general, less than the transit duration. Variations in shock characteristics caused in eccentric systems can only be probed if the shock is observed at different orbital phases, which is, in general, not the case for transit observations. However, non-thermal radio emission produced by the interaction of the star and planet should be modulated by orbital phase. We also quantify the response of the shock to variations in the coronal material itself due to, e.g., a non-axisymmetric stellar corona, planetary obliquity (which may allow the planet to move through different regions of the host star's corona), intrinsic variations of the stellar magnetic field (resulting in stellar wind changes, coronal mass ejections, magnetic cycles). Such variations do not depend on the system eccentricity. We conclude that, for systems where a shock is detectable through transit light curve observations, shock variations should be a common occurrence.

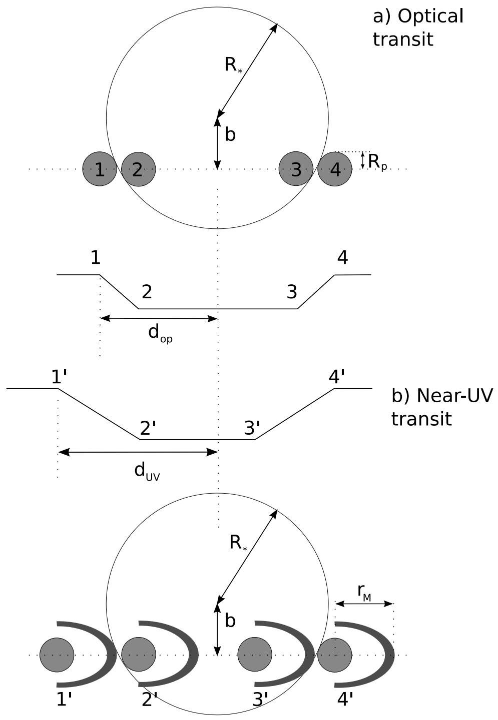

Figure 12: (Vidotto et al.) Sketches of the light curves obtained through observations in the a) optical and b) near-UV, where the bow shock surrounding the planet's magnetosphere is also able to absorb stellar radiation.

Download/Website: `http://arxiv.org/abs/1102.1559`

Contact: `Aline.Vidotto@st-andrews.ac.uk`

Protoplanetary Disks and Their Evolution

Jonathan P. Williams & Lucas A. Cieza
Institute for Astronomy, University of Hawaii, Honolulu, USA

Annual Review of Astronomy and Astrophysics, in press (arXiv:1103.0556)

Flattened, rotating disks of cool dust and gas extending for tens to hundreds of AU are found around almost all low mass stars shortly after their birth. These disks generally persist for several Myr, during which time some material accretes onto the star, some is lost through outflows and photoevaporation, and some condenses into centimeter- and larger-sized bodies or planetesimals. Through observations mainly at infrared through millimeter wavelengths, we can determine how common disks are at different ages, measure basic properties including mass, size, structure, and composition, and follow their varied evolutionary pathways. In this way, we see the first steps toward exoplanet formation and learn about the origins of the Solar System. This review addresses observations of the outer parts, beyond 1 AU, of protoplanetary disks with a focus on recent infrared and (sub-)millimeter results and an eye to the promise of new facilities in the immediate future.

Download/Website: `http://arxiv.org/abs/1103.0556`

Contact: `jw@hawaii.edu`

3 Conference announcements

Exploring Strange New Worlds: From Giant Planets to Super Earths

Chas Beichman[1], *Malcolm Fridlund*[2], *Dawn Gelino*[1], *Jeff Hall*[3], *Conference Chairs*
[1] NASA Exoplanet Science Institute, 770 South WIlson Ave., Pasadena, CA
[2] European Space Agency, ESTEC, P. O. Box 299, Noordwijk, The Netherlands
[3] Lowell Observatory, 1400 West Mars Hill Rd., Flagstaff, AZ

Flagstaff, Arizona, May 1-6, 2011

The NASA Exoplanet Exploration Program and the NASA Exoplanet Science Institute are co-hosting the 6th in a series of international scientific conferences on the topic of present and future observations of exoplanets from space. The conference will present state-of-the art results from the Spitzer and Hubble Space Telescopes, the Kepler and CoRoT transit missions, as well as relevant ground-based facilities. Noted theoreticians will provide perspective and interpretation of the observational results of the physical characterization of planets ranging in size from gas and icy giants, super Earths, and (ultimately) Earth analogs. Speakers will emphasize how exoplanet observations help us understand the formation and evolution of objects in our own Solar System.

Speakers will also look toward the future with a focus on the exoplanet observations using the James Webb Space Telescope (JWST) and ESA's GAIA astrometric mission. Speakers from the four JWST instrument teams will address the capabilities of JWST for coronagraphy and transit follow-up. The conference will end with discussions of the missions and technologies endorsed by the Astro2010 Decadal Review such as micro-lensing opportunities with NASA's WFIRST and ESA's EUCLID projects and a large optical/UV telescope. Similar discussions will be held on plans of other space agencies.

Registration Information

- on-line registration still available
- on-site registration will be available
- tickets are still available for the conference banquet
- a limited number of tickets still available for conference field trips
- spaces are still available for the May 7 Grand Canyon day trip, following the conference

Download/Website: `http://nexsci.caltech.edu/conferences/Flagstaff`
Contact: `StrangeNewWorlds@ipac.caltech.edu`

2011 Sagan Summer Workshop: Exploring Exoplanets with Microlensing

C. Brinkworth
NASA Exoplanet Science Institute, California Institute of Technology, Pasadena, CA, USA

Pasadena, CA, July 25-29, 2011

The 2011 Sagan Exoplanet Summer Workshop: "Exploring Exoplanets with Microlensing", will take place on the Caltech campus July 25 - 29, 2011. The workshop is intended for graduate students and postdocs interested in learning more about the microlensing technique, however all interested parties are welcome to attend. A preliminary list of topics to be covered includes:

- History of Microlensing Theory, Detection, and Follow-up Teams
- Introduction to Microlensing Photometric Techniques
- HST/AO Data Reduction
- Modeling of Microlensing Data
- Extracting the Physical Parameters of Planetary Events
- Null Results and Detection Efficiency
- Future Prospects and Challenges of Microlensing

The workshop will include hands-on group projects to give participants direct experience with the microlensing technique. Attendees will also have the opportunity to present brief summaries of their research.

Important Dates

- June 7: Early on-line registration ends
- June 22: Hotel Registration deadline to be eligible for group rate
- July 1: POP/Poster Submission deadline
- July 8: On-line registration closed
- July 24: Sagan Exoplanet Summer Workshop Opening Reception
- July 25-29: 2011 Sagan Exoplanet Summer Workshop

Download/Website: http://nexsci.caltech.edu/workshop/2011
Contact: sagan_workshop@ipac.caltech.edu

EPSC-DPS Joint Meeting 2011

M. Grande[1], *R. Malhotra*[2]
[1] Aberystwyth University, Wales, UK
[2] The University of Arizona, Tucson, AZ, USA

Nantes, France, 3–7 October 2011

We invite the world-wide community of planetary scientists to submit an abstract for presentation of their recent work at the joint EPSC-DPS 2011 Meeting, which will take place at La Cité Internationale des Congrés Nantes Metropole in Nantes, France. 3-7 October 2011. This modern congress centre is very close to the centre of Nantes, an attractive city, the historical capital of Brittany, on the west coast of France, about 2 hours by high speed train from Paris.

This meeting will bring together the international community of specialists in the planetary sciences to present and discuss the latest results of research on the solar system and other solar systems. The meeting format consists of oral and poster sessions, as well as workshop-style sessions. A number of sessions will be devoted to exo-planetary research. Please visit the meeting website for details.

The abstract deadline is 31 May 2011.

Download/Website: http://meetingorganizer.copernicus.org/EPSC-DPS2011/sessionprogramme/EO

Contact: epsc2011@copernicus.org

Nitrogen in Planetary Systems: The Early Evolution of the Atmospheres of Terrestrial Planets

Christian Muller[1], *Josep Maria Trigo*[2]

[1] Belgian Institute for Space Aeronomy (BIRA-IASB), Brussels, Belgium
[2] Institute of Space Ciencies (CSIC-IEEC), Barcelona, Spain

Barcelona, Spain, September 21–23 2011

This workshop will take place from 21 to 23 September, 2011 in the *Coromines* conference room, inside the IEC historical building located in Carme street 47, nearby the famous Ramblas. The meeting is intended to improve our knowledge of the initial atmospheric composition of Earth and the role of Nitrogen in the evolution of the atmospheres of rocky planets. Nitrogen is also a biochemical element and its delicate balance with oxygen in the Earth's atmosphere conditions the habitability of the surface. Cyanhydric acid, methyl cyanide and nitric oxide probably played a role in the chemical evolution of early life. Consequently, the biomarker character of nitrogen containing molecules in the solar system and in other planetary systems will be also a theme of this meeting.
The list of topics covered by this meeting includes:

- Early atmospheres of rocky and giant planets
- The role of N_2 and other N-bearing species in primeval atmospheres
- Exoplanets: discovery and search of Earth-like candidates
- Remote detection of chemical species in atmospheres
- Early conditions for development of life on Earth and other planets
- Thermodynamic equilibrium chemistry in planetary environments
- Non-equilibrium chemistry: photochemistry and impacts

The meeting is organized with the collaboration, and sponsorship of the European COST programme and the Scientific Secretariat of the Institute for Catalan Studies (IEC). The workshop will take place from 21 to 23 September, 2011 in the *Coromines* conference room, inside the IEC historical building located in Carme street 47, nearby the famous Ramblas. A nice reception, and a poster session will take place at IEC historical cloister on Wednesday 21st. The workshop will be scheduled along three days, with two/one sessions per day, excepting Friday afternoon.

Important dates:
Registration fee before June 30 is 150 Euros. After that date a penalty of 50 Euros is charged.
Contributions can be send after login into the workshop homepage until June 3rd.

Download/Website: `http://ulisse.busoc.be/cost/barcelona-meeting.php`

Contact: `christian.muller@busoc.be,trigo@ieec.uab.es`

Session 02g: "What was the Source of Earth's Volatiles?", Goldschmitt 2011

Conveners: Sean Raymond and Bernard Marty

Prague, Czech Republic, Aug. 14-19, 2011

The origin of Earth's atmosphere and hydrosphere remains mysterious. What were the sources of volatiles to the Earth and at what time? Current models of the solar nebula suggest that temperatures at 1 AU radial distance were sufficiently high that only refractory iron and silicate minerals could condense; hence, Earths volatiles must have come from farther out. Asteroids, comets and interplanetary dust are potential sources of volatiles. Which of these sources dominated can be constrained by measurements of elemental and isotopic abundance ratios, as well as via dynamical models of the accretion process. The timing of volatile delivery is also an issue, as some models predict that significant amounts of volatiles could have been delivered well after the main accretion period. This session will look at volatile delivery from all of these different viewpoints.

We invite abstract submissions for a talk or poster until April 15 at www.goldschmidt2011.org.

Keynote speaker: Kevin Zahnle
Invited speakers: Mike Mumma, Josh Eisner, Reika Yokochi, Harold Levison, Sean Raymond

Download/Website: `http://www.goldschmidt2011.org`

Contact: `rayray.sean@gmail.com`

4 Jobs and Positions

Postdoctoral Research Scientist

Inga Kamp
Kapteyn Astronomical Institute, PO Box 800, 9700 AV Groningen, The Netherlands

Groningen, The Netherlands, send applications before May 16, 2011

The Kapteyn Astronomical Institute in Groningen, The Netherlands, invites applications for a postdoctoral research scientist. The successful candidate is expected to actively participate in the Herschel Open Time Key Program GASPS ("Gas Evolution in Protoplanetary Systems", PI: Dent) and to carry out research related to protoplanetary disks. He or she will also help preparing and carrying out ALMA observing programs.

The group of Dr. Kamp is strongly involved in research on the structure and evolution of protoplanetary disks linking sophisticated two-dimensional thermo-chemical disk models with new multi-wavelength observational data. Research topics in Groningen currently include cosmology, galaxy evolution, star and planet formation and interstellar matter. The postdoctoral research scientist will encounter a stimulating scientific environment being in the same building as SRON, the PI institute and Instrument Control Center for the HIFI instrument. Staff from the Kapteyn Astronomical Institute and SRON are involved in many galactic and extragalactic Herschel Key Programs. Thus, there is an exciting range of opportunities to establish new collaborations. The Kapteyn Institute is part of the Netherlands Research School for Astronomy and belongs to the top research institutions in Astronomy worldwide.

Interested applicants should have a PhD in astrophysics or physics and proven experience in far-infrared and/or submm observations, including analysis of line data and good knowledge of (molecular) spectroscopy. The ability to work in an international team and a good command of the English language are essential. Experience with the

Herschel/PACS instrument and/or submm facilities is an asset.

The University of Groningen offers a salary dependent on qualifications and work experience up to a maximum of EUR 4374 (scale 11) gross per month for a full-time position. The duration of the contract is 2 years with a possible extension to a third year.

Interested candidates should send application material, including a curriculum vitae, a brief statement of past research and future plans, and arrange for three letters of reference to be sent to Dr. Inga Kamp, Kapteyn Astronomical Institute, P.O. Box 800, 9700 AV Groningen, The Netherlands (E-mail address: kamp@astro.rug.nl). Selection of candidates will start **May 16, 2011**, and will continue until the position is filled.

Download/Website: `http://www.astro.rug.nl`

Contact: `kamp@astro.rug.nl`

5 As seen on astro-ph

The following list contains all the entries relating to exoplanets that we spotted on astro-ph during March 2011. If you see any that we missed, please let us know and we'll include them in the next issue.

Exoplanets

astro-ph/1103.0004: **Precise Stellar Radial Velocities of an M Dwarf with a Michelson Interferometer and a Medium-resolution Near-infrared Spectrograph** by *Philip S. Muirhead, Jerry Edelstein, David J. Erskine et al*

astro-ph/1103.0009: **HST/STIS Lyman-alpha observations of the quiet M dwarf GJ436: Predictions for the exospheric transit signature of the hot neptune GJ436b** by *David Ehrenreich, Alain Lecavelier des Etangs, Xavier Delfosse*

astro-ph/1103.0010: **A Search for Additional Planets in Five of the Exoplanetary Systems Studied by the NASA EPOXI Mission** by *Sarah Ballard, Jessie L. Christiansen, David Charbonneau et al*

astro-ph/1103.0011: **Mass-loss rates for transiting exoplanets** by *David Ehrenreich, Jean-Michel Desert*

astro-ph/1103.0014: **CFBDSIR J1458+1013B: A Very Cold (¿T10) Brown Dwarf in a Binary System** by *Michael C. Liu, Philippe Delorme, Trent J. Dupuy et al*

astro-ph/1103.0026: **Hubble Space Telescope Transmission Spectroscopy of the Exoplanet HD 189733b: High-altitude atmospheric haze in the optical and near-UV with STIS** by *D. K. Sing, F. Pont, S. Aigrain et al*

astro-ph/1103.0035: **The GROUSE project II: Detection of the Ks-band secondary eclipse of exoplanet HAT-P-1b** by *E. J. W. de Mooij, R. J. de Kok, S. V. Nefs et al*

astro-ph/1103.0702: **Predicting the detectability of oscillations in solar-type stars observed by Kepler** by *W. J. Chaplin, H. Kjeldsen, T. R. Bedding et al*

astro-ph/1103.0911: **STEREO observations of stars and the search for exoplanets** by *K.T. Wraight, Glenn J. White, D. Bewsher, A.J. Norton*

astro-ph/1103.1199: **Quantization of Planetary Systems and its Dependency on Stellar Rotation** by *Jean-Paul Zoghbi*

astro-ph/1103.1263: **Predictions on the core mass of Jupiter and of giant planets in general** by *Nadine Nettelmann*

astro-ph/1103.1325: **Refining Parameters of the XO-5 Planetary System with High-Precision Transit Photometry** by *G.Maciejewski, M.Seeliger, Ch.Adam et al* astro-ph/1103.1659: **Kepler Eclipsing Binary Stars. II. 2165 Eclipsing Binaries in the Second Data Release** by *Robert W. Slawson, Andrej Prsa, William F. Welsh et al*

astro-ph/1103.1813: **HAT-P-28b and HAT-P-29b: Two Sub-Jupiter Mass Transiting Planets** by *L. A. Buchhave, G. A. Bakos, J. D. Hartman et al*

astro-ph/1103.: **1** by *8*46Hot Super Earths: disrupted young jupiters? Sergei Nayakshin

astro-ph/1103.2081: **Determining Eccentricities of Transiting Planets: A Divide in the Mass-Period Plane** by *Frederic Pont, Nawal Husnoo, Tsevi Mazeh et al*

astro-ph/1103.2238: **Orbital effects of non-isotropic mass depletion of the atmospheres of evaporating hot Jupiters** by *Lorenzo Iorio*

astro-ph/1103.2370: **Observational evidence for a metal rich atmosphere on the super-Earth GJ1214b** by *Jean-Michel Desert, Jacob Bean, Eliza Miller-Ricci Kempton et al*

astro-ph/1103.2541: **Planet Occurrence within 0.25 AU of Solar-type Stars from Kepler** by *Andrew W. Howard, Geoffrey W. Marcy, Stephen T. Bryson et al*

astro-ph/1103.2583: **Escaping Particle fluxes in the atmospheres of close-in exoplanets: I. model of hydrogen** by *J.H. Guo*

astro-ph/1103.2603: **WASP-23b: a transiting hot Jupiter around a K dwarf and its Rossiter-McLaughlin effect** by *Amaury H.M.J. Triaud, Didier Queloz et al*

astro-ph/1103.2791: **Transit surveys for Earths in the habitable zones of white dwarfs** by *Eric Agol*

astro-ph/1103.2794: **Tidal Evolution of a Secularly Interacting Planetary System** by *Richard Greenberg, Christa Van Laerhoven*

astro-ph/1103.2953: **Model Spectra of the First Potentially Habitable Super-Earth - Gl581d** by *L. Kaltenegger, A. Segura Peralta, S. Mohanty*

astro-ph/1103.2603: **WASP-23b: a transiting hot Jupiter around a K dwarf and its Rossiter-McLaughlin effect** by *Amaury H.M.J. Triaud, Didier Queloz, Coel Hellier et al*

astro-ph/1103.3039: **High-resolution spectroscopic search for the thermal emission of the extrasolar planet HD 217107 b** by *Patricio E. Cubillos, Patricio Rojo, Jonathan J. Fortney*

astro-ph/1103.3078: **The Transit Light Curve project. XIV. Confirmation of Anomalous Radii for the Exoplanets TrES-4b, HAT-P-3b, and WASP-12b** by *Tucker Chan, Mikael Ingemyr, Joshua N. Winn et al*

astro-ph/1103.3101: **Equatorial superrotation on tidally locked exoplanets** by *Adam P. Showman, Lorenzo M. Polvani*

astro-ph/1103.3544: **The Ultra Cool Brown Dwarf Companion of WD 0806-661: Age, Mass, and Formation Mechanism** by *David R. Rodriguez, Ben Zuckerman, Carl Melis et al*

astro-ph/1103.3599: **Are falling planets spinning up their host stars?** by *D. J. A. Brown, A. Collier Cameron, C. Hall et al*

astro-ph/1103.3725: **Composition of Transiting and Transiting-only super-Earths** by *Diana Valencia*

astro-ph/1103.3825: **HAT-P-30b: A transiting hot Jupiter on a highly oblique orbit** by *John Asher Johnson, J. N. Winn, J. D. Hartman et al*

astro-ph/1103.3895: **Clouds and Chemistry in the Atmosphere of Extrasolar Planet HR8799b** by *Travis S. Barman, Bruce Macintosh, Quinn M. Konopacky et al*

astro-ph/1103.3896: **A First Comparison of Kepler Planet Candidates in Single and Multiple Systems** by *David W. Latham, Jason F. Rowe, Samuel N. Quinn et al*

astro-ph/1103.3900: **Against all odds? Forming the planet of the HD196885 binary** by *Philippe Thebault*

astro-ph/1103.4127: **Improved Orbital Parameters and Transit Monitoring for HD 156846b** by *Stephen R. Kane, Andrew W. Howard, Genady Pilyavsky et al*

astro-ph/1103.4186: **The Frequency of Low-Mass Exoplanets. III. Toward eta-Earth at Short Periods** by *Robert A. Wittenmyer, C.G. Tinney, R.P. Butler et al*

astro-ph/1103.4859: **Starspots and spin-orbit alignment in the WASP-4 exoplanetary system** by *Roberto Sanchis-Ojeda, Joshua N. Winn, Matthew J. Holman et al*

astro-ph/1103.5025: **The effect of self-gravity on vortex instabilities in disc-planet interactions** by *Min-Kai Lin,*

John Papaloizou
astro-ph/1103.5036: **Edge modes in self-gravitating disc-planet interactions** by *Min-Kai Lin, John Papaloizou*
astro-ph/1103.5086: **Dark Matter And The Habitability of Planets** by *Dan Hooper, Jason H. Steffen*
astro-ph/1103.5499: **Debris disk size distributions: steady state collisional evolution with P-R drag and other loss processes** by *Mark C. Wyatt, Cathie J. Clarke, Mark Booth*
astro-ph/1103.5369: **Extrasolar Asteroid Mining as Forensic Evidence for Extraterrestrial Intelligence** by *Duncan Forgan, Martin Elvis*
astro-ph/1103.5690: **Extrasolar Planets in the Classroom** by *Samuel J. George*
astro-ph/1103.5369: **Extrasolar Asteroid Mining as Forensic Evidence for Extraterrestrial Intelligence** by *Duncan Forgan, Martin Elvis*
astro-ph/1103.5747: **Testing Theory with Dynamical Masses and Orbits of Ultracool Binaries** by *Trent J. Dupuy, Michael C. Liu, Michael J. Ireland*
astro-ph/1103.6020: **The multiple planets transiting Kepler-9 I. Inferring stellar properties and planetary compositions** by *Mathieu Havel, Tristan Guillot, D. Valencia et al*

Disks

astro-ph/1103.0155: **High-Resolution Optical and Near-Infrared Images of the FS Tauri Circumbinary Disk** by *Tomonori Hioki, Yoichi Itoh, Yumiko Oasa et al*
astro-ph/1103.0284: **Resolved Images of Large Cavities in Protoplanetary Transition Disks** by *Sean Andrews, David Wilner, Catherine Espaillat et al*
astro-ph/1103.0556: **Protoplanetary Disks and Their Evolution** by *Jonathan P. Williams, Lucas A. Cieza*
astro-ph/1103.1880: **Evidence Against an Edge-On Disk Around the Extrasolar Planet 2MASS 1207 b and a New Thick Cloud Explanation for its Under-Luminosity** by *Andrew J. Skemer, Laird M. Close, Laszlo Szucs et al*
astro-ph/1103.3000: **The structure and dynamics of molecular gas in planet-forming zones: A CRIRES spectro-astrometric survey** by *Klaus M. Pontoppidan, Geoffrey A. Blake, Alain Smette*
astro-ph/1103.3209: **Planetesimals in Debris Disks of Sun-like Stars** by *Andrew B. Shannon, Yanqin Wu*
astro-ph/1103.3268: **Planetesimal and Protoplanet Dynamics in a Turbulent Protoplanetary Disk: Ideal Stratified Disks** by *Chao-Chin Yang, Mordecai-Mark Mac Low, Kristen Menou*
astro-ph/1103.3502: **Migration of protoplanets with surfaces through discs with steep temperature gradients** by *Ben A. Ayliffe, Matthew R. Bate*
astro-ph/1103.4923: **On the dynamics of resonant super-Earths in disks with turbulence driven by stochastic forcing** by *A. Pierens, C. Baruteau, F. Hersant*
astro-ph/1103.5499: **Debris disk size distributions: steady state collisional evolution with P-R drag and other loss processes** by *Mark C. Wyatt, Cathie J. Clarke, Mark Booth*
astro-ph/1103.5750: **Disk Evolution in OB Associations - Deep Spitzer/IRAC Observations of IC 1795** by *Veronica Roccatagliata, Jeroen Bouwman, Thomas Henning et al*
astro-ph/1103.5814: **Probability of Collisional Capture of Irregular Satellites Around the Gas Giant Planets and Mass Constraints for the Solar Nebula** by *F. Elliott Koch, Brad M. Hansen*
astro-ph/1103.5995: **Non-LTE models for the gaseous metal component of circumstellar discs around white dwarfs** by *S. Hartmann, T. Nagel, T. Rauch et al*
astro-ph/1103.6039: **Water depletion in the disk atmosphere of Herbig AeBe stars** by *D. Fedele, I. Pascucci, S. Brittain et al*

Instrumentation and Techniques

astro-ph/1103.0382: **Preparation of Kepler lightcurves for asteroseismic analyses** by *R.A. Garcia, S. Hekker, D. Stello et al*
astro-ph/1103.0663: **Analysing the active longitudes of the young solar analogue HD 116956 using Bayesian statistics** by *J. Lehtinen, L. Jetsu, M. J. Mantere*

astro-ph/1103.1909: **Improved High Contrast Imaging with On-Axis Telescopes using a Multi-Stage Vortex Coronagraph** by *Dimitri Mawet, Eugene Serabyn, J. Kent Wallace et al*

astro-ph/1103.2522: **Direct detection and spectral characterization of outer exoplanets with the SPICA coronagraph instrument (SCI)** by *Taro Matsuo, Misato Fukagawa, Takayuki Kotani et al*

astro-ph/1103.2535: **A New Concept for Direct Imaging and Spectral Characterization of Exoplanets in Multi-planet Systems** by *Taro Matsuo, Wesley A. Traub, Makoto Hattori et al*

astro-ph/1103.3660: **The Burrell-Optical-Kepler-Survey (BOKS) I: Survey Description and Initial Results** by *John J. Feldmeier, Steve B. Howell, William Sherry et al*

astro-ph/1103.3725: **A dual-mask coronagraph for observing faint companions to binary stars** by *Eric Cady, Michael McElwain, N. Jeremy Kasdin et al*

astro-ph/1103.4776: **Simulation of planet detection with the SPHERE IFS** by *D. Mesa, R. Gratton, A.Berton et al*

astro-ph/1103.4719: **Improving Interferometric Null Depth Measurements using Statistical Distributions: Theory and First Results with the Palomar Fiber Nuller** by *Hanot Charles, Mennesson Bertrand, Martin Stefan et al*

astro-ph/1103.4859: **Starspots and spin-orbit alignment in the WASP-4 exoplanetary system** by *Roberto Sanchis-Ojeda, Joshua N. Winn, Matthew J. Holman et al*

astro-ph/1103.4910: **Estimates of the Planet Yield from Ground-Based High-Contrast Imaging Observations as a Function of Stellar Mass** by *Justin R. Crepp, John Asher Johnson*

astro-ph/1103.5042: **A method to identify and characterise binary candidates - a study of CoRoT data** by *Ronaldo Da Silva, Adriana Silva-Valio*

astro-ph/1103.6085: **Experimental Design for the Gemini Planet Imager** by *James McBride, James R. Graham, Bruce Macintosh et al*