ExoPlanet News
An Electronic Newsletter

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1 Editorial

Welcome to the fifty fourth edition of ExoPlanet News – guaranteed to be the only news sheet you will read this morning that doesn't mention a certain election result. As usual, this month's newsletter contains a wide selection of abstracts reporting the latest discoveries in the field of exoplanet science as well as several job opportunities.
The next edition of the newsletter is planned for early December 2012, following which we'll take a break until the beginning of February 2013. Please send anything relevant to exoplanet@open.ac.uk, and it will appear then. 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.

Best wishes
Andrew Norton & Glenn White
The Open University

2 Abstracts of refereed papers

Benchmark experiments with global climate models applicable to extra-solar gas giant planets in the shallow atmosphere approximation

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Monthly Notices of the Royal Astronomical Society, in press (ArXiv: 1210.4337)

The growing field of exoplanetary atmospheric modelling has seen little work on standardised benchmark tests for its models, limiting understanding of the dependence of results on specific models and conditions. With spatially resolved observations as yet difficult to obtain, such a test is invaluable. Although an intercomparison test for models of tidally locked gas giant planets has previously been suggested and carried out, the data provided were limited in terms of comparability. Here, the shallow PUMA model is subjected to such a test, and detailed statistics produced to facilitate comparison, with both time means and the associated standard deviations displayed, removing the time dependence and providing a measure of the variability. Model runs have been analysed to determine the variability between resolutions, and the effect of resolution on the energy spectra studied. Superrotation is a robust and reproducible feature at all resolutions.

Download/Website: `http://arxiv.org/abs/1210.4337`

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The impact of atmospheric circulation on the chemistry of the hot Jupiter HD 209458b

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Astronomy & Astrophysics, in press (arXiv:1210.6627)

We investigate the effects of atmospheric circulation on the chemistry of the hot Jupiter HD 209458b. We use a simplified dynamical model and a robust chemical network, as opposed to previous studies which have used a three dimensional circulation model coupled to a simple chemical kinetics scheme. The temperature structure and distribution of the main atmospheric constituents are calculated in the limit of an atmosphere that rotates as a solid body with an equatorial rotation rate of 1 km s^{-1}. Such motion mimics a uniform zonal wind which resembles the equatorial superrotation structure found by three dimensional circulation models. The uneven heating of this tidally locked planet causes, even in the presence of such a strong zonal wind, large temperature contrasts between the dayside and nightside, of up to 800 K. This would result in important longitudinal variations of some molecular abundances if the atmosphere were at chemical equilibrium. The zonal wind, however, acts as a powerful disequilibrium process. We identify the existence of a pressure level of transition between two regimes, which may be located between 100 and 0.1 mbar depending on the molecule. Below this transition layer, chemical equilibrium holds, while above it, the zonal wind tends to homogenize the chemical composition of the atmosphere, bringing molecular abundances in the limb and nightside regions close to chemical equilibrium values characteristic of the dayside, i.e. producing an horizontal quenching effect in the abundances. Reasoning based on timescales arguments indicates that horizontal and vertical mixing are likely to compete in HD 209458b's atmosphere, producing a complex distribution where molecular abundances are quenched horizontally to dayside values and vertically to chemical equilibrium values characteristic of deep layers. Either assuming pure horizontal mixing or pure vertical mixing, we find substantial variations in the molecular abundances at the evening and morning limbs, up to one order of magnitude for CH_4, which may have consequences for the interpretation of transmission spectra that sample the planet's terminator of hot Jupiters.

Download/Website: `http://arXiv.org/abs/1210.6627`

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The CHARA Array Angular Diameter of HR 8799 Favors Planetary Masses for Its Imaged Companions

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Astrophysical Journal, in press (arXiv:1210.0556)

HR 8799 is an hF0 mA5 γ Doradus, λ Bootis, Vega-type star best known for hosting four directly imaged candidate planetary companions. Using the CHARA Array interferometer, we measure HR 8799's limb-darkened angular diameter to be 0.342 ± 0.008 mas; this is the smallest interferometrically measured stellar diameter to date, with an error of only 2%. By combining our measurement with the star's parallax and photometry from the literature, we

greatly improve upon previous estimates of its fundamental parameters, including stellar radius (1.44±0.06 $R_{\odot}$), effective temperature (7193±87 K, consistent with F0), luminosity (5.05±0.29 $L_{\odot}$), and the extent of the habitable zone (1.62 AU to 3.32 AU). These improved stellar properties permit much more precise comparisons with stellar evolutionary models, from which a mass and age can be determined, once the metallicity of the star is known. Considering the observational properties of other λ Bootis stars and the indirect evidence for youth of HR 8799, we argue that the internal abundance, and what we refer to as the *effective* abundance, is most likely near-solar. Finally, using the Yonsei-Yale evolutionary models with uniformly scaled solar-like abundances, we estimate HR 8799's mass and age considering two possibilities: $1.516^{+0.038}_{-0.024}$ $M_{\odot}$ and $33^{+7}_{-13.2}$ Myr if the star is contracting toward the zero age main-sequence or $1.513^{+0.023}_{-0.024}$ $M_{\odot}$ and 90^{+381}_{-50} Myr if it is expanding from it. This improved estimate of HR 8799's age with realistic uncertainties provides the best constraints to date on the masses of its orbiting companions, and strongly suggests they are indeed planets. They nevertheless all appear to orbit well outside the habitable zone of this young star.

Download/Website: `http://arXiv.org/abs/1210.0556`

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Scattering of small bodies by planets: a potential origin for exozodiacal dust?

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Astronomy & Astrophysics, in press

High levels of exozodiacal dust are observed around a growing number of main sequence stars. The origin of such dust is not clear, given that it has a short lifetime against both collisions and radiative forces. Even a collisional cascade with km-sized parent bodies, as suggested to explain outer debris discs, cannot survive sufficiently long. In this work we investigate whether the observed exozodiacal dust could originate from an outer planetesimal belt. We investigate the scattering processes in stable planetary systems in order to determine whether sufficient material could be scattered inwards in order to retain the exozodiacal dust at its currently observed levels. We use N-body simulations to investigate the efficiency of this scattering and its dependence on the architecture of the planetary system. The results of these simulations can be used to assess the ability of hypothetical chains of planets to produce exozodi in observed systems. We find that for older ($>$ 100Myr) stars with exozodiacal dust, a massive, large radii ($>$ 20AU) outer belt and a chain of tightly packed, low-mass planets would be required in order to retain the dust at its currently observed levels. This brings into question how many, if any, real systems possess such a contrived architecture and are therefore capable of scattering at sufficiently high rates to retain exozodi dust on long timescales.

Download/Website: `http://ipag.osug.fr/ bonsora`

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Resolved Debris Discs Around A Stars in the Herschel DEBRIS Survey

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Monthly Notices of the Royal Astronomical Society, in press (arXiv:1210.0547)

The majority of debris discs discovered so far have only been detected through infrared excess emission above stellar photospheres. While disc properties can be inferred from unresolved photometry alone under various assumptions for the physical properties of dust grains, there is a degeneracy between disc radius and dust temperature that depends on the grain size distribution and optical properties. By resolving the disc we can measure the actual location of the dust. The launch of Herschel, with an angular resolution superior to previous far-infrared telescopes, allows us to spatially resolve more discs and locate the dust directly. Here we present the nine resolved discs around A stars between 20 and 40 pc observed by the DEBRIS survey. We use these data to investigate the disc radii by fitting narrow ring models to images at 70, 100 and 160 μm and by fitting blackbodies to full spectral energy distributions. We do this with the aim of finding an improved way of estimating disc radii for unresolved systems. The ratio between the resolved and blackbody radii varies between 1 and 2.5. This ratio is inversely correlated with luminosity and any remaining discrepancies are most likely explained by differences to the minimum size of grain in the size distribution or differences in composition. We find that three of the systems are well fit by a narrow ring, two systems are borderline cases and the other four likely require wider or multiple rings to fully explain the observations, reflecting the diversity of planetary systems.

Download/Website: `http://arxiv.org/abs/1210.0547`

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A study of the performance of transit detection tool DST in space-based surveys. Application of the CoRoT pipeline to Kepler data

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Astronomy & Astrophysics, in press (DOI: 10.1051/0004-6361/201219337)

Transit detection algorithms are mathematical tools used for detecting planets in the photometric data of transit surveys. In this work we study their application to space-based surveys. Space missions are exploring the parameter space of the transit surveys where classical algorithms do not perform optimally, either because of the challenging signal-to-noise ratio of the signal or its non-periodic characteristics. We have developed an algorithm addressing these challenges for the mission CoRoT. Here we extend the application to the data from the space mission Kepler. We aim at understanding the performances of algorithms in different data sets. We built a simple analytical model of the transit signal and developed a strategy for the search that improves the detection performance for transiting planets. We analyzed Kepler data with a set of stellar activity filtering and transit detection tools from the CoRoT community that are designed for the search of transiting planets. We present a new algorithm and its performances

compared to one of the most widely used techniques in the literature using CoRoT data. Additionally, we analyzed Kepler data corresponding to quarter Q1 and compare our results with the most recent list of planetary candidates from the Kepler survey. We found candidates that went unnoticed by the Kepler team when analyzing longer data sets. We study the impact of instrumental features on the production of false alarms and false positives. These results show that the analysis of space mission data advocates the use of complementary detrending and transit detection tools also for future space-based transit surveys such as PLATO.

Download/Website: `http://www.aanda.org/index.php?option=com_article&access=doi&doi=10.1051/0004-6361/201219337&Itemid=129`

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WASP-52b, WASP-58b, WASP-59b, and WASP-60b: four new transiting close-in giant planets

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Astronomy & Astrophysics, in press (arXiv:1211.0810)

We present the discovery of four new transiting hot jupiters, detected mainly from SuperWASP-North and SOPHIE observations. These new planets, WASP-52b, WASP-58b, WASP-59b, and WASP-60b, have orbital periods ranging from 1.7 to 7.9 days, masses between 0.46 and 0.94 M_{Jup}, and radii between 0.73 and 1.49 R_{Jup}. Their G1 to K5 dwarf host stars have V magnitudes in the range $11.7 - 13.0$. The depths of the transits are between 0.6 and 2.7 %, depending on the target. With their large radii, WASP-52b and WASP-58b are new cases of low-density, inflated planets, whereas WASP-59b is likely to have a large, dense core. WASP-60 shows shallow transits. In the case of WASP-52 we also detected the Rossiter-McLaughlin anomaly via time-resolved spectroscopy of a transit. We measured the sky-projected obliquity $\lambda = 24^{\circ}{}^{+17}_{-9}$, indicating that WASP-52b orbits in the same direction as its host star is rotating and that this prograde orbit is slightly misaligned with the stellar equator. These four new planetary systems increase our statistics on hot jupiters, and provide new targets for follow-up studies.

Download/Website: `http://arxiv.org/abs/1211.0810`

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WASP-54b, WASP-56b and WASP-57b: Three new sub-Jupiter mass planets from SuperWASP

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Astronomy & Astrophysics, submitted (arXiv:1210.2329)

We present three newly discovered sub-Jupiter mass planets from the SuperWASP survey: WASP-54b is a heavily bloated planet of mass $0.636^{+0.025}_{-0.024}$ M_J and radius $1.653^{+0.090}_{-0.083}$ R_J. It orbits a F9 star, evolving off the main sequence, every 3.69 days. Our MCMC fit of the system yields a slightly eccentric orbit ($e = 0.067^{+0.033}_{-0.025}$) for WASP-54b. We investigated further the veracity of our detection of the eccentric orbit for WASP-54b, and we find that it could be real. However, given the brightness of WASP-54 V=10.42 magnitudes, we encourage observations of a secondary eclipse to draw robust conclusions on both the orbital eccentricity and the thermal structure of the planet. WASP-56b and WASP-57b have masses of $0.571^{+0.034}_{-0.035}$ M_J and $0.672^{+0.049}_{-0.046}$ M_J, respectively; and radii of $1.092^{+0.035}_{-0.033}$ R_J for WASP-56b and $0.916^{+0.017}_{-0.014}$ R_J for WASP-57b. They orbit main sequence stars of spectral type G6 every 4.67 and 2.84 days, respectively. WASP-56b and WASP-57b show no radius anomaly and a high density possibly implying a large core of heavy elements; possibly as high as $\sim$50 $M_\oplus$ in the case of WASP-57b. However, the composition of the deep interior of exoplanets remain still undetermined. Thus, more exoplanet discoveries such as the ones presented in this paper, are needed to understand and constrain giant planets' physical properties.

Download/Website: `http://arxiv.org/abs/1210.2329`

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CFBDSIR2149-0403: a 4-7 Jupiter-mass free-floating planet in the young moving group AB Doradus?

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Astronomy & Astrophysics, in press, arXiv:1210.0305

Using the CFBDSIR wide field survey for brown dwarfs, we identified CFBDSIRJ214947.2-040308.9, a late T dwarf with atypically red $J - K_S$ colour. We obtained an X-Shooter spectra, with signal detectable from 0.8 μm to 2.3 μm, which confirmed a T7 spectral type with an enhanced K_s-band flux indicative of a potentially low-gravity, young, object. The comparison of our near infrared spectrum with atmosphere models, for solar metallicity, shows that CFBDSIRJ214947.2-040308.9 is probably a 650-750 K, log g=3.75-4.0 substellar object. Using evolution models, this translates into a planetary mass object, with an age in the 20-200 Myr range. An independent Bayesian analysis from proper motion measurements results in a 87% probability that this free-floating planet is a member of the 50-120 Myr old AB Doradus moving group, which strengthens the spectroscopic youth diagnosis. By combining our atmospheric characterisation with the age and metallicity constraints arising from the probable membership to the AB Doradus moving group, we find that CFBDSIRJ214947.2-040308.9 is probably a 4-7 Jupiter masses free-floating planet with an effective temperature of $\sim$700 K and a log g of $\sim$4.0, typical of the late T-type exoplanets that are targeted by direct imaging. We stress that this object could be used as a benchmark for understanding the physics of the similar T-type exoplanets that will be discovered by the upcoming high contrast imagers.

Download/Website: `http://adsabs.harvard.edu/abs/2012arXiv1210.0305D`

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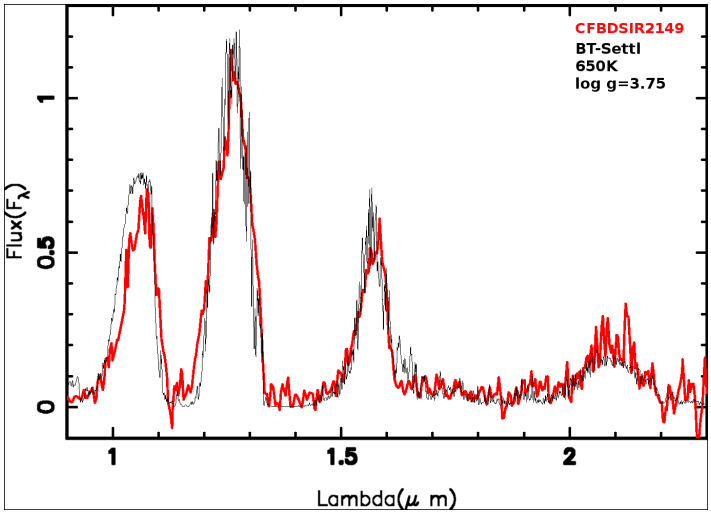

Figure 1: (Delorme et al.) Best fitting BT-SETTL (Allard et al. 2012) model (in black) for CFBDSIR2149 NIR spectrum (in red).

WD0837+185: the formation and evolution of an extreme mass ratio white dwarf-brown dwarf binary in Praesepe

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Astrophysical Journal Letters, published 2012, 759L, 34

There is a striking and unexplained dearth of brown dwarf companions in close orbits ($<$ 3AU) around stars more massive than the Sun, in stark contrast to the frequency of stellar and planetary companions. Although rare and relatively short-lived, these systems leave detectable evolutionary end points in the form of white dwarf - brown dwarf binaries and these remnants can offer unique insights into the births and deaths of their parent systems. We present the discovery of a close (orbital separation $\sim$ 0.006 AU) substellar companion to a massive white dwarf member of the Praesepe star cluster. Using the cluster age and the mass of the white dwarf we constrain the mass of the white dwarf progenitor star to lie in the range 3.5 - 3.7 $M_{\odot}$ (B9). The high mass of the white dwarf means the substellar companion must have been engulfed by the B star's envelope while it was on the late asymptotic giant branch (AGB). Hence, the initial separation of the system was $\sim$ 2 AU, with common envelope evolution reducing the separation to its current value. The initial and final orbital separations allow us to constrain the combination of the common envelope efficiency (α) and binding energy parameters (λ) for the AGB star to $\alpha\lambda \sim 3$. We examine the various formation scenarios and conclude that the substellar object was most likely to have been captured by the white dwarf progenitor early in the life of the cluster, rather than forming in situ.

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How fast do Jupiters grow? Signatures of the snowline and growth rate in the distribution of gas giant planets

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Monthly Notices of the Royal Astronomical Society, in press (arXiv:1209.5921)

We present here observational evidence that the snowline plays a significant role in the formation and evolution of gas giant planets. When considering the population of observed exoplanets, we find a boundary in mass-semimajor axis space that suggests planets are preferentially found beyond the snowline prior to undergoing gap-opening inward migration and associated gas accretion. This is consistent with theoretical models suggesting that sudden changes in opacity – as would occur at the snowline – can influence core migration. Furthermore, population synthesis modelling suggests that this boundary implies that gas giant planets accrete $\sim$ 70 % of the inward flowing gas, allowing $\sim$ 30 % through to the inner disc.

Download/Website: http://www.roe.ac.uk/ wkmr

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Constraints on the habitability of extrasolar moons

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IAU Proceedings, in press (http://arxiv.org/abs/1210.5172)

Detections of massive extrasolar moons are shown feasible with the *Kepler* space telescope. *Kepler*'s findings of about 50 exoplanets in the stellar habitable zone naturally make us wonder about the habitability of their hypothetical moons. Illumination from the planet, eclipses, tidal heating, and tidal locking distinguish remote characterization of exomoons from that of exoplanets. We review our recent findings of constraints on exomoon habitability and show how evaluation of an exomoon's habitability is possible based on the parameters accessible by current and near-future technology.

Download/Website: `http://www.aip.de/People/RHeller`

Contact: `rheller@aip.de`

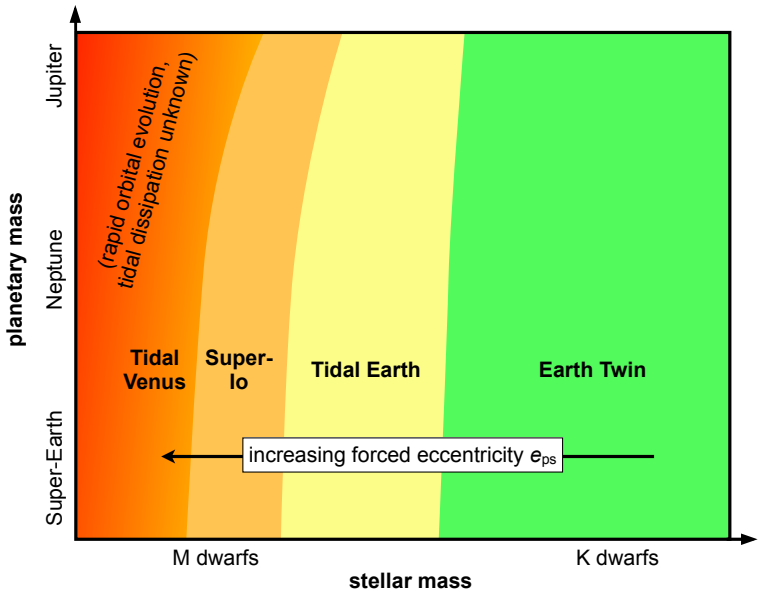

Figure 2: (Heller & Barnes) Schematic classification of hypothetical moons in low-mass stellar systems. The moons have a mass 10 times that of Jupiter's moon Ganymede and are assumed to orbit their planet at the widest Hill stable distance and in the stellar irradiation habitable zone (IHZ). In the IHZ about M dwarfs a satellite's eccentricity $e_{\rm ps}$ is strongly excited, i.e. "forced", by the close star, which induces strong tidal heating in the moon. Super-Io's show tidal surface heating rates h in excess of Jupiter's satellite Io, thus $h > 2\,{\rm W/m^2}$. A Tidal Venus moon is uninhabitable.

Mapping Directly Imaged Giant Exoplanets

Veselin B. Kostov[1]*, Dániel Apai*[2,3]

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Astrophysical Journal, accepted for publication, arXiv:1210.6915

With the increasing number of directly imaged giant exoplanets the current atmosphere models are often not capable of fully explaining the spectra and luminosity of the sources. A particularly challenging component of the atmosphere models is the formation and properties of condensate cloud layers, which fundamentally impact the energetics, opacity, and evolution of the planets. Here we present a suite of techniques that can be used to estimate the level of rotational modulations these planets may show. We propose that the time–resolved observations of such periodic photometric and spectroscopic variations of extrasolar planets due to their rotation can be used as a powerful tool to probe the heterogeneity of their optical surfaces. We address and discuss the following questions: a) what planet properties can be deduced from the light curve and/or spectra, and in particular can we determine rotation periods, spot–coverage, spot colors, spot spectra; b) what is the optimal configuration of instrument/wavelength/temporal sampling required for these measurements; and, c) can principal component analysis be used to invert the light curve and deduce the surface map of the planet. Our simulations describe the expected spectral differences between homogeneous (clear or cloudy) and patchy atmospheres, outline the significance of the dominant absorption features of water, methane, and CO and provide a method to distinguish these two types of atmospheres. Simulated photometry from current and future instruments is used to estimate the level of detectable photometric variations. We conclude that future instruments will be able to recover not only the rotation periods, cloud cover, cloud colors and spectra but even cloud evolution. We also show that a longitudinal map of the planet's atmosphere can be deduced from its disk–integrated light curves.

Download/Website: `http://arxiv.org/abs/1210.6915`

Contact: `vkostov@pha.jhu.edu`

A new analysis of the WASP-3 system: no evidence for an additional companion

M. Montalto[1]*,J. Gregorio*[2]*, G. Boué,*[1]*, A. Mortier*[1]*, I. Boisse*[1]*, M. Oshagh*[1,3]*, M. Maturi*[4]*, P. Figueira*[1]*,S. Sousa*[1]*, N. C. Santos*[1,3]

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[2] Atalaia group, Crow Observatory-Portalegre, 7300 Portalegre, Portugal
[3] Departamento de Fisica e Astronomia, Faculdade de Ciências, Universidade do Porto, 4169-007, Porto, Portugal
[4] Zentrum fuer Astronomie, ITA, Universitaet Heidelberg, Albert-Ueberle-Str. 2, D-69120, Heidelberg, Germany

Monthly Notices of the Royal Astronomical Society, in press arXiv:1211.0218

In this work we investigate the problem concerning the presence of additional bod- ies gravitationally bounded with the WASP-3 system. We present eight new transits of this planet gathered between May 2009 and September 2011 by using the 30-cm Telescope at the Crow Observatory-Portalegre, and analyse all the photometric and radial velocity data published so far. We did not observe significant periodicities in the Fourier spectrum of the observed minus calculated (O-C) transit timing and radial velocity diagrams (the highest peak having false alarm probabilities equal to 56 per cent and 31 per cent respectively) or long term trends. Combining all the available in- formation, we conclude that the radial velocity and transit timing techniques exclude at 99 per cent confidence limit any perturber more massive than $\mathrm{M} \gtrsim 100\,\mathrm{M}_{\mathrm{earth}}$ with periods up to ten times the period of the inner planet. We also investigate the possible presence of an exomoon on this system and determined that considering the scatter of the O-C transit timing residuals a coplanar exomoon would likely produce detectable transits. This hypothesis is however apparently ruled out by observations conducted by other researchers. In case the orbit of the moon is not coplanar the accuracy of our transit timing and transit duration measurements prevents any significant statement. Interestingly, on the basis

of our reanalysis of SOPHIE data we noted that WASP-3 passed from a less active ($\log \mathrm{R}^{'}_{\mathrm{hk}} = -4.95$) to a more active ($\log \mathrm{R}^{'}_{\mathrm{hk}} = -4.8$) state during the 3 yr monitoring period spanned by the observations. Despite no clear spot crossing has been reported for this system, this analysis claims for a more intensive monitoring of the activity level of this star in order to understand its impact on pho- tometric and radial velocity measurements.

Download/Website: `http://arxiv.org/list/astro-ph.EP/recent`

Contact: `Marco.Montalto@astro.up.pt`

The Discovery of HD 37605c and a Dispositive Null Detection of Transits of HD 37605b

Sharon Xuesong Wang[1,2], Jason T. Wright[1,2],William Cochran[3], Stephen R. Kane[4], Gregory W. Henry[5], Matthew J. Payne[6], Michael Endl[3], Phillip J. MacQueen[3], Jeff A. Valenti[7], Victoria Antoci[8,9], Diana Dragomir[8], Jaymie M. Matthews[8], Andrew W. Howard[10,11], Geoffrey W. Marcy[10], Howard Isaacson[10], Eric B. Ford[6], Suvrath Mahadevan[1,2], Kaspar von Braun[4]

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[2] Center for Exoplanets and Habitable Worlds, 525 Davey Laboratory, The Pennsylvania State University, University Park, PA 16802, USA
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[5] Center of Excellence in Information Systems, Tennessee State University, 3500 John A. Merritt Blvd., Box 9501, Nashville,TN 37209, USA
[6] Department of Astronomy, University of Florida, 211 Bryant Space Science Center, P.O. Box 112055, Gainesville, FL 32611, USA
[7] Space Telescope Science Institute, 3700 San Martin Dr., Baltimore, MD 21218, USA
[8] Department of Physics & Astronomy, University of British Columbia, Vancouver, BC V6T1Z1, Canada
[9] Stellar Astrophysics Centre (SAC), Department of Physics and Astronomy, Aarhus University, Ny Munkegade 120, DK-8000 Aarhus C, Denmark
[10] Department of Astronomy, University of California, Berkeley, CA 94720, USA
[11] Space Sciences Laboratory, University of California, Berkeley, CA 94720, USA

Astrophysical Journal, in press(arXiv:1210.6985)

We report the radial-velocity discovery of a second planetary mass companion to the K0 V star HD 37605, which was already known to host an eccentric, $P \sim 55$ days Jovian planet, HD 37605b. This second planet, HD 37605c, has a period of ~ 7.5 years with a low eccentricity and an $M \sin i$ of $\sim 3.4\ M_{\mathrm{Jup}}$. Our discovery was made with the nearly 8 years of radial velocity follow-up at the Hobby-Eberly Telescope and Keck Observatory, including observations made as part of the Transit Ephemeris Refinement and Monitoring Survey (TERMS) effort to provide precise ephemerides to long-period planets for transit follow-up. With a total of 137 radial velocity observations covering almost eight years, we provide a good orbital solution of the HD 37605 system, and a precise transit ephemeris for HD 37605b. Our dynamic analysis reveals very minimal planet-planet interaction and an insignificant transit time variation. Using the predicted ephemeris, we performed a transit search for HD 37605b with the photometric data taken by the T12 0.8-m Automatic Photoelectric Telescope (APT) and the Microvariability and Oscillations of Stars (MOST) satellite. Though the APT photometry did not capture the transit window, it characterized the stellar activity of HD 37605, which is consistent of it being an old, inactive star, with a tentative rotation period of 57.67 days. The MOST photometry enabled us to report a dispositive null detection of a non-grazing transit for this planet. Within the predicted transit window, we exclude an edge-on predicted depth of 1.9% at the $\gg 10\sigma$ level, and exclude any transit with an impact parameter $b > 0.951$ at greater than 5σ. We present the BOOTTRAN package for calculating Keplerian orbital parameter uncertainties via bootstrapping. We made a comparison and found consistency between our orbital fit parameters calculated by the RVLIN package and error bars by BOOTTRAN with those produced by a Bayesian analysis using MCMC.

Download/Website: `RVLIN and BOOTTRAN package: http://exoplanets.org/code/, Machine-readable tables: http://sites.google.com/site/sharonxuesong/publications/a001_hd37605`

Contact: `SXW at xxw131@psu.edu and JTW at jtw13@psu.edu`

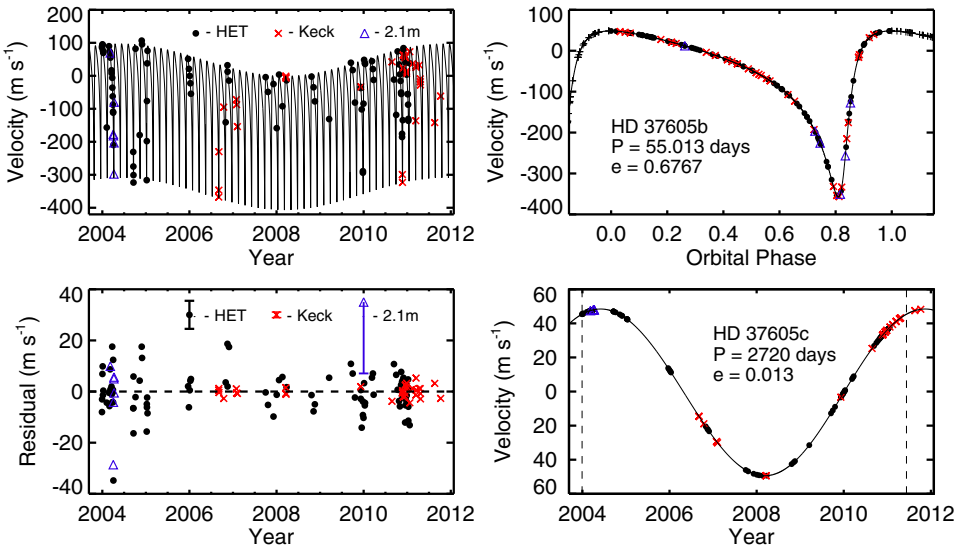

Figure 3: (Wang et al.) Radial velocity and Keplerian model plots for the HD 37605 system. In all panels, HET observations are labeled with black filled circles, Keck observations are labeled with red crosses, and the velocities from the 2.1 m telescope Cochran et al. (2004) are labeled with blue triangles. Best Keplerian fits are plotted in black solid lines. **Top left**: The best-fit 2-planet Keplerian model (solid line) and the observed radial velocities from 3 telescopes. The HET and Keck velocities have been adjusted to take into account the velocity offsets (i.e., subtracting $\Delta_{\rm HET}$ and $\Delta_{\rm Keck}$ from the velocities, respectively; see Table 2 and § 3.2). **Bottom left**: Residual velocities after subtracting the best-fit 2-planet Keplerian model. The lengend gives the typical size of the error bars using the $\pm$ median RV error for each telescope (for 2.1 m telescope only the lower half is shown). **Top right**: RV signal induced by HD 37605b alone, phased up to demonstrate our coverage. **Bottom right**: RV signal induced by HD 37605c alone. The two vertical dashed lines denote the date of our first observation, and the date when HD 37605c closes one orbit, respectively.

Detection of sodium absorption in WASP-17b with Magellan

G. Zhou & D.D.R. Bayliss

Research School of Astronomy and Astrophysics, Australian National University, Cotter Rd, Weston Creek, ACT 2611, Australia

Monthly Notices of the Royal Astronomical Society, published (2012MNRAS.426.2483Z)

We present the detection of sodium absorption in the atmosphere of the extrasolar planet WASP-17b, an inflated 'hot-Jupiter' in a tight orbit around an F6 dwarf. In-transit observations of WASP-17 made with the MIKE spectrograph on the 6.5-m Magellan Telescope were analysed for excess planetary atmospheric absorption in the sodium I 'D' doublet spectral region. Using the interstellar sodium absorption lines as reference, we detect an excess 0.58 ± 0.13 per cent transit signal, with 4.5σ confidence, at 1.5 Å bandwidth around the stellar sodium absorption feature. This result is consistent with the previous VLT detection of sodium in WASP-17b, confirming that the planet has a highly inflated atmosphere.

Download/Website: `http://arxiv.org/abs/1207.6895`

Contact: `george@mso.anu.edu.au`

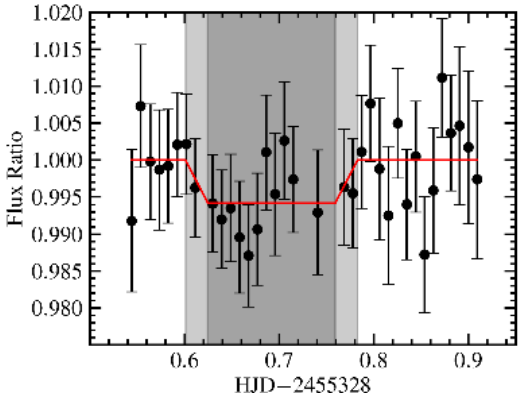

Figure 4: (Zhou & Bayliss) The transit lightcurve about the stellar NaI D_1 and D_2 lines. The red line plots the 0.58 ± 0.13 per cent transit depth fit. The darker shade marks the in-transit proportion of the lightcurve, whilst the lighter shade marks ingress and egress.

3 Jobs and Positions

Research Investment Fellowship in Astronomy

A.J. Norton
Department of Physical Sciences, The Open University, Walton Hall, Milton Keynes MK7 6AA, UK

The Open University, 30 Nov 2012

We invite applicants showing outstanding promise and potential for research leadership to apply for a 4 year independent research fellowship hosted by the Astronomy Discipline in the Open Universitys flagship Centre for Earth, Planetary, Space and Astronomical Research (CEPSAR).

We seek to make this appointment in an area that complements and adds value to our existing research strengths, including one or more of the following areas: astrochemistry, star formation and stellar evolution, exoplanets and planet formation, extragalactic astrophysics and cosmology. We invite applications in any of these or closely related areas, but exceptional candidates with other research interests that would complement group interests are encouraged to apply.

You should have an excellent track record of independent astronomical research evidenced e.g. by highly-cited / high impact REF-eligible publications, and ideally supplemented with other research esteem indicators. The main duties of the post are research-oriented, but it is also hoped that the candidate will be able to consult on strategic areas of teaching need within the Astronomy Discipline, including extragalactic astronomy.

Closing date: 30 November 2012. Interview date is to be advised.

Salary: £30,122 – £44,166. Job Reference: 8469. Temporary contract for 48 months. Based in Milton Keynes.

For detailed information and how to apply go to www.open.ac.uk/employment, call the Recruitment Co-ordinator on +44(0)1908 858110 or email science-recruitment@open.ac.uk quoting the reference number. Further particulars are available in large print, disk or audiotape (minicom +44(0)1908 654901). We promote diversity in employment and welcome applications from all sections of the community.

Download/Website: `http://www3.open.ac.uk/employment/job-details.asp?id=6525&ref=ext`

Contact: `science-recruitment@open.ac.uk`

PhD Student Position in Star and Planet Formation

Michael R. Meyer
ETH Zurich, Switzerland

ETH Zurich, Zurich, Switzerland, 1 Dec 2012

The Institute for Astronomy of ETH Zurich, Star and Planet Formation Research Group (led by Professor Michael Meyer) invites applications for new PhD positions related to: i) the direct detection and characterization of extra-solar planets; ii) tests of planet formation theory from an astronomical, cosmochemical, and geophysical perspective; and iii) formation and evolution of young star clusters within molecular clouds. Salaries for PhD students start at CHF 51750. Students will have the opportunity to study experimental and theoretical aspects of astronomy through formal coursework, conducting research with local experts in star and planet formation as well as our international network of collaborators, and utilize state-of-the-art facilities. Switzerland is a member of ESO and ESA, and successful applicants will have full access to their facilities, as well as data from ongoing programs utilizing the Hubble Space Telescope, and the Herschel Space Telescope. The Institute for Astronomy maintains a network of workstations, as well as a range of high performance computing options, including stand-alone machines, large clusters, and the resources of the Swiss National Supercomputing Center (CSCS). Members of the Institute also play a leading role in the interdisciplinary PLANET-Z initiative linking research groups at the ETH Zurich in astronomy, earth science, and computational astrophysics at the University of Zurich. Qualified applicants will be able to explore research opportunities in the Astronomical Instrumentation Laboratory. Applications are invited from all nationalities and should consist of a CV, description of relevant research experience, academic transcripts, scores from relevant standardized tests (e.g. TOEFL, Physics GRE) a personal statement of interests and goals, and the names of three references that can be contacted if necessary. Materials should be sent electronically in a single pdf file to eth-astro-star-planet@phys.ethz.ch. Review of applications will begin December 1, 2012. The ETH Zurich will provide benefits for maternity leave, retirement, accident insurance, and relocation costs.

Download/Website: `http://www.pa.ethz.ch/`

Contact: `Marianne Chiesi; marianne.chiesi@phys.ethz.ch`

Post-doctoral Position in Star and Planet Formation

Michael R. Meyer
ETH Zurich, Switzerland

ETH Zurich, Zurich, Switzerland, 1 Dec 2012

The Institute for Astronomy of the ETH Zurich, Star and Planet Formation Research Group (led by Professor Michael Meyer) invites applications for a new post-doctoral fellowship related to the STARFORM Project. STARFORM is a Swiss collaboration (the University of Geneva, the University of Zurich, and the ETH Zurich) aimed at under- standing the star formation process from observational, theoretical, and computational points of view. We seek to explore star formation within nearby molecular clouds and in distant galaxies, from small to large scales, using in particular infrared and millimeter observations and state-of-the-art simulations. More information can be found at http://obswww.unige.ch/wordpress/starform.

As part of this project, the ETH Zurich will work closely with colleagues at the University of Zurich to create mock observations of hydrodynamic models of molecular clouds and compare them quantitatively to observations. We are part of an on-going survey of the Orion B molecular cloud and will collaborate with experts in analysis of cloud structure and comparison of models to data. We will also work with colleagues at the University of Geneva on related projects. Salaries and duration of appointments will be commensurate with experience. Starting salaries begin at CHF 84700, with initial appointments of 2+1 years, up to a maximum of six.

Switzerland is a member of ESO and ESA, and successful applicants will have full access to their facilities, as well as data from ongoing programs utilizing the Hubble Space Telescope, the Herschel Space Telescope and a range of

millimeter wave survey telescopes. The Institute for Astronomy maintains a network of workstations, as well as a range of high performance computing options, including stand-alone machines, large clusters, and the resources of the Swiss National Supercomputing Center (CSCS).
Applications are invited from all nationalities and should consist of a CV and brief descriptions of past/proposed research (combined length not to exceed 10 pages). A separate publication list should be attached. Materials should be sent electronically in a single pdf file. This file, as well as three letters of reference (sent directly by the referees) should be sent to eth-astro-star-planet@phys.ethz.ch. Review of applications will begin December 1, 2012 and will continue until positions are filled.
The ETH Zurich will provide benefits for maternity leave, retirement, accident insurance, and relocation costs.

Download/Website: `http://www.pa.ethz.ch/`

Contact: `Marianne Chiesi; marianne.chiesi@phys.ethz.ch`

Post-doctoral Position in Star and Planet Formation

Michael R. Meyer
ETH Zurich, Switzerland

ETH Zurich, Zurich, Switzerland, 1 Dec 2012

The Institute of Astronomy of the ETH Zurich, Star and Planet Formation Research Group (led by Professor Michael Meyer) invites applications for a new post-doctoral fellowship related to the formation of stars and planets. Our group is involved in several research topics including the detection and characterization of extra-solar planets, the structure and evolution of circumstellar disks, and the formation and evolution of young star clusters. More information can be found at http://www.astro.ethz.ch/meyer/index Salaries and duration of appointments will be commensurate with experience. Starting salaries begin at CHF 84700, with initial appointments of 2+1 years, up to a maximum of six. Successful applicants will have the opportunity to work with students at all levels and become involved in one or more of several large programs in which our research group participates. Switzerland is a member of ESO and ESA, and successful applicants will have full access to their facilities, as well as data from ongoing programs utilizing the Hubble Space Telescope, the Herschel Space Telescope and a range ofother facilities. The Institute for Astronomy maintains a network of workstations, as well as a range of high performance computing options, including stand-alone machines, large clusters, and the resources of the Swiss National Supercomputing Center (CSCS). Members of the Institute also play a leading role in the interdisciplinary PLANET-Z initiative linking research groups at the ETH Zurich in astronomy, earth science, and computational astrophysics at the University of Zurich to study planet formation. Interested applicants will also be welcome to explore research opportunities in the Astronomical Instrumentation Laboratory.
Applications are invited from all nationalities and should consist of a CV and brief descriptions of past/proposed research (combined length not to exceed 10 pages). A separate publication list should be attached. Materials should be sent electronically in a single pdf file. This file, as well as three letters of reference (sent directly by the referees) should be sent to eth-astro-star-planet@phys.ethz.ch. Review of applications will begin December 1, 2012 and will continue until positions are filled. The ETH Zurich will provide benefits for maternity leave, retirement, accident insurance, and relocation costs.

Download/Website: `http://www.pa.ethz.ch/`

Contact: `Marianne Chiesi; marianne.chiesi@phys.ethz.ch`

A postdoc position for the analysis of CoRoT data in the research area of ”extrasolar planets” for 2 years

H. Rauer
Institut für Planetenforschung, Deutsches Zentrum für Luft- und Raumfahrt (DLR)

DLR-Standort Berlin, March 1, 2013

Science activities at the Institute of Planetary Research cover a wide range of expertise, ranging from planetology within the Solar System to the detection and characterization of exoplanetary systems, as well as the subsequent modeling of their interior structures, atmospheres, potential habitability and biosignatures. The Institute plays a key role in the French-led (CNES) space mission CoRoT and in the international ground-based survey for transiting exoplanets NGTS (Next Generation Transit Survey) located in Chile. The space mission CoRoT (Convection, Rotation and planetary Transits) is devoted to the search for transiting extrasolar planets and studies of stellar interior through asteroseismology. Since the launch of the mission the Institute of Planetary Research has taken part in the scientific exploitation of the CoRoT data and now offers a post-doctoral research position in the context of exoplanetary science to continue and strengthen these activities.
Main tasks:
The position is aimed at the scientific exploitation of the CoRoT data concerning exoplanet research. The successful candidate will take part in one or several of the ongoing CoRoT activities within the Institute: data analysis, search for planetary transits, ground-based follow-up observations for planet confirmation and characterization, and the general scientific interpretation and modeling of discovered exoplanetary systems. In addition, the successful candidate will have the opportunity to devote a fraction of his/her time to their own research activities within the exoplanetary field.
Required qualifications:

- a PhD in physics, astronomy/astrophysics or geophysics
- experience in astronomical observations and the related data reduction and/or subsequent scientific analysis of extrasolar planets
- a very good publication record
- experience in international cooperation
- a general and well documented experience in the research field of extrasolar planets

Applications should include:

- a cover letter
- CV
- 2 letters of recommendation

The postdoc is offered for 2 years, starting March 1, 2013. Send your application following the instructions online (http://www.dlr.de/dlr/jobs/desktopdefault.aspx/tabid-10596/1003_read-5541/referrer-10572/). The text of the German job advertisement is decisive. Applications should be sent before November 30, 2012.

Download/Website: `http://www.dlr.de/dlr/jobs/desktopdefault.aspx/tabid-10596/1003_read-5541/referrer-10572/`

Contact: `follow instructions on-line`

4 Conference announcements

Workshop on "Ice and Planet Formation"

Anders Johansen, Katrin Ros, Michiel Lambrechts
Lund Observatory, Lund, Sweden

Lund Observatory, Lund, Sweden, 15–17 May 2013

This workshop in Lund focuses on ice(s) and planet formation. Astrophysical ice has become an increasingly popular topic in the past years, inspired and driven by new observations of ices in molecular clouds and protoplanetary discs, models of dust coagulation and planet formation where ice plays an important role and current and upcoming laboratory experiments on ice collisions and ice deposition.

The goal of the workshop is to bring together observers, experimentalists and theorists to discuss the present state-of-the-art of the field as well as future directions. The workshop will consist of contributed talks and posters, with ample time for discussion during extended breaks and poster sessions.

The Ice and Planet Formation workshop will be held 15–17 May 2013 at Lund Observatory in Lund in Sweden. The workshop will start after lunch on Wednesday 15 May and end after lunch on Friday 17 May.

Registration closes 15 February 2013.

Scientific organising committee:
Jürgen Blum (University of Braunschweig)
Ewine van Dishoeck (Leiden University)
Carsten Dominik (Amsterdam University)
Cornelis Dullemond (Heidelberg University)
Thomas Henning (Max Planck Institute for Astronomy)
Michiel Hogerheijde (Leiden University)
Anders Johansen (Lund University)
Klaus Pontoppidan (Space Telescope Science Institute)

Local organising committee:
Anders Johansen (Lund University)
Katrin Ros (Lund University)
Michiel Lambrechts (Lund University)

Download/Website: `http://www.astro.lu.se/~anders/IPF2013`
Contact: `anders@astro.lu.se`

5 As seen on astro-ph

The following list contains all the entries relating to exoplanets that we spotted on astro-ph during October 2012. If you see any that we missed, please let us know and we'll include them in the next issue.

astro-ph/1210.0328 : **Foretellings of Ragnark: World-engulfing Asymptotic Giants and the Inheritance of White Dwarfs** by *Alexander James Mustill, Eva Villaver*

astro-ph/1210.0526 : **Formation and Early Evolution of Circumstellar Disks in Turbulent Molecular Cloud Cores** by *Yusuke Tsukamoto, Masahiro N. Machida*

astro-ph/1210.0531 : **Hint of a transiting extended atmosphere on 55 Cancri b** by *David Ehrenreich, et al.*

astro-ph/1210.0538 : **Deuterium burning in objects forming via the core accretion scenario - Brown dwarfs or planets?** by *Paul Mollire, Christoph Mordasini*

astro-ph/1210.0547 : **Resolved Debris Discs Around A Stars in the Herschel DEBRIS Survey** by *Mark Booth, et al.*

astro-ph/1210.0587 : **The Absence of Cold Dust around Warm Debris Disk Star HD 15407A** by *Hideaki Fujiwara, et al.*

astro-ph/1210.0684 : **The magnetic coupling of planets and small bodies with a pulsar's wind** by *Fabrice Mottez, Jean Heyvaerts*

astro-ph/1210.0793 : **Probing the Blow-Off Criteria of Hydrogen-Rich "Super-Earths"** by *H. Lammer, et al.*

astro-ph/1210.0971 : **Clump formation due to the gravitational instability of a multiphase medium in a massive protoplanetary disc** by *Valeriy N. Snytnikov, Olga P. Stoyanovskaya*

astro-ph/1210.1217 : **The first planet detected in the WTS: an inflated hot-Jupiter in a 3.35 day orbit around a late F-star** by *M. Cappetta, et al.*

astro-ph/1210.1536 : **The escape of heavy atoms from the ionosphere of HD209458b. I. A photochemical-dynamical model of the thermosphere** by *T. T. Koskinen, et al.*

astro-ph/1210.1543 : **The escape of heavy atoms from the ionosphere of HD209458b. II. Interpretation of the observations** by *T. T. Koskinen, et al.*

astro-ph/1210.1640 : **A dynamical study on the habitability of terrestrial exoplanets I: Tidally evolved planet-satellite pairs** by *R. Brasser, S. Ida, E. Kokubo*

astro-ph/1210.1648 : **On the secular behavior of dust particles in an eccentric protoplanetary disk with an embedded massive gas giant planet** by *He-Feng Hsieh, Pin-Gao Gu*

astro-ph/1210.1676 : **Starspot activity and rotation of the planet-hosting star Kepler-17** by *Aldo S. Bonomo, Antonino F. Lanza*

astro-ph/1210.1711 : **Search for Super Earths by Timing of Transits with CoRoT** by *J. Cabrera*

astro-ph/1210.1914 : **Hot circumstellar material resolved around beta Pic with VLTI/PIONIER** by *D. Defrère, et al.*

astro-ph/1210.2329 : **WASP-54b, WASP-56b and WASP-57b: Three new sub-Jupiter mass planets from SuperWASP** by *F. Faedi et al.*

astro-ph/1210.2471 : **Exoplanet Detection Methods** by *Jason T. Wright, B. Scott Gaudi*

astro-ph/1210.2720 : **A Possible Carbon-rich Interior in Super-Earth 55 Cancri e** by *Nikku Madhusudhan et al.*

astro-ph/1210.2963 : **Evidence of nearby supernovae affecting life on Earth** by *Henrik Svensmark*

astro-ph/1210.3000 : **The TRENDS High-Contrast Imaging Survey. I. Three Benchmark M-dwarfs Orbiting Solar-type Stars** by *Justin R. Crepp, et al.*

astro-ph/1210.3045 : **TASTE. III. A homogeneous study of transit time variations in WASP-3b** by *V. Nascimbeni, et al.*

astro-ph/1210.3055 : **Two circumbinary planets in the eclipsing post-common envelope system NSVS 14256825** by *L. A. Almeida, F. Jablonski, C. V. Rodrigues*

astro-ph/1210.3169 : **IRSF SIRIUS JHKs Simultaneous Transit Photometry of GJ1214b** by *Norio Narita, et*

al.

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