ExoPlanet News
An Electronic Newsletter

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1 Editorial

Welcome to the thirty-sixth edition of ExoPlanet News. Thanks to all our contributors for sending in another set of interesting contributions for this month's newsletter - there's plenty to read this time, as this is our first edition since the beginning of December. 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 March 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

Disentangling between stellar activity and planetary signals

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Astronomy & Astrophysics, in press (arXiv:1012.1452B)

Photospheric stellar activity (i.e. dark spots or bright plages) might be an important source of noise and confusion in stellar radial-velocity (RV) measurements. Radial-velocimetry planet search surveys as well as follow-up of photometric transit surveys require a deeper understanding and characterization of the effects of stellar activities to differentiate them from planetary signals.
We simulate dark spots on a rotating stellar photosphere. The variations in the photometry, RV, and spectral line shapes are characterized and analyzed according to the stellar inclination, the latitude, and the number of spots.
We show that the anti-correlation between RV and bisector span, known to be a signature of activity, requires a good sampling to be resolved when there are several spots on the photosphere. The Lomb-Scargle periodograms of the RV variations induced by activity present power at the rotational period P_{rot} of the star and its two first harmonics $P_{rot}/2$ and $P_{rot}/3$. Three adjusted sinusoids fixed at the fundamental period and its two-first harmonics allow us to remove about 90% of the RV jitter amplitude. We apply and validate our approach on four known active planet-host stars: HD 189733, GJ 674, CoRoT-7, and ι Hor. We succeed in fitting simultaneously activity and planetary signals on GJ674 and CoRoT-7. This simultaneous modeling of the activity and planetary parameters leads to slightly higher masses of CoRoT-7b and c of respectively, 5.7 $\pm$ 2.5 M_{Earth} and 13.1 $\pm$ 4.1 M_{Earth}. The larger uncertainties properly take into account the stellar active jitter. We exclude short-period low-mass exoplanets around ι Hor. For data with realistic time-sampling and white Gaussian noise, we use simulations to show that our approach is effective in distinguishing reflex-motion due to a planetary companion and stellar-activity-induced RV variations provided that 1) the planetary orbital period is not close to that of the stellar rotation or one of its two

first harmonics, 2) the semi-amplitude of the planet exceeds ∼30% of the semi-amplitude of the active signal, 3) the rotational period of the star is accurately known, and 4) the data cover more than one stellar rotational period.

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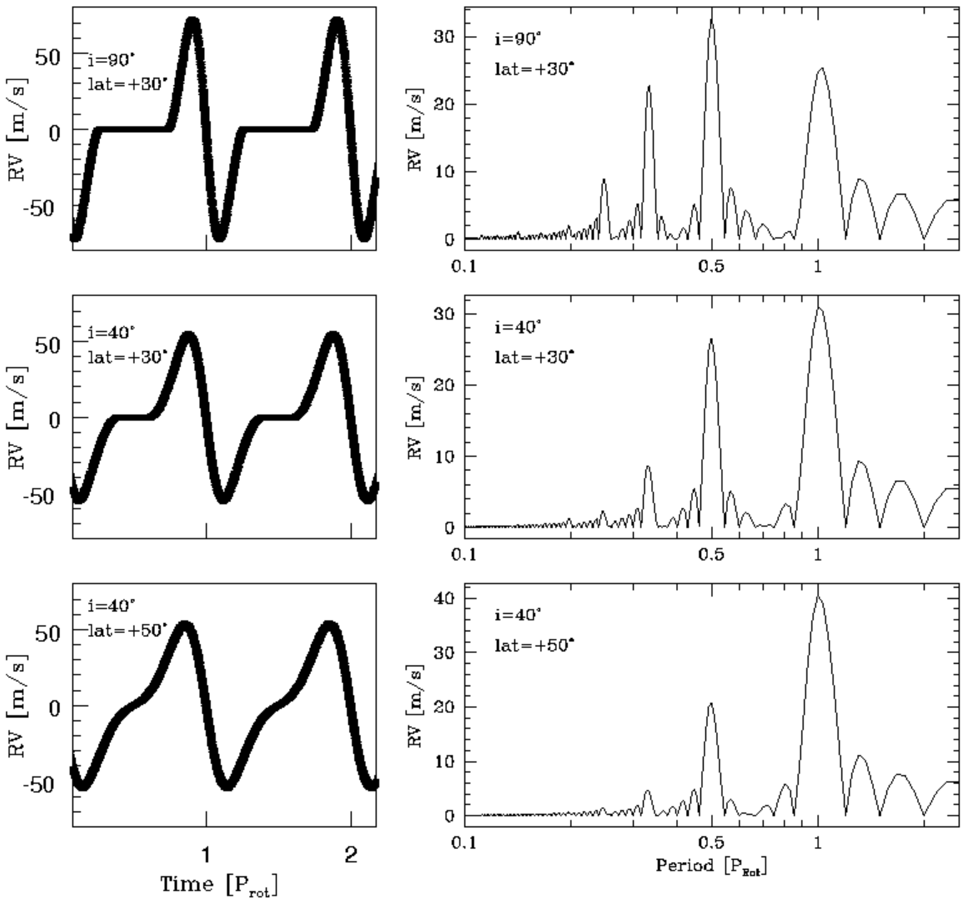

Figure 1: (Boisse et al.) *Left:* RV modulations due to one spot as a function of time (expressed in rotational period unit). At t=0, the dark spot of 1% of the visible stellar surface is in front of the line of sight. The shape of the signal changes with the inclination i of the star and the latitude lat of the spot, labelled in the top left of each panel. *Right:* Lomb-Scargle periodograms of the three RV modulations showed at the left. The fundamental frequency, P_{rot}, and its first harmonics are detected.

Do all Sun-like stars have planets? Inferences from the disc-mass reservoirs of Class 0 protostars

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Monthly Notices of the Royal Astronomical Society, in press/arXive(circa 1 Feb)

Protostars ~ 0.1 Myr old are heavily obscured, but their circumstellar dust discs can be studied by millimetre interferometry that resolves out the obscuring envelope. Consistent estimates are made for the disc masses of Class 0 protostars, and these range over 7-660 Jupiter masses. A simple grain coagulation model reproduces the mass-distributions of more evolved discs around Class I protostars and Class II T Tauri stars (at $\lesssim 1$, $\lesssim 5$ Myr), implying that their observed dust is remnant material. The conversion of most dust grains into planetesimals thus occurs very early, at ~ 0.1 Myr. As this is concurrent with the formation of the star itself, much of the disc is expected to accrete onto the central object, and a correlation of bolometric luminosity and disc mass is observed that agrees well with disc models. The observed Class 0 discs all contain upwards of 20 Earth-masses of dust, allowing for the formation of 'super-Earths' around many Sun-like stars. Only 10 % of the dust mass needs to be converted into planetary cores to match the range of such core-masses presently known.

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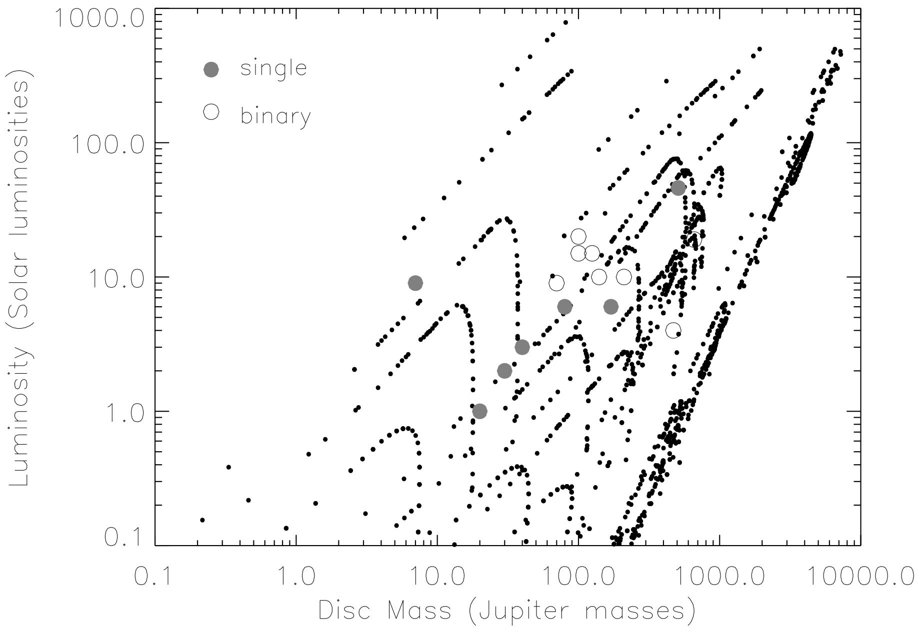

Figure 2: (Greaves & Rice) Bolometric luminosities against disc masses for the Class 0 protostars. In the binary systems shown by unfilled symbols, L_{bol} is taken to be the system total divided by two, as individual values are not known. The black data points are tracks for model discs in systems with stellar mass up to 1.2 $M_{\odot}$.

Tidal obliquity evolution of potentially habitable planets

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Astronomy & Astrophysics, accepted (http://arxiv.org/abs/1101.2156)

Stellar insolation has been used as the main constraint on a planet's habitability. However, as more Earth-like planets are discovered around low-mass stars (LMSs), a re-examination of the role of tides on the habitability of exoplanets has begun. Those studies have yet to consider the misalignment between a planet's rotational axis and the orbital plane normal, i.e. the planetary obliquity. We apply two equilibrium tide theories to compute the obliquity evolution of terrestrial planets orbiting in the habitable zones around LMSs. The time for the obliquity to decrease from an Earth-like obliquity of $23.5°$ to $5°$, the 'tilt erosion time', is compared to the traditional insolation habitable zone (IHZ) as a function of semi-major axis, eccentricity, and stellar mass. We also compute tidal heating and equilibrium rotation caused by obliquity tides. The Super-Earth Gl581 d and the planet candidate Gl581 g are studied as examples for tidal processes. Earth-like obliquities of terrestrial planets in the IHZ around $< 0.25\,M_\odot$ stars are eroded in less than 0.1 Gyr. Only terrestrial planets orbiting stars with masses $> 0.9\,M_\odot$ experience tilt erosion times larger than 1 Gyr throughout the IHZ. Terrestrial planets in the IHZ of stars with masses $< 0.25\,M_\odot$ undergo significant tidal heating due to obliquity tides. The predictions of the two tidal models diverge significantly for $e > 0.3$. In our two-body simulations, Gl581 d's obliquity is eroded to 0 and its rotation period reached its equilibrium state of half its orbital period in < 0.1 Gyr. Tidal surface heating on the putative Gl581 g is < 150 mW/m^2 as long as its eccentricity is $e < 0.3$. Obliquity tides modify the concept of the habitable zone. Tilt erosion of terrestrial planets orbiting LMSs should be included by atmospheric modelers. Tidal heating needs to be considered by geologists.

Download/Website: `http://arxiv.org/abs/1101.2156`

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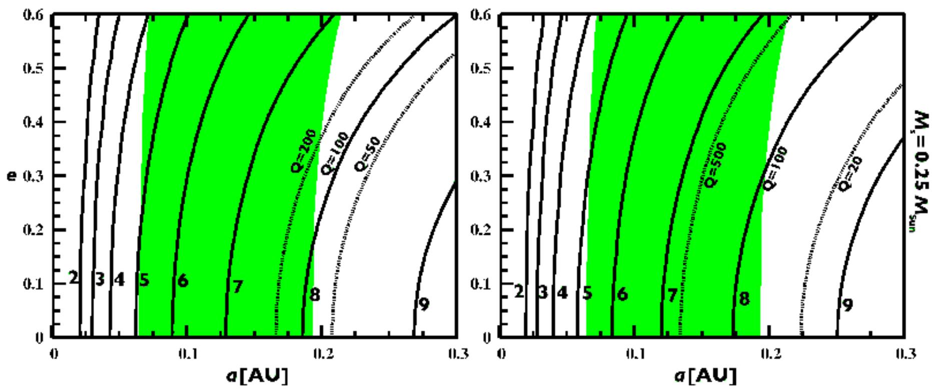

Figure 3: (Heller, Leconte & Barnes) 'Tilt erosion time' $t_{\rm ero.}$, i.e. time required by tides to decrease an initial Earth-like obliquity of $23.5°$ to $5°$, as function of semi-major axis a and eccentricity e. **Left:** An Earth-mass planet and **Right:** a 10 Earth-mass planet orbiting a $0.25\,M_\odot$ star, respectively. The insolation habitable zone (IHZ) is shaded, contours of constant $t_{\rm ero.}$ are labeled in units of $\log(t_{\rm ero.}/{\rm yr})$. Error estimates for the tidal dissipation function $Q_{\rm p}$ of the planets are shown by dashed lines. Obliquities of such planets in the IHZ of their host stars are eroded in < 0.1 Gyr.

Interplanetary magnetic field orientation and the magnetospheres of close-in exoplanets

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Astronomy & Astrophysics, in press (2011A&A...525A.117J)

The abundance of exoplanets with orbits smaller than that of Mercury most likely implies that there are exoplanets exposed to a quasiparallel stellar-wind magnetic field. Many of the generic features of stellar-wind interaction depend on the existence of a nonzero perpendicular interplanetary magnetic field component. However, for closer orbits the perpendicular component becomes smaller and smaller. The resulting *quasiparallel* interplanetary magnetic field may imply new types of magnetospheres and interactions not seen in the solar system. We simulate the Venus-like interaction between a supersonic stellar wind and an Earth-sized, unmagnetized terrestrial planet with ionosphere, orbiting a Sun-like star at 0.2 AU. The importance of a quasiparallel stellar-wind interaction is then studied by comparing three simulation runs with different angles between stellar wind direction and interplanetary magnetic field. The plasma simulation code is a hybrid code, representing ions as particles and electrons as a massless, charge-neutralizing adiabatic fluid. Apart from being able to observe generic features of supersonic stellar-wind interaction we observe the following changes and trends when reducing the angle between stellar wind and interplanetary magnetic field 1) that a large part of the bow shock is replaced by an unstable quasiparallel bow shock; 2) weakening magnetic draping and pile-up; 3) the creation of a second, flanking current sheet due to the need for the interplanetary magnetic field lines to connect to almost antiparallel draped field lines; 4) stellar wind reaching deeper into the dayside ionosphere; and 5) a decreasing ionospheric mass loss. The speed of the last two trends seems to accelerate at low angles.

Download/Website: `http://www.aanda.org/articles/aa/pdf/2011/01/aa14802-10.pdf`

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The thermal structure and the location of the snow line in the protosolar nebula: axisymmetric models with full 3-D radiative transfer

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Icarus, in press (arXiv: 1012.0727)

The precise location of the water ice condensation front (snow line) in the protosolar nebula has been a debate for a long time. Its importance stems from the expected substantial jump in the abundance of solids beyond the snow line, which is conducive to planet formation, and from the higher stickiness in collisions of ice-coated dust grains, which may help the process of coagulation of dust and the formation of planetesimals. In an optically thin nebula, the location of the snow line is easily calculated to be around 3 AU, subject to brightness variations of the young Sun. However, in its first 5 to 10 million years, the solar nebula was optically thick, implying a smaller snowline radius due to shielding from direct sunlight, but also a larger radius because of viscous heating. Several models have attempted to treat these opposing effects. However, until recently treatments beyond an approximate 1+1D radiative transfer were unfeasible. We revisit the problem with a fully self-consistent 3D treatment in an axisymmetric disk model, including a density-dependent treatment of the dust and ice sublimation. We find that the location of the snow line is very sensitive to the opacities of the dust grains and the mass accretion rate of the disk. We show that previous approximate treatments are quite efficient at determining the location of the snow line if the energy budget

is locally dominated by viscous accretion. Using this result we derive an analytic estimate of the location of the snow line that compares very well with results from this and previous studies. Using solar abundances of the elements we compute the abundance of dust and ice and find that the expected jump in solid surface density at the snow line is smaller than previously assumed. We further show that in the inner few AU the refractory species are also partly evaporated, leading to a significantly smaller solid state surface density in the regions where the rocky planets were formed.

Download/Website: `http://arxiv.org/abs/1012.0727`

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A sub-Saturn Mass Planet, MOA-2009-BLG-319Lb

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Astrophysical Journal, published (arXiv:1010.1809)

We report the gravitational microlensing discovery of a sub-Saturn mass planet, MOA-2009-BLG-319Lb, orbiting a K or M-dwarf star in the inner Galactic disk or Galactic bulge. The high cadence observations of the MOA-II survey discovered this microlensing event and enabled its identification as a high magnification event approximately 24 hours prior to peak magnification. As a result, the planetary signal at the peak of this light curve was observed by 20 different telescopes, which is the largest number of telescopes to contribute to a planetary discovery to date. The microlensing model for this event indicates a planet-star mass ratio of $q = (3.95 \pm 0.02) \times 10^{-4}$ and a separation of $d = 0.97537 \pm 0.00007$ in units of the Einstein radius. A Bayesian analysis based on the measured Einstein radius crossing time, $t_{\rm E}$, and angular Einstein radius, $\theta_{\rm E}$, along with a standard Galactic model indicates a host star mass of $M_{\rm L} = 0.38^{+0.34}_{-0.18}\ M_\odot$ and a planet mass of

$M_{\rm p} = 50^{+44}_{-24}\ M_{\oplus}$, which is half the mass of Saturn. This analysis also yields a planet-star three-dimensional separation of $a = 2.4^{+1.2}_{-0.6}$ AU and a distance to the planetary system of $D_{\rm L} = 6.1^{+1.1}_{-1.2}$ kpc. This separation is ~ 2 times the distance of the snow line, a separation similar to most of the other planets discovered by microlensing.

Download/Website: `http://arxiv.org/abs/1010.1809`

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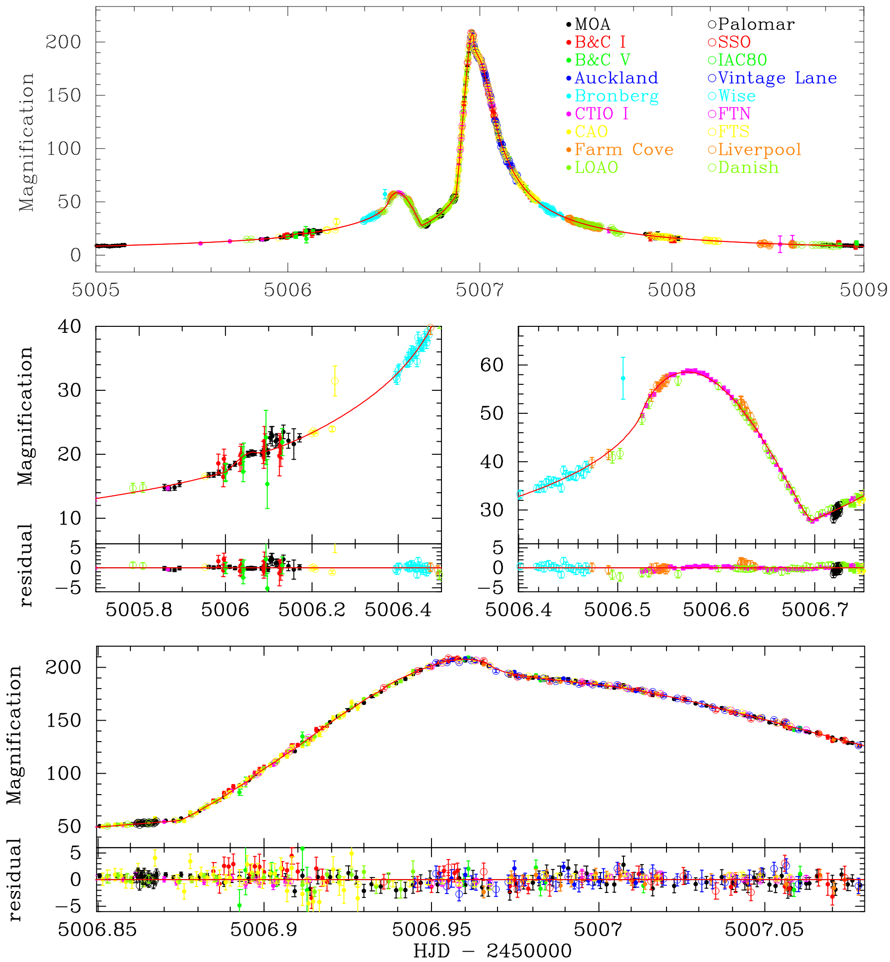

Figure 4: (Miyake et al.) Figure caption: The light curve of planetary microlensing event MOA-2009-BLG-319. The top panel shows the data points and the best fit model light curve with finite source and limb darkening effects. The three lower panels show close-up views of the four caustic crossing light curve regions and the residuals from the best fit light curve. The photometric measurements from MOA, B&C, Auckland, Bronberg, CAO, CTIO, Farm Cove and LOAO are plotted as filled dots with colors indicated by the legend in the top panel. The other data sets are plotted with open circles. The data sets of μFUN Bronberg and SSO have been averaged into 0.01 day bins, and the RoboNet FTN and FTS data sets are shown in 0.005 day bins, for clarity.

Formation of planetary cores at Type I migration traps

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Astrophysical Journal Letters, in press (arXiv:1101.0942)

One of the longstanding unsolved problems of planet formation is how solid bodies of a few decimeters in size can "stick" to form large planetesimals. This is known as the "meter size barrier". In recent years it has become increasingly clear that some form of "particle trapping" must have played a role in overcoming the meter size barrier. Particles can be trapped in long-lived local pressure maxima, such as those in anticyclonic vortices, zonal flows or those believed to occur near ice lines or at dead zone boundaries. Such pressure traps are the ideal sites for the formation of planetesimals and small planetary embryos. Moreover, they likely produce large quantities of such bodies in a small region, making it likely that subsequent N-body evolution may lead to even larger planetary embryos. The goal of this Letter is to show that this indeed happens, and to study how efficient it is. In particular, we wish to find out if rocky/icy bodies as large as 10 $M_\oplus$ can form within 1 Myr, since such bodies are the precursors of gas giant planets in the core accretion scenario.

Download/Website: `http://arxiv.org/abs/1101.0942`

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Early UV Ingress in WASP-12b: Measuring Planetary Magnetic Fields

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ApJ Letters, published (2010ApJ...722L.168V)

Recently, Fossati et al. observed that the UV transit of WASP-12b showed an early ingress compared to the optical transit. We suggest that the resulting early ingress is caused by a bow shock ahead of the planetary orbital motion. In this Letter we investigate the conditions that might lead to the formation of such a bow shock. We consider two scenarios: (1) the stellar magnetic field is strong enough to confine the hot coronal plasma out to the planetary orbit and (2) the stellar magnetic field is unable to confine the plasma, which escapes in a wind. In both cases, a shock capable of compressing plasma to the observed densities will form around the planet for plasma temperatures $T < (4-5) \times 10^6$ K. In the confined case, the shock always forms directly ahead of the planet, but in the wind case the shock orientation depends on the wind speed and hence on the plasma temperature. For higher wind temperatures, the shock forms closer to the line of centers between the planet and the star. We conclude that shock formation leading to an observable early UV ingress is likely to be a common feature of transiting systems and may prove to be a useful tool in setting limits on planetary magnetic field strengths B_p. In the case of WASP-12b, we derive an upper limit of about $B_p = 24$ G.

Download/Website: `http://arxiv.org/abs/1009.5947`

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Prospects for Detection of Exoplanet Magnetic Fields Through Bow-Shock Observations During Transits

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MNRAS Letters, published (2011MNRAS.411L..46V)

An asymmetry between the ingress and egress times was observed in the near-UV light curve of the transit planet WASP-12b. Such asymmetry led us to suggest that the early ingress in the UV light curve of WASP-12b, compared to the optical observations, is caused by a shock around the planet, and that shocks should be a common feature in transiting systems. Here, we classify all the transiting systems known to date according to their potential for producing shocks that could cause observable light curve asymmetries. We found that $36/92$ of known transiting systems would lie above a reasonable detection threshold and that the most promising candidates to present shocks are: WASP-19b, WASP-4b, WASP-18b, CoRoT-7b, HAT-P-7b, CoRoT-1b, TrES-3, and WASP-5b. For prograde planets orbiting outside the co-rotation radius of fast rotating stars, the shock position, instead of being ahead of the planetary motion as in WASP-12b, trails the planet. In this case, we predict that the light curve of the planet should present a late-egress asymmetry. We show that CoRoT-11b is a potential candidate to host such a behind shock and show a late egress. If observed, these asymmetries can provide constraints on planetary magnetic fields. For instance, for a planet that has a magnetic field intensity similar to Jupiter's field (~ 14 G) orbiting a star whose magnetic field is between 1 and 100 G, the stand-off distance between the shock and the planet, which we take to be the size of the planet's magnetosphere, ranges from 1 to 40 planetary radii.

Download/Website: `http://arxiv.org/abs/1011.3455`

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The California Planet Survey III. A Possible 2:1 Resonance in the Exoplanetary Triple System HD 37124

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Astrophysical Journal, accepted

We present new radial velocities from Keck Observatory and both Newtonian and Keplerian solutions for the triple-planet system orbiting HD 37124. The orbital solution for the third planet has improved dramatically since it was first reported in Vogt et al. 2005, where the third planet was reported with an ambiguous orbital period. The period ambiguity is resolved, and the outer two planets have an apparent period commensurability of 2:1. A dynamical analysis finds both resonant and non-resonant configurations consistent with the radial velocity data, and constrains the mutual inclinations of the planets to be $<\sim 30°$. We discuss HD 37124 in the context of the other 20 exoplanetary systems with apparent period commenserabilities, which we summarize in a table. We show that roughly one in three well-characterized multiplanet systems has a apparent low-order period commensuribility, which is more than would naïvely be expected if the periods of exoplanets in known multiplanet systems were drawn randomly from the observed distribution of planetary orbital periods.

Download/Website: `http://xxx.lanl.gov/abs/1101.1097`

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Exoplanet Orbit Database and Exoplanet Data Exoplorer

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[9] Department of Astronomy and Space Physics, Uppsala University, Box 515, 751 20 Uppsala, Sweden

Publications of the Astronomical Society of the Pacific, submitted, (arXiv:1012.5676)

We present a database of well determined orbital parameters of exoplanets. This database comprises spectroscopic orbital elements measured for 421 planets orbiting 357 stars from radial velocity and transit measurements as reported in the literature. We have also compiled fundamental transit parameters, stellar parameters, and the method used for the planets discovery. This Exoplanet Orbit Database includes all planets with robust, well measured orbital parameters reported in peer-reviewed articles. The database is available in a searchable, filterable, and sortable form on the Web at http://exoplanets.org through the Exoplanets Data Explorer Table, and the data can be plotted and explored through the Exoplanet Data Explorer Plotter. We use the Data Explorer to generate publication-ready plots giving three examples of the signatures of exoplanet migration and dynamical evolution: We illustrate the character of the apparent correlation between mass and period in exoplanet orbits, the selection different biases between radial velocity and transit surveys, and that the multiplanet systems show a distinct semi-major axis distribution from apparently singleton systems.

Download/Website: `http://xxx.lanl.gov/abs/1012.5676`

Contact: `jtwright@astro.psu.edu`

3 Other abstracts

A Swiss Watch Running on Chilean Time: A Progress Report on Two New Automated CORALIE RV Pipelines

J.S. Jenkins[1], *A. Jordan*[2]

[1] Departamento de Astronomia, Universidad de Chile, Camino el Observatorio 1515, Las Condes, Santiago, Chile Casilla 36-D
[2] Departamento de Astronomia y Astrofisica, Pontificia Universidad Catolica de Chile, 7820436 Macul, Santiago, Chile

Proceedings of the 16th Workshop on Cool Stars, Stellar Systems, and the Sun , in press (arXiv:1012:3370)

We present the current status of two new fully automated reduction and analysis pipelines, built for the Euler telescope and the CORALIE spectrograph. Both pipelines have been designed and built independently at the Universidad de Chile and Universidad Catolica by the two authors. Each pipeline has also been written on two different platforms, IDL and Python, and both can run fully automatically through full reduction and analysis of CORALIE datasets. The reduction goes through all standard steps from bias subtraction, flat-fielding, scattered light removal, optimal extraction and full wavelength calibration of the data using well exposed ThAr arc lamps. The reduced data are then cross-correlated with a binary template matched to the spectral type of each star and the cross-correlation functions are fit with a Gaussian to extract precision radial-velocities. For error analysis we are currently testing bootstrap, jackknifing and cross validation methods to properly determine uncertainties directly from the data. Our

pipelines currently show long term stability at the 12-15m/s level, measured by observations of two known radial-velocity standard stars. In the near future we plan to get the stability down to the 5-6m/s level and also transfer these pipelines to other instruments like HARPS.

Download/Website: `http://arxiv.org/abs/1012.3370`

Contact: `jjenkins@das.uchile.cl`

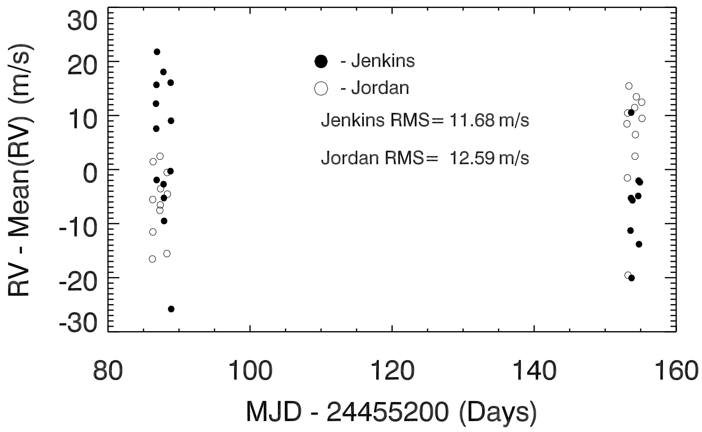

Figure 5: (Jenkins & Jordan) CORALIE RVs for the known RV standard star HD157347. The filled circles are the data points from the IDL pipeline from Jenkins and the open circles are from the Python pipeline of Jordan. The rms scatter around a linear fits are shown in each plot.

4 Conference announcements

The Second CoRoT Symposium: Transiting planets, Vibrating stars and their connection

A. Baglin (chair), M. Deleuil, E. Michel, P. Bordé, T. Guillot, C. Moutou & the CoRoT science council

Palais des congrès, Marseille, France, 14 to 17 June 2010

The first CoRoT symposium was held in February 2009 in Paris. At this symposium, the first results were presented to the scientific community. Since, the analysis of these initial high precision data gained scientific maturity. In addition, the first two years of data are now public and reviewed by a much larger community. It is thus time to gather again planet and star communities.
The second CoRoT symposium will be held from 14 to 17 June 2011 in Marseille at the Palais des Congrès.
Besides presenting the latest results achieved in these two scientific domains, the objective of this symposium is to highlight the complementarity of these two fields of research. The symposium will therefore also focus on the connection between stars and planets and what the studies in one of the two field could bring to the other. Bringing together the two communities will give rise to new projects that will ultimately lead to new advances in the field of planetary systems, considered as a whole.

Download/Website: `http://symposiumcorot2011.oamp.fr/`

Contact: `Corot2011@oamp.fr`

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.

Important Dates

- Jan. 24, 2011: Second announcement
- Jan. 31, 2011: Financial aid applications due
- Feb. 18, 2011: Decisions on financial aid for students announced (via email)
- Feb. 28, 2011: Abstract submission deadline
- Mar. 15, 2011: Early registration ends/deadline to purchase tickets for Wed. trips and Grand Canyon day trip
- Mar. 31, 2011: Final announcement with final agenda including poster/contributed talk decisions
- Apr. 2, 2011: Hotel reservation deadline for conference rate and final announcement
- Apr. 22, 2011: Deadline for submitting electronic posters
- May 1-6, 2011: Conference at High Country Conference Center, Flagstaff, AZ

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. Financial assistance for travel and accommodations will be available for successful applicants.

Workshop registration and the on-line application for financial assistance will be available in early February 2011.

Download/Website: `http://nexsci.caltech.edu/workshop/2011`

Contact: `sagan_workshop@ipac.caltech.edu`

5 Jobs and Positions

Post-doctoral Researcher in Extrasolar Planet Atmosphere Studies

S. Aigrain[1]*, N. Bowles*[2]*, P. Irwin*[3]
[1] University of Oxford – Astrophysics
[2] University of Oxford – Atmospheric, Oceanic and Planetary Physics

Department of Physics, Parks Road, Oxford, starting July 2011

We invite applications for a postdoctoral research position starting on 1 July 2011 or soon thereafter, to work on the interpretation of atmospheric spectra of extra-solar planets, as part of a joint effort between the Astrophysics and AOPP (Atmospheric, Oceanic and Planetary Physics) sub-departments. The project aims to adapt existing spectral inversion techniques, developed in the solar system context, to extra-solar planets. The focus of this position is to improve the spectroscopic line data for key molecules using existing lab facilities, to incorporate these into the NEMESIS spectral inversion package, and to work with Astrophysics observers to interpret existing and prepare future observations of exoplanet atmospheres.

The appointment is for two years, initially based in AOPP, and moving to Astrophysics after approximately six months. The candidate will work closely with Drs S Aigrain (Astrophysics, observations of transiting planets), N Bowles (AOPP, spectroscopy experiments) and P Irwin (AOPP, NEMESIS package), but will be encouraged to interact with other faculty members working in related areas. The starting salary will be in the range £28 983 – £35 646 per annum.

Only applications received before noon on **Friday, 1 April 2011** can be considered. For more information on the post and how to apply, see the URL and contact address below.

Download/Website: https://www.recruit.ox.ac.uk/pls/hrisliverecruit/erq_jobspec_version_4.jobs

Contact: Suzanne.Aigrain@astro.ox.ac.uk

6 Announcements

Planetary Systems Beyond the Main Sequence

S. Schuh[1], U. Heber[2], H. Drechsel[2] (eds.)

[1] Georg-August-University of Göttingen, Institute for Astrophysics, Friedrich-Hund-Platz 1, 37077 Göttingen, Germany
[2] University of Erlangen-Nürnberg, Dr. Remeis Observatory, Sternwartstrasse 7, 96049 Bamberg, Germany

AIP Conference Proceedings, Volume 1331, American Institute of Physics, New York, in press (arXiv:1011.6606)

We are glad to announce the upcoming publication of the Conference Proceedings of ”Planetary Systems Beyond the Main Sequence”, held 11–14 August 2010 in Bamberg, Germany.
This conference was the first to discuss the fate of a planet and its host star when the star evolves into a red giant and finally ends its life as a white dwarf. Scientists specialised in stellar evolution met experts from the exoplanet field to discuss this interplay.
The Author Versions of all those contributions which have been submitted to the *arXiv* Preprint Server may be accessed via the Table of Contents at the following Website:

Download/Website: http://arxiv.org/abs/1011.6606

Contact: schuh@astro.physik.uni-goettingen.de

Protoplanetary Dust: Astrophysical and Cosmochemical Perspectives

Dániel Apai[1], Dante S. Lauretta[2]

[1] Space Telescope Science Institute, Baltimore, MD, USA
[2] University of Arizona, Tucson, AZ, USA

Planetary Science Series, Cambridge University Press, published (http://adsabs.harvard.edu/abs/2010pdac.book.....A)

Planet formation studies uniquely benefit from three disciplines: astronomical observations of extrasolar planet-forming disks, analysis of material from the early Solar System, and laboratory astrophysics experiments. Pre-planetary solids, fine dust, and chondritic components are central elements linking these studies. This book is the first comprehensive overview of planet formation, in which astronomers, cosmochemists, and laboratory astrophysicists jointly discuss the latest insights from the Spitzer and Hubble space telescopes, new interferometers, space missions including Stardust and Deep Impact, and laboratory techniques. Following the evolution of solids from their genesis through protoplanetary disks to rocky planets, the book discusses in detail how the latest results from these disciplines fit into a coherent picture. This volume provides a clear introduction and valuable reference for students and researchers in astronomy, cosmochemistry, laboratory astrophysics, and planetary sciences.

”Protoplanetary Dust is a terrific edition (No. 12) to the Cambridge Planetary Science Series. This book should be required reading for all cosmochemists (and astronomers), and it would serve as a excellent text for an interesting graduate course on the origin of solar systems.” – Geochemical News

Contents:

1. Planet formation and protoplanetary dust by (D. Apai and D. S. Lauretta)
2. The origins of protoplanetary dust and the formation of accretion disks (H-P. Gail and P. Hope)
3. Evolution of protoplanetary disk structures (F. Ciesla and C. P. Dullemond)
4. Chemical and isotopic evolution of the solar nebula and protoplanetary disks (D. Semenov, S. Chakraborty and Mark Thiemens)
5. Laboratory studies of simple dust analogs in astrophysical environments (J. R. Brucato and J. A. Nuth III)
6. Dust composition in protoplanetaty dust (M. Min and George Flynn)
7. Dust particle size evolution (K. M. Pontoppidan and A. J. Brearly)
8. Thermal processing in protoplanetary nebulae (D. Apai, H. C. Connolly Jr. and D. S. Lauretta)
9. The clearing of protoplanetary disks and of the protosolar nebula (I. Pascucci and S. Tachibana)
10. Accretion of planetesimals and the formation of rocky planets (J. E. Chambers, D. O’Brien and A. M. Davis)

Download/Website: `http://www.cambridge.org/catalogue/catalogue.asp?isbn=9780521517720`

Contact: `apai@stsci.edu`

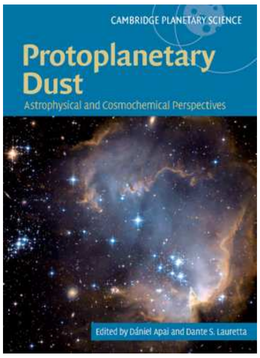

Figure 6: (Apai & Lauretta) The Protoplanetary Dust textbook provides a consistent set of reviews following the formation of rocky planets from the genesis of dust through the protoplanetary disks to the final assembly. The invited reviews are co-written by astronomers and meteoriticists.

2011B NASA Keck Call - proposals due March 17, 2011

NASA

NASA is soliciting proposals to use the Keck Telescopes for the 2011B observing semester (August 2011 - January 2012). NASA intends the use of the Keck telescopes to be highly strategic in support of on-going missions and/or high priority, long term science goals. NASA Keck time is open to *PIs at U.S.-based institutions* to explore a wide range of disciplines including exoplanets and solar system topics, galactic and extragalactic topics, cosmology and high energy astrophysics. This semester and continuing into future semesters, there is limited time available for observations of targets based on public Kepler data or data obtained through the Kepler Guest Observer programs. In addition, the call for CoRoT Key Science has been extended to semester 2012B. Proposals are also sought in the

following discipline areas: (1) investigations in support of EXOPLANET EXPLORATION science goals and missions; (2) investigations of our own SOLAR SYSTEM; (3) investigations in support of COSMIC ORIGINS science goals and missions; (4) investigations in support of PHYSICS OF THE COSMOS science goals and missions; and (5) direct MISSION SUPPORT.
The proposal process is being handled by the NASA Exoplanet Science Institute (NExScI) at Caltech and all proposals are due on **17 March 2011 at 4 pm PDT**.

Download/Website: `http://nexsci.caltech.edu/missions/KeckSolicitation/index.shtml`

Contact: `KeckCFP@ipac.caltech.edu`

7 As seen on astro-ph

The following list contains all the entries relating to exoplanets that we spotted on astro-ph during December 2010 and January 2011. If you see any that we missed, please let us know and we'll include them in the next issue.

Exoplanets

astro-ph/1012.0266: **The effects of stochastic forces on the evolution of planetary systems and Saturn's rings** by *Hanno Rein*

astro-ph/1012.0331: **A ground-based transmission spectrum of the super-Earth exoplanet GJ1214b** by *Jacob L. Bean, Eliza Miller-Ricci Kempton, Derek Homeier*

astro-ph/1012.0376: **The Transit Light Curve Project. XIII. Sixteen Transits of the Super-Earth GJ 1214b** by *Joshua A. Carter, Joshua N. Winn, Matthew J. Holman et al.*

astro-ph/1012.0572: **Planets in evolved binary systems** by *Hagai B. Perets*

astro-ph/1012.0574: **A New Hybrid N-Body-Coagulation Code for the Formation of Gas Giant Planets** by *Benjamin C. Bromley, Scott J. Kenyon*

astro-ph/1012.0584: **How planet-planet scattering can create high-inclination as well as long-period orbits** by *Sourav Chatterjee, Eric B. Ford, Frederic A. Rasio*

astro-ph/1012.0692: **Calculation of the enrichment of the giant planet envelopes during the late heavy bombardment** by *Alexis Matter, Tristan Guillot, Alessandro Morbidelli*

astro-ph/1012.0747: **The EXOTIME project: a status report on PG 1325+101 (QQ Vir)** by *Serena Benatti, Roberto Silvotti, Riccardo U. Claudi et al.*

astro-ph/1012.0765: **Understanding exoplanet formation, structure and evolution in 2010** by *, G. Chabrier, J. Leconte, I. Baraffe*

astro-ph/1012.0775: **The EXOTIME targets HS0702+6043 and HS0444+0458** by *Ronny Lutz, Sonja Schuh, Roberto Silvotti*

astro-ph/1012.0811: **A new look at NICMOS transmission spectroscopy: no conclusive evidence for molecular features** by *Neale P. Gibson, Frederic Pont, Suzanne Aigrain*

astro-ph/1012.1168: **The HARPS search for southern extra-solar planets: XXVIII. Two giant planets around M0 dwarfs** by *Thierry Forveille, Xavier Bonfils, Gaspare Lo Curto et al.*

astro-ph/1012.1180: **APOSTLE Observations of GJ 1214b: System Parameters and Evidence for Stellar Activity** by *P. Kundurthy, E. Agol, A. C. Becker et al.*

astro-ph/1012.1319: **A possible dividing line between massive planets and brown-dwarf companions** by *Johannes Sahlmann, Damien Segransan, Didier Queloz*

astro-ph/1012.1603: **High C/O Ratio and Weak Thermal Inversion in the Very Hot Atmosphere of Exoplanet WASP-12b** by *Nikku Madhusudhan, Joseph Harrington, Kevin B. Stevenson et al.*

astro-ph/1012.1720: **A search for star-planet interactions in chromospheric lines** by *L.F. Lenz, A. Reiners, M. Kurster*

astro-ph/1012.1780: **A new view on planet formation** by *Sergei Nayakshin*
astro-ph/1012.1876: **The Fate of Exoplanets and the Red Giant Rapid Rotator Connection** by *Joleen K. Carlberg, Steven R. Majewski, Phil Arras et al.*
astro-ph/1012.1883: **Habitability of Planets Orbiting Cool Stars** by *Rory Barnes, Victoria S. Meadows, Shawn D. Domagal-Goldman et al.*
astro-ph/1012.1926: **Forming Close-in Earth-like Planets via a Collision-Merger Mechanism in Late-stage Planet Formation** by *Jianghui Ji, Sheng Jin, C. G. Tinney*
astro-ph/1012.2157: **Exoplanet atmospheres: a brand-new and rapidly expanding research field** by *Mercedes Lopez-Morales*
astro-ph/1012.2183: **Implications of the TTV-Detection of Close-In Terrestrial Planets Around M Stars for Their Origin and Dynamical Evolution** by *Nader Haghighipour, Sara Rastegar*
astro-ph/1012.2217: **Kepler light curves and stellar rotational periods** by *Timo Reinhold, Ansgar Reiners, Gibor Basri et al.*
astro-ph/1012.2234: **A Survey of M Stars in the Field of View of Kepler Space Telescope** by *Mahmoudreza Oshagh, Nader Haghighipour, Nuno C.Santos*
astro-ph/1012.2278: **WASP-34b: a near-grazing transiting sub-Jupiter-mass exoplanet in a hierarchical triple system** by *B. Smalley, D.R. Anderson, A. Collier Cameron et al.*
astro-ph/1012.2286: **The WASP-South search for transiting exoplanets** by *Coel Hellier, D.R. Anderson, A. Collier Cameron et al.*
astro-ph/1012.2382: **Consequences of the Ejection and Disruption of Giant Planets** by *James Guillochon, Enrico Ramirez-Ruiz, Douglas N. C. Lin*
astro-ph/1012.2672: **Star-Planet Interactions in X-rays** by *K. Poppenhaeger*
astro-ph/1012.3027: **Qatar-1b: a hot Jupiter orbiting a metal-rich K dwarf star** by *K.A.Alsubai, N.R.Parley, D.M.Bramich et al.*
astro-ph/1012.3365: **Transit Timing Variation Analysis of OGLE-TR-132b with Seven New Transits** by *Elisabeth R. Adams, Mercedes Lopez-Morales, James L. Elliot et al.*
astro-ph/1012.3469: **The Interaction of Planets and Brown Dwarfs with AGB Stellar Winds** by *Hyosun Kim, Ronald E. Taam*
astro-ph/1012.3475: **Secular Chaos and the Production of Hot Jupiters** by *Yanqin Wu, Yoram Lithwick*
astro-ph/1012.4281: **Measuring Be depletion in cool stars with exoplanets** by *Elisa Delgado Mena, Garik Israelian, Jonay I. Gonzalez Hernandez et al.*
astro-ph/1012.4281: **Measuring Be depletion in cool stars with exoplanets** by *Elisa Delgado Mena, Garik Israelian, Jonay I. Gonzalez Hernandez et al.*
astro-ph/1012.4486: **Completing the Census of Exoplanets with the Microlensing Planet Finder (MPF)** by *David P. Bennett, J. Anderson, J.-P. Beaulieu et al.*
astro-ph/1012.4791: **A short-period censor of sub-Jupiter mass exoplanets with low density** by *Gy. M. Szabo, L. L. Kiss*
astro-ph/1012.4882: **NIRSPEC Radial Velocity Measurements of Late-M Dwarfs** by *A. Tanner, R. White, J. Bailey et al.*
astro-ph/1012.5181: **A much lower density for the transiting extrasolar planet WASP-7** by *John Southworth, M. Dominik, U. G. Jorgensen et al.*
astro-ph/1012.5281: **Theory of planet formation** by *Christoph Mordasini, Hubert Klahr, Yann Alibert et al.*
astro-ph/1012.5413: **Erosion of icy cores in giant gas planets** by *Hugh F. Wilson, Burkhard Militzer*
astro-ph/1012.5676: **The Exoplanet Orbit Database** by *Jason T Wright, Onsi Fakhouri, Geoffrey W. Marcy*
astro-ph/1012.5791: **Constraining tidal dissipation in F-type main-sequence stars: the case of CoRoT-11** by *A. F. Lanza, C. Damiani, D. Gandolfi*
astro-ph/1012.5938: **The upper atmosphere of the exoplanet HD209458b revealed by the sodium D lines: Temperature-pressure profile, ionization layer, and thermosphere** by *, A. Vidal-Madjar, D.K. Sing, A. Lecavelier des Etangs et al.*

astro-ph/1101.0059: **Polarized reflected light from the exoplanet HD189733b: First multicolor observations and confirmation of detection** by *S. V. Berdyugina, A. V. Berdyugin, D. M. Fluri et al.*

astro-ph/1101.0158: **Possible Signs of Water and Differentiation in a Rocky Exoplanetary Body** by *J. Farihi, C. S. Brinkworth, B. T. Gaensicke et al.*

astro-ph/1101.0196: **SOPHIE velocimetry of Kepler transit candidates II. KOI-428b: a hot Jupiter transiting a subgiant F-star** by *A. Santerne, R. F. Diaz, F. Bouchy et al.*

astro-ph/1101.0322: **Planets from the HATNet project** by *G.A.Bakos, J. D. Hartman, G. Torres et al.*

astro-ph/1101.0432: **Probing the impact of stellar duplicity on the frequency of giant planets: final results of our VLT/NACO survey** by *A. Eggenberger, S. Udry, G. Chauvin et al.*

astro-ph/1101.0463: **Radial velocity follow-up of CoRoT transiting exoplanets** by *A. Santerne, M. Endl, A. Hatzes et al.*

astro-ph/1101.0513: **Extrasolar planet population synthesis III. Formation of planets around stars of different masses** by *Yann Alibert, Christoph Mordasini, Willy Benz*

astro-ph/1101.0615: **Planets around Giant Stars** by *A. Quirrenbach, S. Reffert, C. Bergmann*

astro-ph/1101.0630: **PTF/M-dwarfs: A Large New M-dwarf Planetary Transit Survey** by *Nicholas M. Law, Adam L. Kraus, Rachel R. Street*

astro-ph/1101.0691: **The role of rotation on the evolution of dynamo generated magnetic fields in Super Earths** by *Jorge I. Zuluaga, Pablo A. Cuartas-Restrepo*

astro-ph/1101.0800: **Bayesian Re-analysis of the Gliese 581 Exoplanet System** by *Philip C Gregory*

astro-ph/1101.1035: **The Tidal Downsizing hypothesis for planet formation and the composition of Solar System comets** by *Sergei Nayakshin, Seung-Hoon Cha, John Bridges*

astro-ph/1101.1086: **Determining the Metallicity of Low-Mass Stars and Brown Dwarfs: Tools for Probing Fundamental Stellar Astrophysics, Tracing Chemical Evolution of the Milky Way and Identifying the Hosts of Extrasolar Planets** by *Andrew A. West, John J. Bochanski, Brendan P. Bowler et al.*

astro-ph/1101.1087: **On the Inclination Dependence of Exoplanet Phase Signatures** by *Stephen R. Kane, Dawn M. Gelino*

astro-ph/1101.1097: **The California Planet Survey III. A Possible 2:1 Resonance in the Exoplanetary Triple System HD 37124** by *J. T. Wright, Dimitri Veras, Eric B. Ford et al.*

astro-ph/1101.1222: **Stellar rotation in the Hyades and Praesepe: gyrochronology and braking timescale** by *P. Delorme, A. Collier Cameron, L. Hebb et al.*

astro-ph/1101.1590: **Determination of the inclination of the multi-planet hosting star HR8799 using asteroseismology** by *Duncan Wright, Andr-Nicolas Chene, Peter De Cat et al.*

astro-ph/1101.1773: **The Fate of Planets** by *Eva Villaver*

astro-ph/1101.1799: **The Optical Gravitational Lensing Experiment. OGLE-III Photometric Maps of the Galactic Disk Fields** by *M. K. Szymanski, A. Udalski, I. Soszynski et al.*

astro-ph/1101.1899: **Transiting exoplanets from the CoRoT space mission: XIII. CoRoT-14b: an unusually dense very hot Jupiter** by *B. Tingley, M. Endl, J.-C. Gazzano et al.*

astro-ph/1101.1913: **Planet Formation Around M-dwarfs: From Young Disks to Planets** by *I. Pascucci, G. Laughlin, B. S. Gaudi et al*

astro-ph/1101.1973: **A Combined Subaru/VLT/MMT 1–5 Micron Study of Planets Orbiting HR 8799: Implications for Atmospheric Properties, Masses, and Formation** by *, Thayne Currie, Adam S. Burrows, Yoichi Itoh et al.*

astro-ph/1101.1994: **Prospects of the Detection of Circumbinary Planets With Kepler and CoRoT Using the Variations of Eclipse Timing** by *R. Schwarz, N. Haghighipour, S. Eggl et al.*

astro-ph/1101.2087: **Using Stellar Densities to Evaluate Transiting Exoplanetary Candidates** by *Brandon Tingley, Aldo Bonomo, Hans-Jorg Deeg*

astro-ph/1101.2156: **Tidal obliquity evolution of potentially habitable planets** by *Ren Heller, Jeremy Leconte, Rory Barnes et al.*

astro-ph/1101.2432: **Thermal emission from WASP-33b, the hottest known planet** by *A. M. S. Smith, D. R.*

Anderson, I. Skillen et al.

astro-ph/1101.2588: **News From The Gamma Cephei Planetary System** by *Michael Endl, William D. Cochran, Artie P. Hatzes et al.*

astro-ph/1101.2808: **Metallicity of M dwarfs: the link to exoplanets** by *V. Neves, X. Bonfils, N. C. Santos*

astro-ph/1101.2813: **Distorted, non-spherical transiting planets: impact on the transit depth and on the radius determination** by *, Jeremy Leconte, Dong Lai, Gilles Chabrier*

astro-ph/1101.2893: **The Gemini NICI Planet-Finding Campaign : Discovery of a Substellar L Dwarf Companion to the Nearby Young M Dwarf CD-35 2722** by *Zahed Wahhaj, Michael C. Liu, Beth A. Biller et al.*

astro-ph/1101.3238: **Application of recent results on the orbital migration of low mass planets: convergence zones** by *C. Mordasini, K.-M. Dittkrist, Y. Alibert et al.*

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