ExoPlanet News
An Electronic Newsletter

No. 46, February 6th, 2012

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1 Editorial

Welcome to the forty-sixth edition of ExoPlanet News. This month's edition is packed full of interesting abstracts, announcements for attractive conferences and plenty of job, fellowship and studentship adverts. We are sure that you will find something interesting within these pages, including several papers reporting new transit timing results from *Kepler* and microlensing results.
The next issue will be due before we know it, and we'll aim to send that out near the beginning of March. 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

Confirming Fundamental Properties of the Exoplanet Host Star ϵ Eridani Using the Navy Optical Interferometer

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Astrophysical Journal, in press (arXiv:1112.0447)

We measured the angular diameter of the exoplanet host star ϵ Eridani using the Navy Optical Interferometer. We determined its physical radius, effective temperature, and mass by combining our measurement with the star's parallax, photometry from the literature, and the Yonsei–Yale isochrones (Yi et al. 2001), respectively. We used the resulting stellar mass of 0.82±0.05 $M_{\odot}$ plus the mass function from Benedict et al. (2006) to calculate the planet's mass, which is 1.53±0.22 $M_{\rm Jupiter}$. Using our new effective temperature, we also estimated the extent of the habitable zone for the system.

Download/Website: `http://arxiv.org/abs/1112.0447`

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Multiwavelength flux variations induced by stellar magnetic activity: effects on planetary transits

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Astronomy & Astrophysics, in press (arXiv:1201.3514)

Stellar magnetic activity is a source of noise in the study of the transits of extrasolar planets. It induces flux variations that significantly affect the transit depth determination and the derivations of planetary and stellar parameters. Furthermore, the colour dependence of stellar activity may significantly influence the characterization of planetary atmospheres. Here we present a systematic approach to quantify the corresponding stellar flux variations as a function of wavelength bands. We consider a star with spots covering a given fraction of its disc and model the variability in both the UBVRIJHK photometric system and the *Spitzer*/IRAC wavebands for dwarf stars from G to M spectral types. We compare activity-induced flux variations in different passbands with planetary transits and quantify how they affect the determination of the planetary radius and the analysis of the transmission spectroscopy in the study of planetary atmospheres. We suggest that the monitoring of the systems by using broad-band photometry, from visible to infrared, helps us to constrain activity effects. The ratio of the relative variations in the stellar fluxes at short wavelength optical bands (e.g., U or B) to near-infrared ones (e.g., J or K) can be used to distinguish starspot brightness dips from planetary transits in a stellar light curve. In addition to the perturbations in the measurement of the planetary radius, we find that starspots can affect the determinations of both the relative semimajor axis and the inclination of the planetary orbit, which have a significant impact on the derivation of the stellar density from the transit light curves.

Download/Website: `http://arxiv.org/abs/1201.3514`

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A planetary system around the nearby M dwarf GJ 667C with at least one super-Earth in its habitable zone.

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Astrophysical Journal Letters, in press (arXiv:1202.0446)

We re-analyze 4 years of HARPS spectra of the nearby M1.5 dwarf GJ 667C available through the ESO public archive. The new radial velocity (RV) measurements were obtained using a new data analysis technique that derives the Doppler measurement and other instrumental effects using a least-squares approach. Combining these new 143 measurements with 41 additional RVs from the Magellan/PFS and Keck/HIRES spectrometers, reveals 3 additional signals beyond the previously reported 7.2-day candidate, with periods of 28 days, 75 days, and a secular trend consistent with the presence of a gas giant (Period$\sim$ 10 years). The 28-day signal implies a planet candidate with a minimum mass of 4.5 M_{Earth} orbiting well within the canonical definition of the star's liquid water habitable zone, this is, the region around the star at which an Earth-like planet could sustain liquid water on its surface. Still, the ultimate water supporting capability of this candidate depends on properties that are unknown such as its albedo, atmospheric composition and interior dynamics. The 75-day signal is less certain, being significantly affected by aliasing interactions among a potential 91-day signal, and the likely rotation period of the star at 105 days detected in two activity indices. GJ 667C is the common proper motion companion to the GJ 667AB binary, which is metal poor compared to the Sun. The presence of a super-Earth in the habitable zone of a metal poor M dwarf in a triple star system, supports the evidence that such worlds should be ubiquitous in the Galaxy.

Download/Website: `http://arxiv.org/abs/1202.0446`

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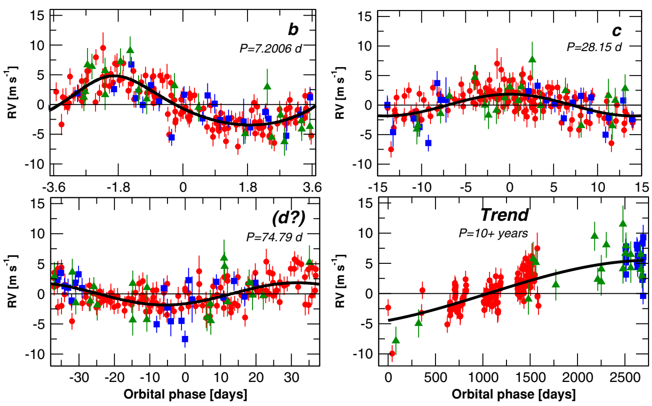

Figure 1: (Anglada et al.) Phase-folded RV measurements of the four signals discussed in the paper. The 143 HARPS measurements are shown in red circles, 21 PFS measurements are shown in blue squares and the green triangles correspond to the 20 HIRES observations. Each preferred Keplerian model is shown as a black line.

Free Collisions in a Microgravity Many-Particle Experiment. II. The Collision Dynamics of Dust-Coated Chondrules

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Icarus, in press(10.1016/j.icarus.2011.11.036/arXiv:1105.3897)

The formation of planetesimals in the early Solar System is hardly understood, and in particular the growth of dust aggregates above millimeter sizes has recently turned out to be a difficult task in our understanding [Zsom et al. 2010, Astronomy & Astrophysics, 513, A57]. Laboratory experiments have shown that dust aggregates of these sizes stick to one another only at unreasonably low velocities. However, in the protoplanetary disk, millimeter-sized particles are known to have been ubiquitous. One can find relics of them in the form of solid chondrules as the main constituent of chondrites. Most of these chondrules were found to feature a fine-grained rim, which is hypothesized to have formed from accreting dust grains in the solar nebula. To study the influence of these dust-coated chondrules on the formation of chondrites and possibly planetesimals, we conducted collision experiments between millimeter-sized, dust-coated chondrule analogs at velocities of a few $\mathrm{cm\,s^{-1}}$. For 2 and 3 mm diameter chondrule analogs covered by dusty rims of a volume filling factor of 0.18 and 0.35-0.58, we found sticking velocities of a few $\mathrm{cm\,s^{-1}}$. This velocity is higher than the sticking velocity of dust aggregates of the same size. We therefore conclude that chondrules may be an important step towards a deeper understanding of the collisional growth of larger bodies. Moreover, we analyzed the collision behavior in an ensemble of dust aggregates and non-coated chondrule analogs. While neither the dust aggregates nor the solid chondrule analogs show sticking in collisions among their species, we found an enhanced sicking efficiency in collisions between the two constituents, which leads us to the conjecture that chondrules might act as "catalyzers" for the growth of larger bodies in the young Solar System.

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

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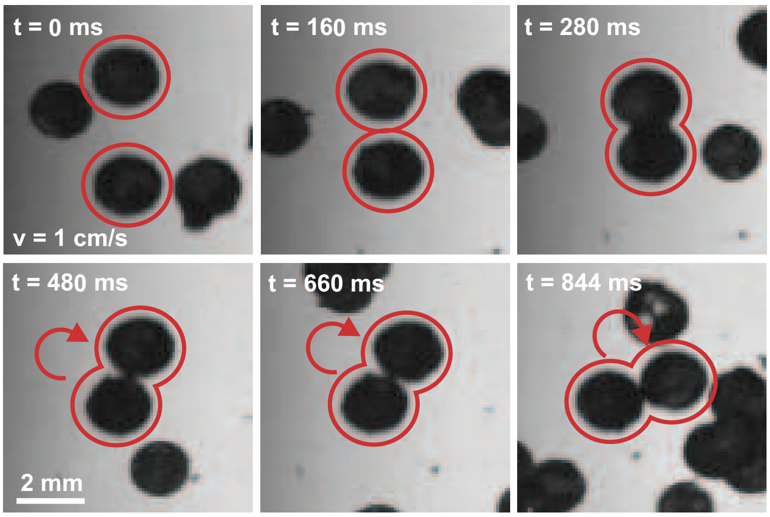

Figure 2: (Beitz et al.) Image sequence of a sticking collision between two dust-coated chondrule analogs (2 mm diameter, $\phi = 0.18$) at a velocity of 1 cm $\mathrm{s^{-1}}$. After sticking to each other, they rotate around their common center of mass. A movie of this collision can be found in the online version of this article.

A simple model for the evolution of the dust population in protoplanetary disks

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Astronomy & Astrophysics, in press (arXiv:1201.5781)

Context: The global size and spatial distribution of dust is an important ingredient in the structure and evolution of protoplanetary disks and in the formation of larger bodies, such as planetesimals.
Aims: We aim to derive simple equations that explain the global evolution of the dust surface density profile and the upper limit of the grain size distribution and which can readily be used for further modeling or for interpreting of observational data.
Methods: We have developed a simple model that follows the upper end of the dust size distribution and the evolution of the dust surface density profile. This model is calibrated with state-of-the-art simulations of dust evolution, which treat dust growth, fragmentation, and transport in viscously evolving gas disks.
Results: We find very good agreement between the full dust-evolution code and the toy model presented in this paper. We derive analytical profiles that describe the dust-to-gas ratios and the dust surface density profiles well in protoplanetary disks, as well as the radial flux by solid material "rain out", which is crucial for triggering any gravity assisted formation of planetesimals. We show that fragmentation is the dominating effect in the inner regions of the disk leading to a dust surface density exponent of -1.5, while the outer regions at later times can become drift-dominated, yielding a dust surface density exponent of -0.75. Our results show that radial drift is not efficient in fragmenting dust grains. This supports the theory that small dust grains are resupplied by fragmentation due to the turbulent state of the disk.

Download/Website: `http://arxiv.org/abs/1201.5781`

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One or more bound planets per Milky Way star from microlensing observations

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Nature, 481, 167-169 (2012)

Most known extrasolar planets (exoplanets) have been discovered using the radial velocity[1,2] or transit[3] methods. Both are biased towards planets that are relatively close to their parent stars, and studies find that around 17–30% (refs 4, 5) of solar-like stars host a planet. Gravitational microlensing[6–9], on the other hand, probes planets that are further away from their stars. Recently, a population of planets that are unbound or very far from their stars was discovered by microlensing[10]. These planets are at least as numerous as the stars in the Milky Way[10]. Here we report a statistical analysis of microlensing data (gathered in 2002–07) that reveals the fraction of bound planets 0.5–10 AU (Sun–Earth distance) from their stars. We find that 17^{+6}_{-9}% of stars host Jupiter-mass planets (0.3–10 $M_{\rm J}$, where $M_{\rm J} = 318\ M_\oplus$ and $M_\oplus$ is Earth's mass). Cool Neptunes (10–30 $M_\oplus$) and super-Earths (5–10 $M_\oplus$) are even more common: their respective abundances per star are 52^{+22}_{-29}% and 62^{+35}_{-37}%. We conclude that stars are orbited by planets as a rule, rather than the exception.

Download/Website: `http://www.nature.com/nature, http://arxiv.org`

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Stellar jitter from variable gravitational redshift: implications for RV confirmation of habitable exoplanets

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Monthly Notices of the Royal Astronomical Society, published (2012MNRAS.tmpL.394C)

A variation of gravitational redshift, arising from stellar radius fluctuations, will introduce astrophysical noise into radial velocity measurements by shifting the centroid of the observed spectral lines. Shifting the centroid does not necessarily introduce line asymmetries. This is fundamentally different from other types of stellar jitter so far identified, which do result from line asymmetries. Furthermore, only a very small change in stellar radius, $\sim 0.01\%$, is necessary to generate a gravitational redshift variation large enough to mask or mimic an Earth-twin. We explore possible mechanisms for stellar radius fluctuations in low-mass stars. Convective inhibition due to varying magnetic field strengths and the Wilson depression of starspots are both found to induce substantial gravitational redshift variations. Finally, we investigate a possible method for monitoring/correcting this newly identified potential source of jitter and comment on its impact for future exoplanet searches.

Download/Website: `http://onlinelibrary.wiley.com/doi/10.1111/j.1745-3933.2011.01205.x/pdf`

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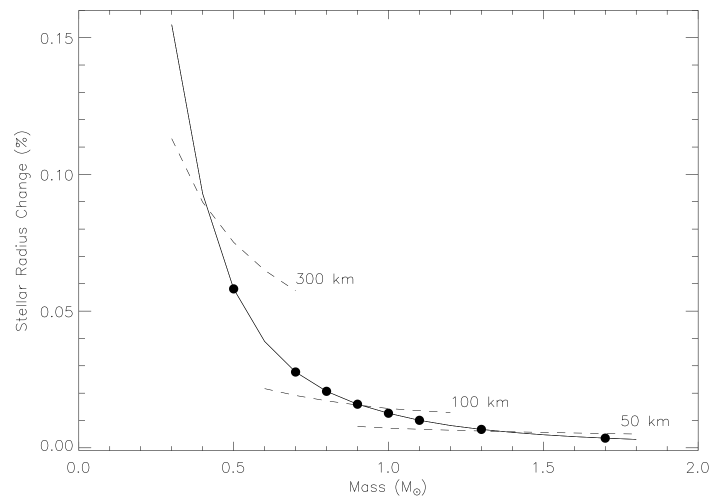

Figure 3: (Cegla et al.) The smooth curve represents the stellar radius change (expressed as a percentage) required to induce a variable gravitational redshift signal equivalent to an Earth-twin radial velocity signal. Circles represent, from right to left, spectral types: F0, F5, G0, G2, G5, K0, K5, and M0. Dashed curves represent stellar radius variations of 50, 100 and 300 km. For a solar-like star, a $\sim 0.01\%$ radius change over a timescale of years is sufficient to mask or mimic an Earth-like planet.

High-resolution imaging of young M-type stars of the solar neighbourhood: Probing for companions down to the mass of Jupiter

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Astronomy & Astrophysics, in press, (arXiv:1112.3008)

High-contrast imaging is a powerful technique when searching for gas giant planets and brown dwarfs orbiting at separations greater than several AU. Around solar-type stars, giant planets are expected to form by core accretion or by gravitational instability, but since core accretion is increasingly difficult as the primary star becomes lighter, gravitational instability would be a probable formation scenario for still-to-find distant giant planets around a low-mass star. A systematic survey for such planets around M dwarfs would therefore provide a direct test of the efficiency of gravitational instability.
We search for gas giant planets orbiting late-type stars and brown dwarfs of the solar neighbourhood. We obtained deep high-resolution images of 16 targets with the adaptive optic system of VLT-NACO in the L' band, using direct imaging and angular differential imaging. This is currently the largest and deepest survey for Jupiter-mass planets around M-dwarfs. We developed and used an integrated reduction and analysis pipeline to reduce the images and derive our 2D detection limits for each target. The typical contrast achieved is about 9 magnitudes at 0.5" and 11 magnitudes beyond 1". For each target we also determine the probability of detecting a planet of a given mass at a given separation in our images. We derived accurate detection probabilities for planetary companions, taking orbital projection effects into account, with in average more than 50% probability to detect a $3\,\mathrm{M_{Jup}}$ companion at 10 AU and a $1.5\,\mathrm{M_{Jup}}$ companion at 20 AU, bringing strong constraints on the existence of Jupiter-mass planets around this sample of young M-dwarfs.

Download/Website: `http://adsabs.harvard.edu/abs/2011arXiv1112.3008D`

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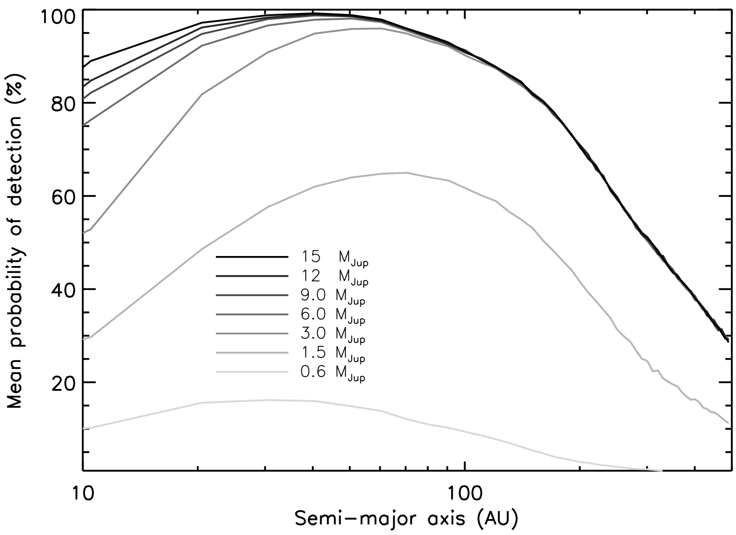

Figure 4: (Delorme et al.) Summary of the detection probabilities of the survey for a range of companion masses, obtained by averaging the detection probabilities, taking the projection effects into account that could hid a planet in the line of sight of the central star on a fraction of its orbit. (obtained with the MESS code, Bonavita et al. 2012) of the 14 targets with an accurate age determination. The semi-major axis values are therefore in real AU, not projected AU.

Transit Timing Observations from *Kepler*: II. Confirmation of Two Multiplanet Systems via a Non-parametric Correlation Analysis

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Astrophysical Journal, in press (arXiv:1201.5409)

We present a new method for confirming transiting planets based on the combination of transit timingn variations (TTVs) and dynamical stability. Correlated TTVs provide evidence that the pair of bodies are in the same physical system. Orbital stability provides upper limits for the masses of the transiting companions that are in the planetary regime. This paper describes a non-parametric technique for quantifying the statistical significance of TTVs based on the correlation of two TTV data sets. We apply this method to an analysis of the transit timing variations of two stars with multiple transiting planet candidates identified by Kepler. We confirm four transiting planets in two multiple planet systems based on their TTVs and the constraints imposed by dynamical stability. An additional three candidates in these same systems are not confirmed as planets, but are likely to be validated as real planets once further observations and analyses are possible. If all were confirmed, these systems would be near 4:6:9 and 2:4:6:9 period commensurabilities. Our results demonstrate that TTVs provide a powerful tool for confirming transiting planets, including low-mass planets and planets around faint stars for which Doppler follow-up is not practical with existing facilities. Continued Kepler observations will dramatically improve the constraints on the planet masses and orbits and provide sensitivity for detecting additional non-transiting planets. If Kepler observations were extended to eight years, then a similar analysis could likely confirm systems with multiple closely spaced, small transiting planets in or near the habitable zone of solar-type stars.

Download/Website: `http://www.astro.ufl.edu/ eford/data/kepler/`

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Transit Timing Observations from *Kepler*: III. Confirmation of 4 Multiple Planet Systems by a Fourier-Domain Study of Anti-correlated Transit Timing Variations

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Monthly Notices of the Royal Astronomical Society, in press (arXiv:1201.5415)

We present a method to confirm the planetary nature of objects in systems with multiple transiting exoplanet candidates. This method involves a Fourier-Domain analysis of the deviations in the transit times from a constant period that result from dynamical interactions within the system. The combination of observed anti-correlations in the transit times and mass constraints from dynamical stability allow us to claim the discovery of four planetary systems Kepler-25, Kepler-26, Kepler-27, and Kepler-28, containing eight planets and one additional planet candidate.

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Transit Timing Observations from *Kepler*: IV. Confirmation of 4 Multiple Planet Systems by Simple Physical Models

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Astrophysical Journal, in press (arxiv:1201.5415)

Eighty planetary systems of two or more planets are known to orbit stars other than the Sun. For most, the data can be sufficiently explained by non-interacting Keplerian orbits, so the dynamical interactions of these systems have not been observed. Here we present 4 sets of lightcurves from the *Kepler* spacecraft, which each show multiple planets transiting the same star. Departure of the timing of these transits from strict periodicity indicates the planets are perturbing each other: the observed timing variations match the forcing frequency of the other planet. This confirms that these objects are in the same system. Next we limit their masses to the planetary regime by requiring the system remain stable for astronomical timescales. Finally, we report dynamical fits to the transit times, yielding possible values for the planets' masses and eccentricities. As the timespan of timing data increases, dynamical fits may allow detailed constraints on the systems' architectures, even in cases for which high-precision Doppler follow-up is impractical.

Download/Website: `http://www.ucolick.org/~fabrycky/kepler/ttvconfirm/`

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Transit Timing Observations from *Kepler*: VI. Transit Timing Variation Candidates in the First Seventeen Months from Polynomial Models

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Astrophysical Journal, submitted (arXiv:1201.1892)

Transit timing variations provide a powerful tool for confirming and characterizing transiting planets, as well as detecting non-transiting planets. We report the results an updated TTV analysis for 822 planet candidates (Borucki et al. 2011; Batalha et al. 2012) based on transit times measured during the first seventeen months of *Kepler* observations (Rowe et al. 2012). We present 35 TTV candidates (4.1% of suitable data sets) based on long-term trends and 153 mostly weaker TTV candidates (18% of suitable data sets) based on excess scatter of TTV measurements about a linear ephemeris. We anticipate that several of these planet candidates could be confirmed and perhaps characterized with more detailed TTV analyses using publicly available *Kepler* observations. For many others, *Kepler* has observed a long-term TTV trend, but an extended *Kepler* mission will be required to characterize the system via TTVs. We find that the occurence rate of planet candidates that show TTVs is significantly increased (∼60%-76%) for planet candidates transiting stars with multiple transiting planet candidate when compared to planet candidates transiting stars with a single transiting planet candidate.

Download/Website: `http://www.astro.ufl.edu/ eford/data/kepler/`

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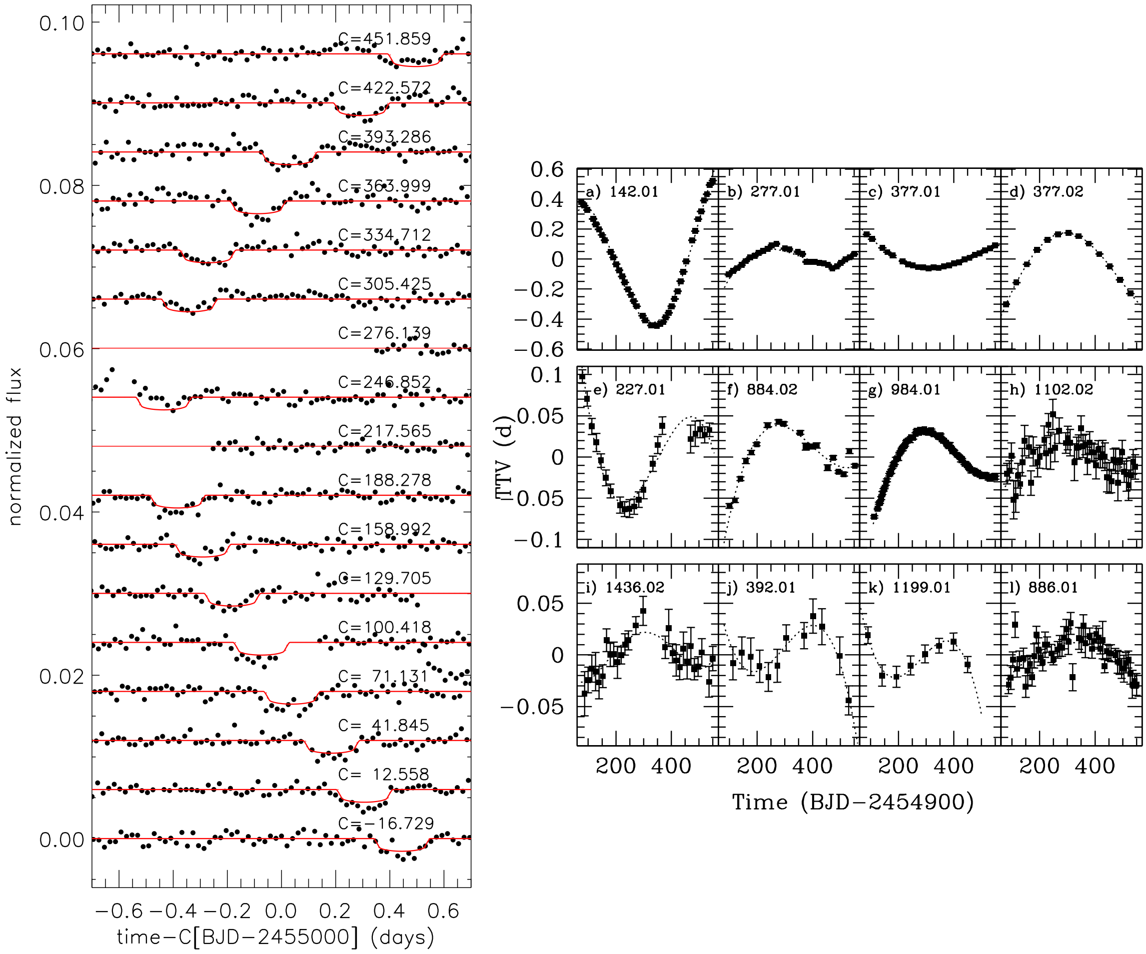

Figure 5: **Left:** (Fabrycky et al.) Individual transits of Kepler-30 b. Each portion of the lightcurve is shown with its transit shifted to the best linear-ephemeris value, and the model is shown with the best-fit transit time taken into account. This is the biggest transit timing variation yet reported in multiple-planet systems.
Right: (Ford et al.) Transit times for planet candidates with long-term TTV trends. Dotted lines show the best-fit polynomial model given in Table 1. Kepler-9b (panel c), Kepler-9c (panel d) and Kepler-24b (panel h) have already been confirmed via TTVs (Holman et al. 2010). Similar figures for additional planet candidates will be available at http://www.astro.ufl.edu/∼eford/data/kepler/

Infrared Non-detection of Fomalhaut b – Implications for the Planet Interpretation

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Astrophysical Journal, in press (arXiv:1201.4388)

The nearby A4-type star Fomalhaut hosts a debris belt in the form of an eccentric ring, which is thought to be caused by dynamical influence from a giant planet companion. In 2008, a detection of a point-source inside the inner edge of the ring was reported and was interpreted as a direct image of the planet, named Fomalhaut b. The detection was made at ~600–800 nm, but no corresponding signatures were found in the near-infrared range, where the bulk emission of such a planet should be expected. Here we present deep observations of Fomalhaut with *Spitzer*/IRAC at 4.5 μm, using a novel PSF subtraction technique based on ADI and LOCI, in order to substantially improve the *Spitzer* contrast at small separations. The results provide more than an order of magnitude improvement in the upper flux limit of Fomalhaut b and exclude the possibility that any flux from a giant planet surface contributes to the observed flux at visible wavelengths. This renders any direct connection between the observed light source and the dynamically inferred giant planet highly unlikely. We discuss several possible interpretations of the total body of observations of the Fomalhaut system, and find that the interpretation that best matches the available data for the observed source is scattered light from transient or semi-transient dust cloud.

Download/Website: `http://arxiv.org/abs/1201.4388`

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Quasiparallel and parallel stellar wind interaction and the magnetospheres of close-in exoplanets

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Astronomical Notes, published (2011AN....332.1062J)

Venus-like interactions between stellar wind and planets can be expected to change radically when the IMF is quasiparallel to the stellar wind velocity in the frame of a planet. There should exist close-in orbits in which planets are ideally exposed to such (quasi)parallel stellar winds. The abundance of close-in exoplanets make it likely that exoplanets in such orbits exist. We study how the Venus-like interaction between a supersonic stellar wind and a terrestrial exoplanet with atmosphere but no intrinsic magnetic field orbiting a Sun-like star at 0.2 AU, depends on the IMF-stellar wind angle. We extend an earlier study by adding simulations for the very lowest IMF-stellar wind angles. For this we use a hybrid simulation code, A.I.K.E.F., that models ions as macroparticles and electrons as a massless, charge-neutralizing adiabatic fluid. We find that as the IMF becomes closer and closer to parallel to the stellar wind, the lack of shielding stellar wind-induced magnetic fields leads to the collapse of the magnetosheath and dayside bow shock and stellar wind impacting the atmosphere in bulk, opening up for extensive direct interaction between stellar wind and atmosphere, e.g. ENA production, energy deposition and atmospheric erosion. Combined with an observed order-of-magnitude decrease in the rate of ionospheric ions being lost to the stellar wind, the result may prove relevant for atmospheric evolution. Model shortcomings potentially weaken the conclusions that can be drawn from the most extreme case, the perfectly parallel interaction.

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Almost All of Kepler's Multiple Planet Candidates are Planets

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Astronomical Journal, in press (arXiv:1201.5424)

We present a statistical analysis that demonstrates that the overwhelming majority of Kepler candidate multiple transiting systems (multis) indeed represent true, physically-associated transiting planets. Binary stars provide the primary source of false positives among Kepler planet candidates, implying that false positives should be nearly randomly-distributed among Kepler targets. In contrast, true transiting planets would appear clustered around a smaller number of Kepler targets if detectable planets tend to come in systems and/or if the orbital planes of planets encircling the same star are correlated. There are more than one hundred times as many Kepler planet candidates in multi-candidate systems as would be predicted from a random distribution of candidates, implying that the vast majority are true planets. Most of these multis are multiple planet systems orbiting the Kepler target star, but there are likely cases where (a) the planetary system orbits a fainter star, and the planets are thus significantly larger than has been estimated, or (b) the planets orbit different stars within a binary/multiple star system. We use the low overall false positive rate among Kepler multis, together with analysis of Kepler spacecraft and ground-based data, to validate the closely-packed Kepler-33 planetary system, which orbits a star that has evolved somewhat off of the main sequence. Kepler-33 hosts five transiting planets with periods ranging from 5.67 to 41 days.

Download/Website: `http://arxiv.org/abs/1201.5424`

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Modelling the huge, *Herschel*-resolved debris ring around HD 207129

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Astronomy & Astrophysics, published (ADS: 2012A&A...537A.110L)

Debris disks, which are inferred from the observed infrared excess to be ensembles of dust, rocks, and probably planetesimals, are common features of stellar systems. As the mechanisms of their formation and evolution are linked to those of planetary bodies, they provide valuable information. The few well-resolved debris disks are even more valuable because they can serve as modelling benchmarks and help resolve degeneracies in modelling aspects such as typical grain sizes and distances. Here, we present an analysis of the HD 207129 debris disk, based on its well-covered spectral energy distribution and *Herschel*/PACS images obtained in the framework of the DUNES (DUst around NEarby Stars) programme. We use an empirical power-law approach to the distribution of dust and we then model the production and removal of dust by means of collisions, direct radiation pressure, and drag forces. The resulting best-fit model contains a total of nearly 10^{-2} Earth masses in dust, with typical grain sizes in the planetesimal belt ranging from 4 to 7 microns. We constrain the dynamical excitation to be low, which results in very long collisional lifetimes and a drag that notably fills the inner gap, especially at 70 microns. The radial distribution stretches from well within 100 AU in an unusual, outward-rising slope towards a rather sharp outer edge at about 170–190 AU. The inner edge is therefore smoother than that reported for Fomalhaut, but the contribution from the extended halo of barely bound grains is similarly small. Both slowly self-stirring and planetary perturbations could potentially have formed and shaped this disk.

Download/Website: `http://adsabs.harvard.edu/abs/2012A%26A...537A.110L`

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Mass and other transiting exoplanet parameters solely from optical photometric light curves

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Astronomy & Astrophysics, published (2012A&A...538A...4M)

We present a theoretical analysis of the optical light curves (LCs) for short-period high-mass transiting extrasolar planet systems. Our method considers the primary transit, the secondary eclipse, and the overall phase shape of the LC between the occultations. Phase variations arise from (i) reflected and thermally emitted light by the planet, (ii) the ellipsoidal shape of the star due to the gravitational pull of the planet, and (iii) the Doppler shift of the stellar light as the star orbits the center of mass of the system. Our full model of the out-of-eclipse variations contains information about the planetary mass, orbital eccentricity, the orientation of periastron and the planets albedo. For a range of hypothetical systems we demonstrate that the ellipsoidal variations (ii.) can be large enough to be distinguished from the remaining components and that this effect can be used to constrain the planets mass. To detect the ellipsoidal variations, the LC requires a minimum precision of 10^{-4} , which coincides with the precision of the Kepler mission. As a test of our approach, we consider the Kepler LC of the transiting object HAT-P-7. We are able to estimate the mass of the companion, and confirm its planetary nature solely from the LC data. Future space missions, such as PLATO and the James Webb Space Telescope with even higher photometric precision, will be able to reduce the errors in all parameters. Detailed modeling of any out-of-eclipse variations seen in new systems will be a useful diagnostic tool prior to the requisite ground based radial velocity follow-up.

Download/Website: `http://adsabs.harvard.edu/abs/2012A%26A...538A...4M`

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WASP-36b: A new transiting planet around a metal-poor G-dwarf, and an investigation into analyses based on a single transit light curve

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Astronomical Journal, in press (arXiv:1110.5313)

We report the discovery, from WASP and CORALIE, of a transiting exoplanet in a 1.54-d orbit. The host star, WASP-36, is a magnitude $V = 12.7$, metal-poor G2 dwarf ($T_{\rm eff} = 5959 \pm 134$ K), with [Fe/H] $= -0.26 \pm 0.10$. We determine the planet to have mass and radius respectively 2.30 ± 0.07 and 1.28 ± 0.03 times that of Jupiter.
We have eight partial or complete transit light curves, from four different observatories, which allows us to investigate the potential effects on the fitted system parameters of using only a single light curve. We find that the solutions obtained by analysing each of these light curves independently are consistent with our global fit to all the data, despite the apparent presence of correlated noise in at least two of the light curves.

Download/Website: `http://arxiv.org/abs/1110.5313`

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Resolving the inner regions of the HD97048 circumstellar disk with VLT/NACO Polarimetric Differential Imaging

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Astronomy & Astrophysics, in press (http://xxx.lanl.gov/abs/1112.1953)

Circumstellar disks are the cradles of planetary systems and their physical and chemical properties directly influence the planet formation process. As most planets supposedly form in the inner disk regions, i.e., within a few tens of AU, it is crucial to study circumstellar disk on these scales to constrain the conditions for planet formation. Our aims are to characterize the inner regions of the circumstellar disk around the young Herbig Ae/Be star HD97048 in polarized light.We use VLT/NACO to observe HD97048 in polarimetric differential imaging (PDI) mode in the H and K_s band. PDI offers high-contrast capabilities at very small inner working angles and probes the dust grains on the surface layer of the disk that act as the scattering surface.We spatially resolve the disk around HD97048 in polarized flux in both filters on scales between $\sim$0.1″–1.0″ corresponding to the inner $\sim$16–160 AU. Fitting isophots to the flux calibrated H-band image between 13 – 14 mag/arcsec^2 and 14 – 15 mag/arcsec^2 we derive a apparent disk inclination angle of $34° \pm 5°$ and $47° \pm 2°$, respectively. The disk position angle in both brightness regimes is almost identical and roughly 80°. Along the disk major axis the surface brightness of the polarized flux drops from $\sim$11 mag/arcsec^2 at $\sim$0.1″ ($\sim$16 AU) to $\sim$15.3 mag/arcsec^2 at $\sim$1.0″ ($\sim$160 AU). The brightness profiles along the major axis are fitted with power-laws falling off as $\propto r^{-1.78\pm0.02}$ in H and $\propto r^{-2.34\pm0.04}$ in K_s. As the surface brightness drops off more rapidly in K_s compared to H the disks becomes relatively bluer at larger separations possibly indicating changing dust grain properties as a function of radius.For the first time the inner $\sim$0.1″–1.0″ ($\sim$16–160 AU) of the surface layer of the HD97048 circumstellar disk have been imaged in scattered light demonstrating the power of ground-based imaging polarimetry. Our data fill an important gap in a large collection of existing data including resolved thermal dust and PAH emission images as well as resolved gas emission lines. HD97048 is thus an ideal test case for sophisticated models of circumstellar disks and a prime target for future high-contrast imaging observations.

Download/Website: `http://xxx.lanl.gov/abs/1112.1953`

Contact: `quanz@astro.phys.ethz.ch`

Sunlight refraction in the mesosphere of Venus during the transit on June 8th, 2004

P. Tanga[1], T. Widemann[2], B. Sicardy[2], J. M. Pasachoff[3], J. Arnaud[4], L. Comolli[5], A. Rondi[6], S. Rondi[6], P. Sütterlin[7,8]

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[3] Williams College Hopkins Observatory, Williamstown, MA 01267-2565, USA
[4] Lab. Fizeau UMR6525, Université de Nice Sophia-Antipolis, CNRS, Obs. de la Côte d'Azur, BP 4229, 06304 Nice Cedex 4, France
[5] Gruppo Astronomico Tradatese, Via Mameli 13, 21049 Tradate, Italy
[6] Société Astronomique de France, 3 rue Beethoven, 75016 Paris, France
[7] Sterrekundig Instituut, Utrecht University, Postbus 80 000, 3508 TA Utrecht, The Netherlands.
[8] Now: Institute for Solar Physics, The Royal Swedish Academy of Sciences, Alba Nova University Center, 106 91 Stockholm, Sweden

Icarus, in press (arXiv:1112.3136)

Many observers in the past gave detailed descriptions of the telescopic aspect of Venus during its extremely rare transits across the Solar disk. In particular, at the ingress and egress, the portion of the planet's disk outside the Solar photosphere has been repeatedly perceived as outlined by a thin, bright arc ("aureole"). Those historical visual observations allowed inferring the existence of Venus' atmosphere, the bright arc being correctly ascribed to the refraction of light by the outer layers of a dense atmosphere. On June 8th, 2004, fast photometry based on electronic imaging devices allowed the first quantitative analysis of the phenomenon. Several observers used a variety of acquisition systems to image the event – ranging from amateur-sized to professional telescopes and cameras – thus collecting for the first time a large amount of quantitative information on this atmospheric phenomenon. In this paper, after reviewing some elements brought by the historical records, we give a detailed report of the ground based observations of the 2004 transit. Besides confirming the historical descriptions, we perform the first photometric analysis of the aureole using various acquisition systems. The spatially resolved data provide measurements of the aureole flux as a function of the planetocentric latitude along the limb. A new differential refraction model of solar disk through the upper atmosphere allows us to relate the variable photometry to the latitudinal dependency of scale-height with temperature in the South polar region, as well as the latitudinal variation of the cloud-top layer altitude. We compare our measurements to recent analysis of the Venus Express VIRTIS-M, VMC and SPICAV/SOIR thermal field and aerosol distribution. Our results can be used a starting point for new, more optimized experiments during the 2012 transit event.

Download/Website: `http://www.sciencedirect.com/science/article/pii/S0019103511004696`

Contact: `Paolo.Tanga@oca.eu`

A Hot Gap Around Jupiter's Orbit in the Solar Nebula

N. J. Turner, M. Choukroun, J. Castillo-Rogez & G. Bryden
Jet Propulsion Laboratory, California Institute of Technology, 4800 Oak Grove Drive, Pasadena, California 91109, USA

Astrophysical Journal, in press (arXiv:1110.4166)

The Sun was an order of magnitude more luminous during the first few hundred thousand years of its existence, due in part to the gravitational energy released by material accreting from the Solar nebula. If Jupiter was already near its present mass, the planet's tides opened an optically-thin gap in the nebula. We show using Monte Carlo radiative transfer calculations that sunlight absorbed by the nebula and re-radiated into the gap raised temperatures well above the sublimation threshold for water ice, with potentially drastic consequences for the icy bodies in Jupiter's feeding zone. Bodies up to a meter in size were vaporized within a single orbit if the planet was near its present location during this early epoch. Dust particles lost their ice mantles, and planetesimals were partially to fully devolatilized, depending on their size. Scenarios in which Jupiter formed promptly, such as those involving a gravitational instability of the massive early nebula, must cope with the high temperatures. Enriching Jupiter in the noble gases through delivery trapped in clathrate hydrates will be more difficult, but might be achieved by either forming the planet much further from the star, or capturing planetesimals at later epochs. The hot gap resulting from an early origin for Jupiter also would affect the surface compositions of any primordial Trojan asteroids.

Download/Website: `http://arxiv.org/abs/1110.4166`

Contact: `neal.turner@jpl.nasa.gov`

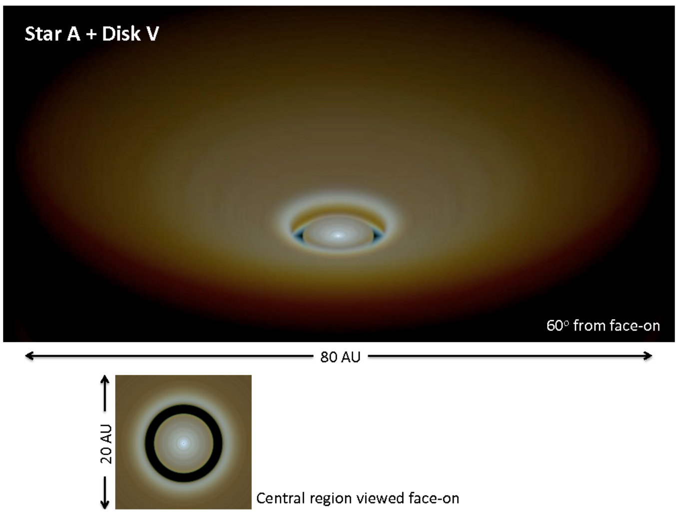

Figure 6: (Turner et al.) Synthetic image of the model Solar nebula with gap opened by Jupiter at 5 AU. The red, green and blue channels correspond to wavelengths 40, 20 and 10 μm, and the intensity scale is logarithmic with the central protostar saturated. At top, the system is viewed 60° from face-on and the field of view is just over 80 AU across. The gap's outer rim is hotter than its surroundings and appears as a bright ring. Also visible through the gap is the hot rim on the disk's lower surface. The gap itself appears bluish because the sightlines pass through optically-thin hot material overlying the rings that emits most strongly at 10 μm. The bottom panel is a face-on view of the central 20 AU on the same color scale.

Chemical Processes in Protoplanetary Disks II. On the Importance of Photochemistry and X-ray Ionization

Catherine Walsh[1], *Hideko Nomura*[2], *T. J. Millar*[1], *& Yuri Aikawa*[3]

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[2] Department of Astronomy, Graduate School of Science, Kyoto University, Kyoto 606-8502, Japan
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Astrophysical Journal, accepted (arXiv:1201.2613)

We investigate the impact of photochemistry and X-ray ionization on the molecular composition of, and ionization fraction in, a protoplanetary disk surrounding a typical T Tauri star. We use a sophisticated physical model, which includes a robust treatment of the radiative transfer of UV and X-ray radiation, and calculate the time-dependent chemical structure using a comprehensive chemical network. In previous work, we approximated the photochemistry and X-ray ionization, here, we recalculate the photoreaction rates using the explicit UV wavelength spectrum and wavelength-dependent reaction cross sections. We recalculate the X-ray ionization rate using our explicit elemental composition and X-ray energy spectrum. We find photochemistry has a larger influence on the molecular composition than X-ray ionization. Observable molecules sensitive to the photorates include OH, HCO^+, N_2H^+, H_2O, CO_2 and CH_3OH. The only molecule significantly affected by the X-ray ionization is N_2H^+ indicating it is safe to adopt existing approximations of the X-ray ionization rate in typical T Tauri star-disk systems. The recalculation of the photorates increases the abundances of neutral molecules in the outer disk, highlighting the importance of taking into account the shape of the UV spectrum in protoplanetary disks. A recalculation of the photoreaction rates also affects the gas-phase chemistry due to the adjustment of the H/H_2 and C^+/C ratios. The disk ionization fraction is not significantly affected by the methods adopted to calculate the photochemistry and X-ray ionization. We determine there is a probable 'dead zone' where accretion is suppressed, present in a layer, $Z/R \lesssim$ 0.1 - 0.2, in the disk midplane, within $R \approx 200$ AU.

Download/Website: `http://adsabs.harvard.edu/abs/2012arXiv1201.2613W`

Contact: `catherine.walsh@qub.ac.uk`

Planetesimal formation by sweep-up: How the bouncing barrier can be beneficial to growth

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Astronomy & Astrophysics, accepted (arXiv:1201.4282)

The formation of planetesimals is often accredited to collisional sticking of dust grains. The exact process is unknown, as collisions between larger aggregates tend to lead to fragmentation or bouncing rather than sticking. Recent laboratory experiments have however made great progress in the understanding and mapping of the complex physics involved in dust collisions. We want to study the possibility of planetesimal formation using the results from the latest laboratory experiments, particularly by including the *fragmentation with mass transfer* effect, which might lead to growth even at high impact velocities. We present a new experimentally and physically motivated dust collision model capable of predicting the outcome of a collision between two particles of arbitrary masses and velocities. The new model includes a natural description of cratering and mass transfer, and provides a smooth transition from equal- to different-sized collisions. It is used together with a continuum dust-size evolution code which is both fast in terms of execution time and able to resolve the dust well at all sizes, allowing for all types of

interactions to be studied without biases. We find that for the general dust population, bouncing collisions prevent the growth above millimeter-sizes. However, if a small number of cm-sized particles are introduced, for example due to vertical mixing or radial drift, they can act as a catalyst and start to sweep up the smaller particles. At a distance of 3 AU, 100-meter-sized bodies are formed on a timescale of 1 Myr. We conclude that direct growth of planetesimals might be a possibility thanks to a combination of the existence of a bouncing barrier and the fragmentation with mass transfer effect. The bouncing barrier is here even beneficial, as it prevents the growth of too many large particles that would otherwise only fragment among each other, and creates a reservoir of small particles that can be swept up by larger bodies. However, for this process to work, a few seeds of cm in size or larger have to be introduced.

Download/Website: `http://arxiv.org/abs/1201.4282`

Contact: `windmark@mpia.de`

On the Migration of Jupiter and Saturn: Constraints from Linear Models of Secular Resonant Coupling with the Terrestrial Planets

Craig B. Agnor[1] *and D. N. C. Lin*[2,3]

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[3] Kavli Institute of Astronomy and Astrophysics & College of Physics, Peking University, Beijing, China

Astrophysical Journal, published (2012ApJ...745..143A)

We examine how the late divergent migration of Jupiter and Saturn may have perturbed the terrestrial planets. Using a modified secular model we have identified six secular resonances between the ν_5 frequency of Jupiter and Saturn and the four apsidal eigenfrequencies of the terrestrial planets ($g_{1\text{–}4}$). We derive analytic upper limits on the eccentricity and orbital migration timescale of Jupiter and Saturn when these resonances were encountered to avoid perturbing the eccentricities of the terrestrial planets to values larger than the observed ones. Because of the small amplitudes of the $j = 2, 3$ terrestrial eigenmodes the $g_2 - \nu_5$ and $g_3 - \nu_5$ resonances provide the strongest constraints on giant planet migration. If Jupiter and Saturn migrated with eccentricities comparable to their present day values, smooth migration with exponential timescales characteristic of planetesimal-driven migration ($\tau \sim$ 5–10Myr) would have perturbed the eccentricities of the terrestrial planets to values greatly exceeding the observed ones. This excitation may be mitigated if the eccentricity of Jupiter was small during the migration epoch, migration was very rapid (e.g., $\tau < 0.5$Myr perhaps via planet–planet scattering or instability-driven migration) or the observed small eccentricity amplitudes of the $j = 2, 3$ terrestrial modes result from low probability cancellation of several large amplitude contributions. Results of orbital integrations show that very short migration timescales, characteristic of instability-driven migration, may also perturb the terrestrial planets' eccentricities by amounts comparable to their observed values. We discuss the implications of these constraints for the relative timing of terrestrial planet formation, giant planet migration, and the origin of the so-called Late Heavy Bombardment of the Moon 3.9 ± 0.1 Ga ago. We suggest that the simplest way to satisfy these dynamical constraints may be for the bulk of any giant planet migration to be complete in the first 30-100Myr of solar system history.

Download/Website: `http://arxiv.org/abs/1110.5042`

Contact: `C.B.Agnor@qmul.ac.uk`

3 Jobs and Positions

Two 2 yr post-doctoral positions on exoplanet atmosphere modeling

Prof. L. Decin and Prof. R. Keppens

Leuven, Belgium, Start date: as soon as possible

Interdisciplinary project on exoplanet atmosphere modeling between the Institute of Astronomy, the Centre of Plasma-Astrophysics and the Quantum Chemistry and Physical Chemistry Section at the Leuven University, Belgium

The project

At the Leuven University (Belgium), we seek candidates for two post-doctoral research positions, ready to play a key role in a new interdisciplinary project on exoplanet atmosphere modeling. The postdocs will interact closely with a team consisting of astrophysicists, computational mathematicians, and chemists, as the goal is to develop a 3D exoplanet atmosphere model where circulation dynamics, dust formation, chemistry and ultimately non-LTE radiative transfer modeling gets combined in a new state of the art computational tool. The exoplanet atmosphere models will be benchmarked against solar system planet data, and must pave the way to use the detailed spectral characterisation of exoplanets which will be possible through the future James Webb Space Telescope.

We seek one postdoc preferentially having experience with existing atmospheric flow computations (e.g. through using the public MITgcm code or through similar global modeling efforts), and having in any case sufficient experience in implementing and exploiting advanced numerical algorithms for fluid dynamics. The other postdoc should have experience in either chemical-dynamical models with the aim to include microphysical cloud modelling or in multi-D non-LTE radiative transfer.

The postdocs will interact with two PhDs obtaining improved info on the pressure-temperature dependent chemical kinetics. At the Leuven University, we have access to parallel computing facilities, to be exploited extensively in this project.

The position

At the Leuven University, the postdoc will join the Institute for Astronomy (Prof. L. Decin) or the Centre for Plasma Astrophysics (Prof. R. Keppens). The interdisciplinary project is carried out in collaboration with Prof. S. Carl and Prof. M. Nguyen from the Chemistry department, all at K.U.Leuven.

As is common at the Leuven University, the postdoc shall take up a teaching assistance task of maximum 4 hours per week in the Bachelor of Physics (Dutch) or in the Master of Astronomy & Astrophysics (English).

Contract

You will be employed for a fixed period of 2 years. The salary will be commensurate to the standard scale for post-doctoral researchers at the Leuven University. The preferred starting date is between 1 June 2012 and 1 September 2012, but will be adapted to the selected candidate's availability. Candidates are thus requested to indicate their preferred starting date in the application.

Interested?

The successful candidate must have a PhD degree in astrophysics, mathematics, physics or chemistry.Applications must include a letter of interest, a CV with clear indication of achieved grades on all university master course topics related to this post, and must be accompanied by two recommendation letters. The latter are to be submitted seperately to the address mentioned below.

DEADLINE: 31 March 2012

More information can be obtained by contacting Leen Decin or Rony Keppens:

Prof. L. Decin
Institute for Astronomy, K.U. Leuven
Celestijnenlaan 200D, 3001 Heverlee, Belgium
Leen.Decin@ster.kuleuven.be
http://fys.kuleuven.be/ster/staff/senior-staff/leen
See also: http://www.fys.kuleuven.be/ster/

Prof. R. Keppens
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Rony.Keppens@wis.kuleuven.be
http://perswww.kuleuven.be/Rony_Keppens/
See also: http://wis.kuleuven.be/cpa/

Download/Website: http://fys.kuleuven.be/ster/vacancies/postdoc-exoplanets.pdf

Contact: Leen.Decin@ster.kuleuven.be

Postdoctoral Research and Doctoral Student Positions in New Key National Research Program on Planetary Habitability

M. Güdel[1], E. Dorfi[1], R. Dvorak[1], M. Khodachenko[2], H. Lammer[2], E. Pilat-Lohinger[1]

[1] Institute of Astronomy, University of Vienna, Türkenschanzstr. 17, A-1180 Vienna, Austria
[2] Austrian Academy of Sciences, Space Research Institute, Schmiedlstr. 6, A-8042 Graz, Austria

Institute of Astronomy, Vienna, and Space Research Institute, Graz, start date: March 1, 2012 or later

The University of Vienna and the Space Research Institute in Graz, Austria, announce the availability of up to 6 postdoctoral research positions (2- to 4-year contracts) and up to 5 graduate student positions in a large key national research project dedicated to the study of conditions for habitability in planetary systems. The project, led by Prof. Manuel Güdel at Vienna, is anticipated to run for 8 years and is supported by national members and international collaborators. Co-leads are Profs. E. Pilat-Lohinger, E. Dorfi, R. Dvorak (Vienna), H. Lammer and M. Khodachenko (Graz).

Successful candidates will work in one of six specialist teams, addressing hydrodynamic and chemical modeling of protoplanetary disks during their entire evolution, water transport during planet formation, evolution of the stellar radiative and particle environment, wind-magnetosphere interactions, radiative+particle interactions with upper planetary atmospheres, and related processes in binary systems. A more detailed summary of the research fields/options is available on request. Work can be observational, numerical or theoretical. For numerical work, high-performance computer clusters will be accessible. Strong scientific interactions and collaborations between the groups will be emphasized. An early starting date is encouraged, but no earlier than 1 March 2012.

Applications include a CV, a publication list, a summary of past research (for postdoc positions, max 3 pages) resp. a summary of undergraduate studies (for graduate student positions) and a brief description of the preferred research area or proposed topics the candidate would like to contribute. These documents must be submitted electronically as a PDF file to manuel.guedel@univie.ac.at.

Review starts 20 February 2012 (submission extension from previously 1 February!); applications submitted thereafter will be considered until the posts are filled. Applicants should arrange for three letters of reference sent by the referees directly to the same address.

Download/Website: http://homepage.univie.ac.at/manuel.guedel/path.html

Contact: manuel.guedel@univie.ac.at

Three LEAP PhD positions in Theory of Brown Dwarf and Planetary Atmospheres

Christiane Helling
SUPA, School of Phsyics & Astronomy, University of St Andrews, KY16 9SS, North Haugh, UK

PhD position, announced

The School of Physics & Astronomy of the University of St Andrews offers three PhD positions
in brown dwarf and planetary atmosphere theory on the topics of

#1 Charge separation in turbulent explosive volcano plumes

#2 Ionisation in atmospheres across the star-planet mass boundary

#3 The link between planetary atmosphere and planetary magnetic field

We are looking for excellent graduate students. The graduate students will be part of a newly forming research group LEAP that studies charge processes in planetary atmospheres and is funded by the European Research Council under the FP7 work program Ideas. The PhD students will benefit from the SUPA graduate school, the university's GradSkill program as well as from the lively atmosphere in the department.

The School of Physics & Astronomy of the University of St Andrews offers a young, vibrant and modern work environment with 40% of the astronomy staff members being women. The research in St Andrews combines theoretical, numerical and observational research in extra-solar planets, in protoplanetary disk, in star formation, in magnetic activity, and in star-planet interaction as well as in gravitational lensing and galaxy dynamics.

Applicants for these graduate positions should have a degree in astronomy, astrophysics, physics, geophysics, or a closely related field. The graduate students will work under the supervision of Dr Christiane Helling funded by an ERC starting grant with funds for computing, publications, and travel.

Candidates should send a CV and a brief statement of research interest (max. 1 A4 page) and arrange for two letters of reference.

Deadline: 30 March 2012

Download/Website: `www.leap2010.eu`

Contact: `CH@LEAP2010.eu`

Graduate student position on debris disks

Alexander V. Krivov
Astrophysical Institute and University Observatory, Friedrich Schiller University, Schillergäßchen 2-3 , 07745 Jena, Germany

October 1, 2012

The Astrophysical Institute and University Observatory (AIU) of the Friedrich Schiller University, Jena, Germany, is seeking candidates for a PhD student position to join the theory group at the AIU. The main research interest of the group is to study debris disks in extrasolar planetary systems. The group collaborates closely with two other groups at the AIU (observations and cosmic dust laboratory) and is involved in a number of projects at the international level. The PhD student is expected to work on one of the numerous aspects of debris disks. These include dynamical, collisional, and thermal emission modeling of debris disks and their relation to exoplanets and planet formation. He/she can also participate in analysis and interpretation of *Herschel Space Observatory* data. The position requires 2 hours of teaching per week, for instance by leading exercise classes.

The position is available for three years starting from **October 1, 2012**. The salary is standard for PhD positions in Germany (1/2 TV-L E-13 of the German federal public service scale).

The applicants should have a strong educational record and hold a masters degree or equivalent in physics or astronomy. Previous experience with astronomical research, preferrably in theoretical astrophysics, would be an advantage.

Applications should include a CV, a brief statement of research interests, and two names of reference. All applications received by **April 30, 2012** will be given full consideration.

Download/Website: `http://www.astro.uni-jena.de, click on ``Theory''`

Contact: `krivov@astro.uni-jena.de`

4 Conference announcements

Transiting Planets in the House of the Sun: A Workshop on M Dwarf Stars and Their Planets

Convener: Eric Gaidos
University of Hawaii at Manoa, Honolulu, Hawaii USA

IfA Maui Maikalani/ATRC, Hawaii USA, June 3-6, 2012

This workshop will provide an introductory but authoritative review of M dwarf stars and the detection, formation, and potential habitability of their planets. It is principally intended for advanced graduate students and junior post-docs, but investigators at all levels are welcome to apply. The workshop will consist of invited lectures, contributed research presentations, and a field trip to the summit and observatory of Haleakala to observe the transit of Venus across the Sun.

Download/Website: `http://www.soest.hawaii.edu/GG/FACULTY/GAIDOS/haleakala.html`

Contact: `mauitransit@gmail.com`

The Origins of Stars and Planetary Systems

Ralph Pudritz, James Wadsley, and Christine Wilson

McMaster University in Hamilton, Ontario, Canada, 10-15 June 2012

This interdisciplinary conference will explore the deep links between the processes of star and planet formation, highlighting recent advances in observations (Kepler, Herschell), theory, and computation.
The conference features 9 interdisciplinary and interleaved sessions, each with an invited Review Speaker, who will set up the session with a true review of the current state of that field, as well a Keynote Speaker who will focus more on their own contributions to the subject. The 9 sessions are

- Star Formation in Clusters
- Planets-Statistical Properties
- Planets in Cluster Context
- Young, Gas-Rich Disks
- Atmospheres and Evolutionary Models
- Cores and Small Scale Collapse
- Planet Formation-Early Stages in Disks
- Planet Formation-Late Stages
- Brown Dwarft and Lower Mass End of IMF

About 60% of the talks will be contributed, so please register as early as you can. The SOC will make decisions about the contributed talks schedule soon after April 15, 2012. Three days will also feature Discussion sessions at day's end, meant to provide a stimulating forum for the key results and issues raised in the presentations.

Download/Website: `http://origins.physics.mcmaster.ca/oi_planets/`

2012 Sagan Summer Workshop: Working with Exoplanet Light Curves

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

Pasadena, CA, July 23-27, 2012

Registration is now open for the 2012 Sagan Exoplanet Summer Workshop on "Working with Exoplanet Light Curves". The workshop will take place on the Caltech campus July 23 - 27, 2012. The workshop is intended for graduate students and postdocs interested in learning more about working with light curves, however all interested parties are welcome to attend. The application for limited financial support is available on the workshop website with applications due Friday, March 2.

This workshop will explore the use of exoplanet light curves to study planetary system architectures and atmospheres and to discover exomoons and ring systems. Attendees will participate in hands-on exercises to gain experience in working with Kepler and other transit light curves, and will also have the opportunity to present their own work through short presentations (research POPs) and electronic posters. A preliminary list of topics to be covered includes:

- The Promise of Transits
- Basic Light Curve Models
- Validation and Confirmation of Transit Signals
- Characterization of Exoplanet Atmospheres
- Planetary Architecture
- Available Analysis Packages
- Working with Kepler Data
- Introduction to Transit Spectroscopy

Important Dates

- February 6: On-line Registration available and Financial Support Application period open
- March 2: Financial Support applications and supporting letter of recommendation due
- March 26: Financial Support decisions announced via email
- April 2: POP/Poster/Talk Submission Page On-line
- June 15: Early on-line registration ends
- June 21: Hotel Registration deadline to be eligible for group rate
- June 29: POP/Poster Submission deadline
- July 13: On-line registration closed
- July 13: Talk Submission by workshop speakers deadline and final agenda posted
- July 22: Sagan Exoplanet Summer Workshop Opening Reception
- July 23-27: 2012 Sagan Exoplanet Summer Workshop

Download/Website: `http://nexsci.caltech.edu/workshop/2012`
Contact: `sagan_workshop@ipac.caltech.edu`

Characterizing & Modeling Extrasolar Planetary Atmospheres: Theory & Observation

L. Kaltenegger[12], *T. Henning*[1]
[1] MPIA, Koenigstuhl 17, 69117 Heidelberg, Germany
[2] CfA, 60 Garden street, 02138 MA, USA

MPIA, Heidelberg, Germany, July 16-20

Registration and abstract deadline: April 15, 2012

This meeting will summarize our current understanding of planetary atmospheres from giant planets to rocky planets. Discussion will include the following general topics.

Theory: Extrasolar Giant Planet Atmosphere and Dynamics, Rocky Planet Atmosphere and Dynamics, Retrieval Methods for Observations

Observations: Recent Observation of Extrasolar Planet Spectra, Direct Imaged Exoplanets, Recent results from Ground and Space based Observations

SOC:
Baraffe I., Univ. of Exeter, UK, Burrows A., Princeton Univ., USA, Chabrier G., ENS Lyon, France, Greene T., NASA Ames, USA, Henning T., MPIA, Germany (co-Chair), Kaltenegger L., MPIA / CfA, Germany (co-Chair), Kasting J., Penn State Univ., USA, Meyer M., ETH, Switzerland, Sasselov D., Harvard Univ., USA, Seager S., MIT, USA

LOC: Biller B., Betremeux Y., Henning T., Kaltenegger L. (chair), Krause O., Miguel Y., Mordasini Ch., Nielbock M., van Boekel R. , MPIA, Germany

Download/Website: `http://www.mpia-hd.mpg.de/exoplanets2012/index.php`

Contact: `exoplanets2012@mpia.de`

Pro-Am Conference on Stellar Astrophysics: Double stars, pulsating stars, exoplanets, supernovae

L. Corp
Androméde 4A, Rodez, France

Onet le Château, Rodez, France, 28 September – 1st October 2012

CAPAS, Amateur-Professionnal Congress - Stellar Astrophysics, aims to present new discoveries and new technics in various subjects related to stellar astrophysics and in which amateur astronomers might be involved. Professional and amateur astronomers, as well as international associations are expected to participate and share their findings. For the first time, double star astronomers and variable star astronomers will be able to share their views during these 4 days. To be noticed: a visit of an historical site will be organised as well as 2 open conferences which will allow to present the work of the attendees to the public and give the opportunity to the audience to meet astronomers. CAPAS Congress is open to anybody. daily fees are proposed in order to allow to attend only to a part of the congress for those willing to.

Preliminary programme now available at: http://rr-lyr.ast.obs-mip.fr/capas2012/article_0001.en.php

Download/Website: `http://rr-lyr.ast.obs-mip.fr/capas2012/`

Contact: `capas-2012@orange.fr`

5 Announcements

Habitable Zone Gallery upgrade - Movies

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The Habitable Zone Gallery (www.hzgallery.org) is a service to the exoplanet community which provides Habitable Zone information for each of the exoplanetary systems with known planetary orbital parameters. We announce the release of a significant upgrade to the service which includes movie animations for each of the planets contained within the gallery. In total, the service currently provides access to both mpg and mp4 movies for 485 planets in 416 systems. The animations track the position of the planet as it orbits the star, showing the change in star-planet separation and the predicted effective temperature at each location. We encourage their usage in both education and scientific contexts as a visualization aid for the known exosystems. We have also made various improvements to the interface including an update page which shows recent changes and additions to the list of exoplanets. We welcome feedback and suggestions.

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

Contact: `skane@ipac.caltech.edu,dawn@ipac.caltech.edu`

6 As seen on astro-ph

The following list contains all the entries relating to exoplanets that we spotted on astro-ph during December 2011 and January 2012. If you see any that we missed, please let us know and we'll include them in the next issue.

astro-ph/1201.6582: **Exoplanets Bouncing Between Binary Stars** by *Nickolas Moeckel et al.*
astro-ph/1201.6573: **Probing the haze in the atmosphere of HD 189733b with HST/WFC3 transmission spectroscopy** by *N. P. Gibson et al.*
astro-ph/1201.6419: **The sub-Saturn Mass Transiting Planet HAT-P-12b** by *Jae Woo Lee et al.*
astro-ph/1201.6252: **Detailed compositional analysis of the heavily polluted DBZ white dwarf SDSS J073842.56+183509.06: A window on planet formation?** by *P. Dufour et al.*
astro-ph/1201.5730: **The Curious Case of HU Aquarii - Dynamically Testing Proposed Planetary Systems** by *Jonathan Horner et al.*
astro-ph/1201.5727: **WASP-4b Transit Observations With GROND** by *Nikolay Nikolov et al.*
astro-ph/1201.5424: **Almost All of Kepler's Multiple Planet Candidates are Planets** by *Jack J. Lissauer et al.*
astro-ph/1201.5415: **Transit Timing Observations from Kepler: IV. Confirmation of 4 Multiple Planet Systems by Simple Physical Models** by *Daniel C. Fabrycky et al.*
astro-ph/1201.5412: **Transit Timing Observations from Kepler: III. Confirmation of 4 Multiple Planet Systems by a Fourier-Domain Study of Anti-correlated Transit Timing Variations** by *Jason H. Steffen et al.*
astro-ph/1201.5409: **Transit Timing Observations from Kepler: II. Confirmation of Two Multiplanet Systems via a Non-parametric Correlation Analysis** by *Eric B. Ford et al.*
astro-ph/1201.5391: **The Effects of Irradiation on Hot Jovian Atmospheres: Heat Redistribution and Energy Dissipation** by *Rosalba Perna et al.*
astro-ph/1201.5140: **The impact of Gaia and LSST on binary stars and exo-planets** by *L. Eyer et al.*
astro-ph/1201.5075: **HAT-P-38b: A Saturn-Mass Planet Transiting a Late G Star** by *B. Sato et al.*
astro-ph/1201.4973: **GK Boo and AE For: Two low-mass eclipsing binaries with dwarf companions** by *P. Zasche et al.*
astro-ph/1201.4637: **Evaporation of extrasolar planets** by *A. Lecavelier des Etangs*

astro-ph/1201.4483: **A new vision on giant planet interiors: the impact of double diffusive convection** by *Jeremy Leconte*

astro-ph/1201.4047: **Cool Young Stars in the Northern Hemisphere: Beta Pictoris and AB Doradus Moving Group Candidates** by *Joshua E. Schlieder et al.*

astro-ph/1201.4043: **Analysis of Light Curves of Eclipsing Systems with Exoplanets: HD 189733** by *M. K. Abubekerov et al.*

astro-ph/1201.3622: **Debris disks as signposts of terrestrial planet formation. II Dependence of exoplanet architectures on giant planet and disk properties** by *Sean N. Raymond et al.*

astro-ph/1201.3616: **Transit Monitoring in the South (TraMoS) project: Discarding Transit Timing Variations in WASP-5b** by *S. Hoyer et al.*

astro-ph/1201.3484: **Astrometry and Exoplanet Characterization: Gaia and Its Pandora's Box** by *A. Sozzetti*

astro-ph/1201.3238: **Science performance of Gaia, ESA's space-astrometry mission** by *J. H. J. de Bruijne*

astro-ph/1201.2789: **The TRAPPIST survey of southern transiting planets. I. Thirty eclipses of the ultra-short period planet WASP-43 b** by *M. Gillon et al.*

astro-ph/1201.2622: **Probing the interiors of the ice giants: Shock compression of water to 700 GPa and 3.8 g/ccm** by *M. D. Knudson et al.*

astro-ph/1201.2313: **The Stability of the Suggested Planet in the nu Octantis System: A Numerical and Statistical Study** by *Billy Quarles et al.*

astro-ph/1201.2302: **Habitability of Earth-type Planets and Moons in the Kepler-16 System** by *Billy Quarles et al.*

astro-ph/1201.2189: **Characterizing the Cool KOIs III. KOI-961: A Small Star with Large Proper Motion and Three Small Planets** by *Philip S. Muirhead et al.*

astro-ph/1201.2175: **Planet-Planet Scattering Alone Cannot Explain the Free-Floating Planet Population** by *Dimitri Veras et al.*

astro-ph/1201.2080: **Degeneracy in the characterization of non-transiting planets from transit timing variations** by *Gwenael Boue et al.*

astro-ph/1201.1892: **Transit Timing Observations from Kepler: VI. Transit Timing Variation Candidates in the First Seventeen Months from Polynomial Models** by *Eric B. Ford et al.*

astro-ph/1201.1873: **Transit Timing Observations from Kepler: VII. Potentially interesting candidate systems from Fourier-based statistical tests** by *Jason H. Steffen et al.*

astro-ph/1201.1584: **Interaction of Close-in Planets with the Magnetosphere of their Host Stars. II. Super-Earths as Unipolar Inductors and their Orbital Evolution** by *Randy O. Laine et al.*

astro-ph/1201.1385: **Interaction of free-floating planets with a star-planet pair** by *Harry Varvoglis et al.*

astro-ph/1201.1048: **Detection of Potential Transit Signals in the First Three Quarters of Kepler Mission Data** by *Peter Tenenbaum et al.*

astro-ph/1201.1036: **Extrasolar planet population synthesis IV. Correlations with disk metallicity, mass and lifetime** by *C. Mordasini et al.*

astro-ph/1201.1023: **Ground-based, Near-infrared Exospectroscopy. II. Tentative Detection of Emission From the Extremely Hot Jupiter WASP-12b** by *Ian J. M. Crossfield et al.*

astro-ph/1201.1002: **MOA-2011-BLG-293Lb: A testbed for pure survey microlensing planet detections** by *J. C. Yee et al.*

astro-ph/1201.0756: **The Link Between Planetary Systems, Dusty White Dwarfs, and Metal Polluted White Dwarfs** by *J. Debes et al.*

astro-ph/1201.0752: **The Hunt for Exomoons with Kepler (HEK): I. Description of a New Observational Project** by *David M. Kipping et al.*

astro-ph/1201.0668: **A Uniformly Derived Catalogue of Exoplanets from Radial Velocities** by *Morgan D. J. Hollis et al.*

astro-ph/1112.6301: **Development of binary shaped pupil mask coronagraph for the observation of exoplanets** by *Kanae Haze* astro-ph/1112.6268: **The third body in the eclipsing binary AV CMi: Hot Jupiter or brown dwarf?** by *Alexios Liakos et al.*

astro-ph/1112.6266: **Light Curve and orbital period analysis of the eclipsing binary AT Peg** by *Alexios Liakos et al.*

astro-ph/1112.5969: **Probabilities of exoplanet signals from posterior samplings** by *Mikko Tuomi et al.*

astro-ph/1112.5432: **Outward migration of a super-Earth in a disc with outward propagating density waves excited by a giant planet** by *E. Podlewska-Gaca et al.*

astro-ph/1112.5145: **Thermal emission at 3.6-8 micron from WASP-19b: a hot Jupiter without a stratosphere orbiting an active star** by *D. R. Anderson et al.*

astro-ph/1112.5043: **AMBER/VLTI observations of 5 giant stars** by *F. Cusano et al.*

astro-ph/1112.4850: **Detection of warm water vapour in Taurus protoplanetary discs by Herschel** by *P. Riviere-Marichalar et al.*

astro-ph/1112.4550: **Two Earth-sized planets orbiting Kepler-20** by *Francois Fressin et al.*

astro-ph/1112.4514: **Kepler-20: A Sun-like Star with Three Sub-Neptune Exoplanets and Two Earth-size Candidates** by *Thomas N. Gautier III et al.*

astro-ph/1112.4476: **Analytic models for albedos, phase curves and polarization of reflected light from exoplanets** by *Nikku Madhusudhan et al.*

astro-ph/1112.3974: **Absolute dimensions of eclipsing binaries. XXIX. The Am-type systems SW Canis Majoris and HW Canis Majoris** by *G. Torres et al.*

astro-ph/1112.3591: **Models of Stars, Brown Dwarfs and Exoplanets** by *France Allard et al.*

astro-ph/1112.3398: **An icy Kuiper-Belt around the young solar-type star HD 181327** by *J. Lebreton et al.*

astro-ph/1112.3008: **High resolution imaging of young M-type stars of the solar neighborhood: Probing the existence of companions down to the mass of Jupiter** by *P. Delorme et al.*

astro-ph/1112.2997: **Global models of planetary system formation in radiatively-inefficient protoplanetary discs** by *Phil Hellary et al.*

astro-ph/1112.2817: **Coronagraphic Low Order Wave Front Sensor : post-processing sensitivity enhancer for high performance coronagraphs** by *Frederic P. A. Vogt et al.*

astro-ph/1112.2784: **VO-KOREL: A Fourier disentangling service of Virtual Observatory** by *Petr Skoda*

astro-ph/1112.2728: **EChO - Exoplanet Characterisation Observatory** by *G. Tinetti et al.*

astro-ph/1112.2366: **Discovering habitable Earths, hot Jupiters and other close planets with microlensing** by *Rosanne Di Stefano*

astro-ph/1112.2165: **Kepler-21b: A 1.6REarth Planet Transiting the Bright Oscillating F Subgiant Star HD 179070** by *Steve B. Howell et al.*

astro-ph/1112.2087: **Constraining the interior of extrasolar giant planets with the tidal Love number k_2 using the example of HAT-P-13b** by *U. Kramm et al.*

astro-ph/1112.2008: **Estimating transiting exoplanet masses from precise optical photometry** by *D. Mislis et al.*

astro-ph/1112.1765: **Adaptive Optics Observations of Exoplanets, Brown Dwarfs & Binary Stars** by *Sasha Hinkley*

astro-ph/1112.1704: **Outward migration of a giant planet with a gravitationally unstable gap edge** by *Min-Kai Lin et al.*

astro-ph/1112.1701: **Three New Eclipsing White-dwarf - M-dwarf Binaries Discovered in a Search for Transiting Planets Around M-dwarfs** by *Nicholas M. Law et al.*

astro-ph/1112.1658: **A General Circulation Model for Gaseous Exoplanets with Double-Gray Radiative Transfer** by *Emily Rauscher et al.*

astro-ph/1112.1640: **Kepler-22b: A 2.4 Earth-radius Planet in the Habitable Zone of a Sun-like Star** by *William J. Borucki et al.*

astro-ph/1112.1595: **Stars Don't Eat Their Young Migrating Planets - Empirical Constraints On Planet Migration Halting Mechanisms** by *Peter Plavchan et al.*

astro-ph/1112.1553: **Stellar jitter from variable gravitational redshift: implications for RV confirmation of habitable exoplanets** by *H. M. Cegla et al.*

astro-ph/1112.1512: **Shock formation around planets orbiting M-dwarf stars** by *A. A. Vidotto et al.*

astro-ph/1112.1208: **The periodic and chaotic regimes of motion in the exoplanet 2/1 mean-motion resonance** by *Tatiana A. Michtchenko et al.*

astro-ph/1112.1035: **Transiting exoplanets from the CoRoT space mission XXI. CoRoT-19b: A low density planet orbiting an old inactive F9V-star** by *E. W. Guenther et al.*

astro-ph/1112.1021: **A Uniform Search for Secondary Eclipses of Hot Jupiters in Kepler Q2 Lightcurves** by *Jeffrey L. Coughlin et al.*

astro-ph/1112.0692: **Gaia and sigma Orionis from 20 Msol to 3 MJup: the most complete and precise Initial Mass Function with a parallax determination?** by *Jose A. Caballero*

astro-ph/1112.0584: **Transiting exoplanets from the CoRoT space mission - XIX. CoRoT-23b: a dense hot Jupiter on an eccentric orbit** by *D. Rouan et al.*

astro-ph/1112.0577: **Capture of Irregular Satellites via Binary Planetesimal Exchange Reactions in Migrating Planetary Systems** by *Alice C. Quillen et al.*

astro-ph/1112.0572: **Transmission spectrum of Venus as a transiting exoplanet** by *David Ehrenreich et al.*

astro-ph/1112.0447: **Confirming Fundamental Parameters of the Exoplanet Host Star epsilon Eridani Using the Navy Optical Interferometer** by *Ellyn K. Baines et al.*

astro-ph/1112.0368: **Debris Disks in Kepler Exoplanet Systems** by *S. M. Lawler et al.*

astro-ph/1112.0359: **The Frequency of Hot Jupiters in the Galaxy: Results from the SuperLupus Survey** by *Daniel Bayliss et al.*

astro-ph/1112.0337: **Predicting Planets in Kepler Multi-Planet Systems** by *Julia Fang et al.*

astro-ph/1112.0223: **Origin and Detectability of coorbital planets from radial velocity data** by *C. A. Giuppone et al.*

astro-ph/1112.0017: **Characterizing the Cool KOIs II. The M Dwarf KOI-254 and its Hot Jupiter** by *John Asher Johnson et al.*

astro-ph/1112.0002: **Close Companions to Young Stars. I. A Large Spectroscopic Survey in Chamaeleon I and Taurus-Auriga** by *Duy Cuong Nguyen et al.*