ExoPlanet News
An Electronic Newsletter

No. 72, September 1st, 2014

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1 Editorial

Welcome back after our summer break to the 72nd edition of ExoPlanet News. It's good to see a great crop of abstracts and meeting announcements this month, so I hope there's something here for everyone to enjoy.

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. Although please note that, following a change to the way our webservers operate, our system manager has now configured things so that my updates to the website only become live over-night, so it may be up to 24 hours from the time the newsletter is e-mailed out before it is available on the website.

Best wishes
Andrew Norton
The Open University

2 Abstracts of refereed papers

Signs of a faint disc population at polluted white dwarfs

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Monthly Notices of the Royal Astronomical Society, in press (arXiv:1408.0229)

Observations of atmospheric metals and dust discs around white dwarfs provide important clues to the fate of terrestrial planetary systems around intermediate mass stars. We present *Spitzer* IRAC observations of 15 metal polluted white dwarfs to investigate the occurrence and physical properties of circumstellar dust created by the disruption of planetary bodies. We find subtle infrared excess emission consistent with warm dust around KUV 15519+1730 and HS 2132+0941, and weaker excess around the DZ white dwarf G245-58, which, if real, makes it the coolest white dwarf known to exhibit a 3.6μm excess and the first DZ star with a bright disc. All together our data corroborate a picture where 1) discs at metal-enriched white dwarfs are commonplace and most escape detection in the infrared (possibly as narrow rings), 2) the discs are long lived, having lifetimes on the order of 10^6 yr or longer, and 3) the frequency of bright, infrared detectable discs decreases with age, on a timescale of roughly 500 Myr, suggesting large planetesimal disruptions decline on this same timescale.

Download/Website: `http://arxiv.org/abs/1408.0229`

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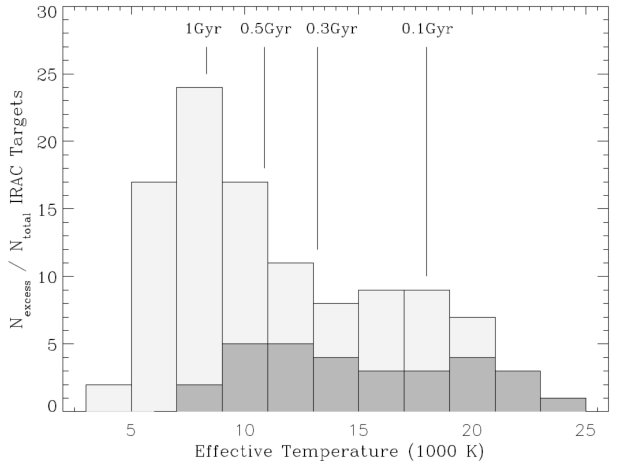

Figure 1: (Bergfors et al.) Fraction of polluted white dwarfs observed to have infrared excess with *Spitzer* IRAC. Light grey bins represent the total number of observed white dwarfs, dark grey those with observed disk emission. While the fraction of polluted white dwarfs with disks is higher for warmer and younger white dwarfs, the discoveries in this study add to the number of cooler white dwarfs with faint excesses, suggesting there is a population of white dwarfs which still retain dust at old age.

Near-infrared transmission spectrum of the warm-uranus GJ 3470b with the Wide Field Camera-3 on the Hubble Space Telescope

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Astronomy & Astrophysics, in press (arXiv:1405.1056)

The atmospheric composition of super-earths and neptunes is the object of intense observational and theoretical investigations. Transmission spectra recently obtained for such exoplanets are featureless in the near infrared. This flat signature is attributed to the presence of optically-thick clouds or translucent hazes. The planet GJ 3470b is a warm neptune (or uranus) detected in transit across a bright late-type star. The transit of this planet has already been observed in several band passes from the ground and space, allowing observers to draw an intriguing yet incomplete transmission spectrum of the planet atmospheric limb. In particular, published data in the visible suggest the existence of a Rayleigh scattering slope – making GJ 3470b a unique case among the known neptunes, while data obtained beyond 2 μm are consistent with a flat infrared spectrum. The unexplored near-infrared spectral region between 1 μm and 2 μm, is thus the key to understanding the atmospheric nature of GJ 3470b. Here, we report on the first space-borne spectrum of GJ 3470, obtained during one transit of the planet with the Wide Field Camera-3 (WFC3) on board the *Hubble Space Telescope* (*HST*), operated in stare mode. The spectrum covers the 1.1–1.7 μm region with a resolution of $\sim$ 300 ($\Delta\lambda \sim 4$ nm). We retrieve the transmission spectrum of GJ 3470b with a chromatic planet-to-star radius ratio precision of 0.09% (about half a scale height) per 40 nm bins. At this precision, the spectrum appears featureless, in good agreement with ground-based and *Spitzer* infrared data at longer wavelengths, pointing to a flat transmission spectrum from 1 μm to 5 μm. We present new simulations of possible theoretical transmission spectra for GJ 3470b, which allow us to show that the *HST*/WFC3 observations rule out cloudless hydrogen-rich atmospheres ($> 10\sigma$) as well as hydrogen-rich atmospheres with tholin haze ($> 5\sigma$). Adding our near-infrared measurements to the full set of previously published data from 0.3 μm to 5 μm, we find that a cloudy, hydrogen-rich atmosphere can explain the full transmission spectrum: the tentative Rayleigh slope in the visible and the flat near-infrared spectrum can be both reproduced if the water volume mixing ratio is lower at the terminator than predicted by equilibrium thermochemistry models.

Download/Website: `http://arxiv.org/abs/1405.1056`

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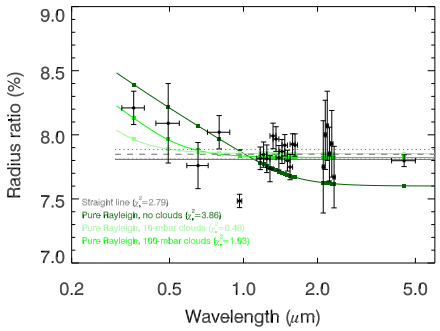

Figure 2: (Ehrenreich et al.) Simple transmission spectrum models can best reproduce the observed spectrum: straight-line (thick grey horizontal line) and pure-Rayleigh's (green curves) vs. all radius ratio measurements of GJ 3470b (black dots). The *HST*/WFC3 data presented in this work are comprised between 1 μm and 2 μm. Squares show the models value over the measurement band passes. The WFC3 broad-band radius ratio and its 1-σ uncertainty are represented by the dashed and dotted lines, respectively.

Formation, Habitability, and Detection of Extrasolar Moons

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Astrobiology, in press (arXiv:1408.6164)

The diversity and quantity of moons in the Solar System suggest a manifold population of natural satellites exist around extrasolar planets. Of peculiar interest from an astrobiological perspective, the number of sizable moons in the stellar habitable zones may outnumber planets in these circumstellar regions. With technological and theoretical methods now allowing for the detection of sub-Earth-sized extrasolar planets, the first detection of an extrasolar moon appears feasible. In this review, we summarize formation channels of massive exomoons that are potentially detectable with current or near-future instruments. We discuss the orbital effects that govern exomoon evolution, we present a framework to characterize an exomoon's stellar plus planetary illumination as well as its tidal heating, and we address the techniques that have been proposed to search for exomoons. Most notably, we show that natural satellites in the range of 0.1 - 0.5 Earth mass (i) are potentially habitable, (ii) can form within the circumplanetary debris and gas disk or via capture from a binary, and (iii) are detectable with current technology.

Download/Website: `http://online.liebertpub.com/doi/abs/10.1089/ast.2014.1147`

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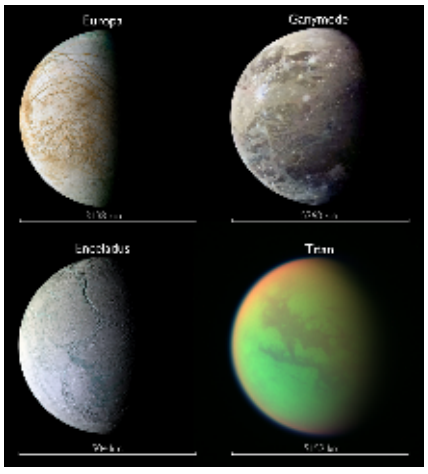

Figure 3: (Heller et al.) Europa, Enceladus, Ganymede, and Titan are regarded as potentially habitable moons in the Solar System. Global lineaments on Europa's surface and ridges on Enceladus indicate liquid water as close as a few kilometers below their frozen surfaces. Ganymede's surface is much older, with two predominant terrains: bright, grooved areas and older, heavily cratered, dark regions. Titan has a dense nitrogen atmosphere and liquid methane/ethane seas on its surface. While the atmosphere is intransparent to the human eye, the lower right image contains information taken in the infrared. Note the different scales! Moon diameters are indicated below each satellite. (Image credits: NASA/JPL/Space Science Institute/Ted Stryk) (Color images available online at www.liebertonline.com/ast)

Predicting a third planet in the Kepler-47 circumbinary system

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The Astrophysical Journal, submitted

We have explored the possibility of a third circumbinary planet having a dynamically stable orbit in the Kepler-47 system and producing the single, unexplained transit event (not associated with either the binary star or the two known circumbinary planets) reported in the discovery paper (Orosz et al. 2012). We applied the dynamical mapping MEGNO technique to identify regions in the phase space of the system where this third planet can maintain stable, quasi-periodic orbits. The long-term, Lagrangian stability of the entire 5-body configuration (eclipsing binary + three planets) is confirmed by direct numerical integrations for 10 Myr. We identified several long-term stable regions between the two confirmed planets, and also an extended region beyond the orbit of the outer planet Kepler-47c. To further constrain the orbit of the hypothetical third planet, we compared the synthetic single transit duration it produces from the ensemble of stable orbits to the measured duration of the unexplained transit event (~ 4.15 hours). Due to the rich dynamics of the system, different stable orbits of such a hypothetical, third circumbinary planet can produce similar single-transit durations. To remove this degeneracy, we fixed the planet's orbit as circular and use the observed duration of the unexplained transit to analytically place an upper limit of 424 days for the planetary period. Our analysis strongly suggests that, if the yet unexplained single transit event is indeed due to a planetary object, then the most probable orbit for this undetected planet will be between Kepler-47b and Kepler-47c – a region characterized by low-order mean motion resonances. We present our methodology in details, and discuss the implication of our results.

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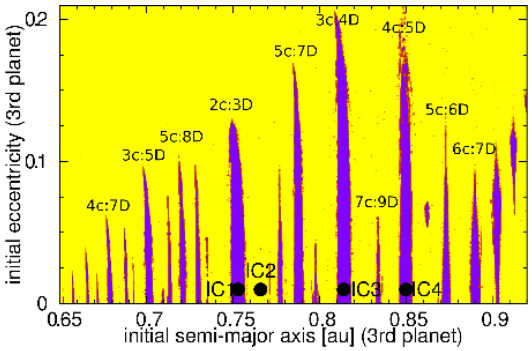

Figure 4: (Hinse et al.) Dynamical MEGNO map of a third planet (D) initially started between Kepler-47b and Kepler-47c. Initial orbits colored in blue correspond to a quasi-periodic time evolution of the third planet. Yellow regions correspond to chaotic dynamics. Mean motion resonances between the third planet and Kepler-47c are labelled accordingly. Four initial conditions (IC1 through IC4) each with initial eccentricity of 0.01 were tested for long-term stability. Single-orbit integration of IC1, IC3 and IC4 maintained quasi-periodic, stable bounded orbits over a time period of 10 million years. IC2 exhibits a random walk in the eccentricity and semi-major axis of the third planet. For the quasi-periodic orbit IC1 we considered various masses of the third planet and found stable bounded orbits for planet masses up to 50 Mearth.

Secular orbital evolution of planetary systems and the dearth of close-in planets around fast rotations

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Monthly Notices of the Royal Astronomical Society, published (2014MNRAS.443.1451L)

Recent analyses of Kepler space telescope data reveal that transiting planets with orbital periods shorter than $2-3$ days are generally observed around late-type stars with rotation periods longer than $\sim 5-10$ days. We investigate different explanations for this phenomenon and favor an interpretation based on secular perturbations in multi-planet systems on non-resonant orbits. In those systems, the orbital eccentricity of the innermost planet can reach values close to unity through a process of chaotic diffusion of its orbital elements in the phase space. When the eccentricity of the innermost orbit becomes so high that the periastron gets closer than ~ 0.05 AU, tides shrink and circularize the orbit producing a close-in planet on a timescale $\lesssim 50$ Myr. The probability of high eccentricity excitation and subsequent circularization is estimated and is found to increase with the age of the system. Thus, we are able to explain the observed statistical correlation between stellar rotation and minimum orbital period of the innermost planet by using the stellar rotation period as a proxy of its age through gyrochronology. Moreover, our model is consistent with the $entire$ observed distributions of the rotation and orbital periods $P_{\rm orb}$ for $3 \lesssim P_{\rm orb} \lesssim 15$ days.

Download/Website: `http://arxiv.org/abs/1405.7245`

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Two-fluid dust and gas mixtures in smoothed particle hydrodynamics: a semi-implicit approach

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Monthly Notices of the Royal Astronomical Society, published (2014MNRAS.443..927L)

A method to avoid the explicit time integration of small dust grains in the two-fluid gas/dust smoothed particle hydrodynamics (SPH) approach is proposed. By assuming a very simple exponential decay model for the relative velocity between the gas and dust components, all the effective characteristics of the drag force can be reproduced. A series of tests has been performed to compare the accuracy of the method with analytical and explicit integration results. We find that the method performs well on a wide range of tests, and can provide large speed-ups over explicit integration when the dust stopping time is small. We have also found that the method is much less dissipative than conventional explicit or implicit two-fluid SPH approaches when modelling dusty shocks.

Download/Website: `http://mnras.oxfordjournals.org/content/443/1/927.abstract`

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Radial velocity confirmation of Kepler-91 b. Additional evidence of its planetary nature using the Calar Alto/CAFE instrument

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Astronomy & Astrophysics Letters, published (2014A&A...568L...1L)

The object transiting the star Kepler-91 was recently assessed as being of planetary nature. The confirmation was achieved by analysing the light-curve modulations observed in the *Kepler* data. However, quasi-simultaneous studies claimed a self-luminous nature for this object, thus rejecting it as a planet. In this work, we apply an independent approach to confirm the planetary mass of Kepler-91b by using multi-epoch high-resolution spectroscopy obtained with the Calar Alto Fiber-fed Echelle spectrograph (CAFE). We obtain the physical and orbital parameters with the radial velocity technique. In particular, we derive a value of $1.09 \pm 0.20\,M_{\rm Jup}$ for the mass of Kepler-91b, in excellent agreement with our previous estimate that was based on the orbital brightness modulation.

Download/Website: `http://adsabs.harvard.edu/abs/2014A%26A...568L...1L`

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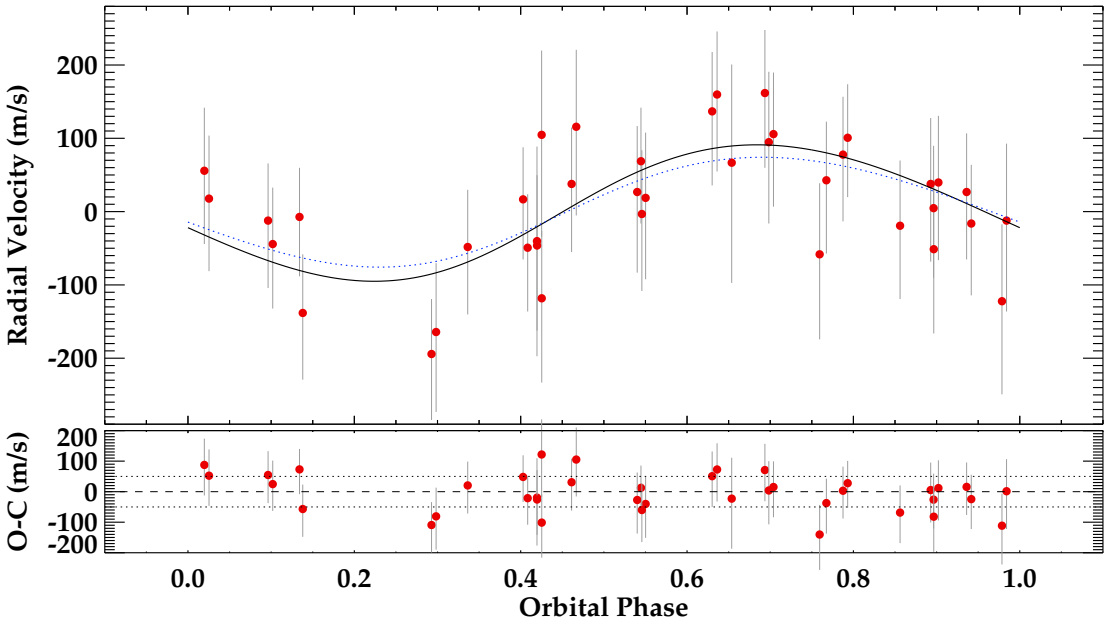

Figure 5: (Lillo-Box et al.) Radial velocity data (red circles). The solid black line shows the fit to the acquired radial velocity data by assuming the period obtained by the *Kepler* team and the small eccentricity derived in Lillo-Box et al. (2014a) using the light-curve modulations (REB). The dotted line represents the independent curve obtained by using the parameters extracted from Lillo-Box et al. (2014a), using the REB modulations..

Rossiter-McLaughlin Observations of 55 Cnc e

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Astrophysical Journal Letters, published (arXiv:1408.2007)

We present Rossiter-McLaughlin observations of the transiting super-Earth 55 Cnc e collected during six transit events between January 2012 and November 2013 with HARPS and HARPS-N. We detect no radial-velocity signal above 35 cm s^{-1} (3σ) and confine the stellar $v \sin i_\star$ to 0.2 ± 0.5 km s^{-1}. The star appears to be a very slow rotator, producing a very low amplitude Rossiter-McLaughlin effect. Given such a low amplitude, the Rossiter-McLaughlin effect of 55 Cnc e is undetected in our data, and any spin–orbit angle of the system remains possible. We also performed Doppler tomography and reach a similar conclusion. Our results offer a glimpse of the capacity of future instrumentation to study low amplitude Rossiter-McLaughlin effects produced by super-Earths.

Download/Website: `http://adsabs.harvard.edu/abs/2014arXiv1408.2007L`

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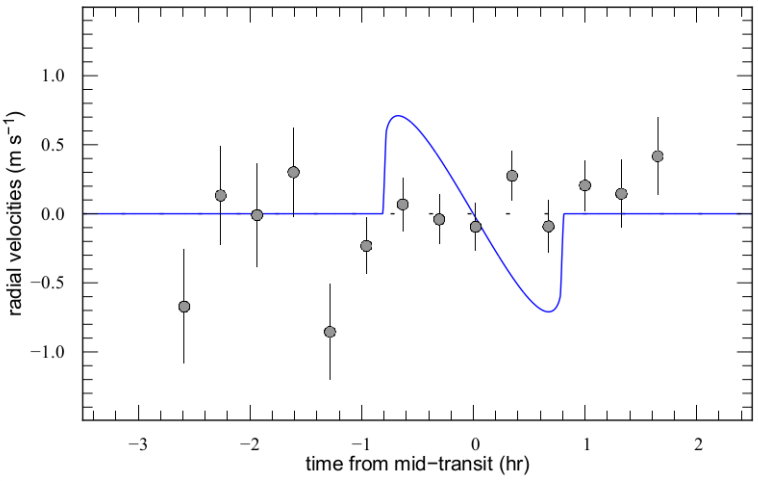

Figure 6: (López Morales et al.) Rossiter-McLaughlin observations binned in 14 equidistant points, and a model of the Rossiter-McLaughlin effect, for $v \sin i_\star = 2.4$ km s^{-1} and $\beta = 0°$.

Low EUV Luminosities Impinging on Protoplanetary Disks

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The Astrophysical Journal, in press (arXiv:1407.1574)

The amount of high-energy stellar radiation reaching the surface of protoplanetary disks is essential to determine their chemistry and physical evolution. Here, we use millimetric and centimetric radio data to constrain the EUV luminosity impinging on 14 disks around young ($\sim$2-10Myr) sun-like stars. For each object we identify the long-wavelength emission in excess to the dust thermal emission, attribute that to free-free disk emission, and thereby compute an upper limit to the EUV reaching the disk. We find upper limits lower than 10^{42} photons/s for all sources without jets and lower than 5×10^{40} photons/s for the three older sources in our sample. These latter values are low for EUV-driven photoevaporation alone to clear out protoplanetary material in the timescale inferred by observations. In addition, our EUV upper limits are too low to reproduce the [NeII] 12.81 micron luminosities from three disks with slow [NeII]-detected winds. This indicates that the [NeII] line in these sources primarily traces a mostly neutral wind where Ne is ionized by 1 keV X-ray photons, implying higher photoevaporative mass loss rates than those predicted by EUV-driven models alone. In summary, our results suggest that high-energy stellar photons other than EUV may dominate the dispersal of protoplanetary disks around sun-like stars.

Download/Website: `http://arxiv.org/abs/1407.1574`

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Disk Radii and Grain Sizes in *Herschel*-Resolved Debris Disks

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The Astrophysical Journal, published (2014ApJ...792...65P/arXiv:1407.4579)

The radii of debris disks and the sizes of their dust grains are important tracers of the planetesimal formation mechanisms and physical processes operating in these systems. Here we use a representative sample of 34 debris disks resolved in various *Herschel Space Observatory*[1] programs to constrain the disk radii and the size distribution of their dust. While we modeled disks with both warm and cold components, and identified warm inner disks around about two-thirds of the stars, we focus our analysis only on the cold outer disks, i.e. Kuiper-belt analogs. We derive the disk radii from the resolved images and find a large dispersion for host stars of any spectral class, but no significant trend with the stellar luminosity. This argues against ice lines as a dominant player in setting the debris disk sizes, since the ice line location varies with the luminosity of the central star. Fixing the disk radii to those inferred from the resolved images, we model the spectral energy distribution to determine the dust temperature and the grain size distribution for each target. While the dust temperature systematically increases towards earlier spectral types, the ratio of the dust temperature to the blackbody temperature at the disk radius decreases with the stellar luminosity. This is explained by a clear trend of typical sizes increasing towards more luminous stars.

[1] Herschel is an ESA space observatory with science instruments provided by European-led Principal Investigator consortia and with important participation from NASA.

The typical grain sizes are compared to the radiation pressure blowout limit $s_{\rm blow}$ that is proportional to the stellar luminosity-to-mass ratio and thus also increases towards earlier spectral classes. The grain sizes in the disks of G- to A-stars are inferred to be several times $s_{\rm blow}$ at all stellar luminosities, in agreement with collisional models of debris disks. The sizes, measured in the units of $s_{\rm blow}$, appear to decrease with the luminosity, which may be suggestive of the disk's stirring level increasing towards earlier-type stars. The dust opacity index β ranges between zero and two, and the size distribution index q varies between three and five for all the disks in the sample.

Download/Website: `http://adsabs.harvard.edu/abs/2014ApJ...792...65P`

Contact: `nicole.pawellek@uni-jena.de`

Discovery of a companion candidate in the HD169142 transition disk and the possibility of multiple planet formation

M. Reggiani[1], *S. P. Quanz*[1], *M. R. Meyer*[1], *L. Pueyo*[2], *O. Absil*[3], *A. Amara*[1], *G. Anglada*[4], *H. Avenhaus*[1], *J. H. Girard*[5], *C. Carrasco Gonzalez*[6], *J. Graham*[7], *D. Mawet*[5], *F. Meru*[1], *J. Milli*[5], *M. Osorio*[4], *S. Wolff*[2], *J. M. Torrelles*[8]

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Astrophysical Journal Letters, published (ApJ, 792, L23)

We present L' and J-band high-contrast observations of HD169142, obtained with the VLT/NACO AGPM vector vortex coronagraph and the Gemini Planet Imager, respectively. A source located at 0".156±0".032 north of the host star (PA=7.4°±11.3°) appears in the final reduced L' image. At the distance of the star (∼145 pc), this angular separation corresponds to a physical separation of 22.7±4.7 AU, locating the source within the recently resolved inner cavity of the transition disk. The source has a brightness of L'=12.2±0.5 mag, whereas it is not detected in the J band (J >13.8 mag). If its L' brightness arose solely from the photosphere of a companion and given the $J-L'$ color constraints, it would correspond to a 28-32 $M_{Jupiter}$ object at the age of the star, according to the COND models. Ongoing accretion activity of the star suggests, however, that gas is left in the inner disk cavity from which the companion could also be accreting. In this case the object could be lower in mass and its luminosity enhanced by the accretion process and by a circumplanetary disk. A lower mass object is more consistent with the observed cavity width. Finally, the observations enable us to place an upper limit on the L'-band flux of a second companion candidate orbiting in the disk annular gap at ∼50 AU, as suggested by millimeter observations. If the second companion is also confirmed, HD169142 might be forming a planetary system, with at least two companions opening gaps and possibly interacting with each other.

Download/Website: `http://iopscience.iop.org/2041-8205/792/1/L23/`

Contact: `reggiani@phys.ethz.ch`

Stellar Activity Masquerading as Planets in the Habitable Zone of the M dwarf Gliese 581

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[3] The Penn State Astrobiology Research Center, The Pennsylvania State University
[4] McDonald Observatory, The University of Texas at Austin

Science, in press (eprint arXiv:1407.1049)

The M dwarf Gliese 581 is believed to host four planets, including one (GJ 581d) near the habitable zone that could possibly support liquid water on its surface if it is a rocky planet. The detection of another habitable-zone planet–GJ 581g–is disputed, as its significance depends on the eccentricity assumed for d. Analyzing stellar activity using the Hα line, we measure a stellar rotation period of 130 ± 2 days and a correlation for Hα modulation with radial velocity. Correcting for activity greatly diminishes the signal of GJ 581d (to 1.5σ), while significantly boosting the signals of the other known super-Earth planets. GJ 581d does not exist, but is an artifact of stellar activity which, when incompletely corrected, causes the false detection of planet g.

Download/Website: `http://www.sciencemag.org/content/early/2014/07/02/science.1253253`

Contact: `pmr19@psu.edu`

HAZMAT I: The Evolution of Far-UV and Near-UV Emission from Early M Stars

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[2] Department of Planetary Sciences and Lunar and Planetary Laboratory University of Arizona, Tucson AZ, 85721, USA

The Astronomical Journal, in press (arXiv:1407.1344)

The spectral energy distribution, variability and evolution of the high-energy radiation from an M dwarf planet host is crucial in understanding the planet's atmospheric evolution and habitability and in interpreting the planet's spectrum. The star's extreme-UV (EUV), far-UV (FUV) and near-UV (NUV) emission can chemically modify, ionize, and erode the atmosphere over time. This makes determining the lifetime exposure of such planets to stellar UV radiation critical for both the evolution of a planet's atmosphere and our potential to characterize it. Using the early M star members of nearby young moving groups (YMGs), which sample critical ages in planet formation and evolution, we measure the galex NUV and FUV flux as a function of age. The median UV flux remains at a "saturated" level for a few hundred million years, analogous to that observed for X-ray emission. By the age of the Hyades Cluster (650 Myr), we measure a drop in UV flux by a factor of 2–3 followed by a steep drop from old (several Gyrs) field stars. This decline in activity beyond 300 Myr follows roughly t^{-1}. Despite this clear evolution, there remains a wide range of 1–2 orders of magnitude in observed emission levels at every age. These UV data supply the much-needed constraints to M dwarf upper-atmosphere models, which will provide empirically-motivated EUV predictions and more accurate age-dependent UV spectra as inputs to planetary photochemical models.

Download/Website: `http://arxiv.org/abs/1407.1344`

Contact: `shkolnik@lowell.edu`

ALMA HINTS AT THE PRESENCE OF TWO COMPANIONS IN THE DISK AROUND HD 100546

Catherine Walsh[1], Attila Juhász[1], Paola Pinilla[1], Daniel Harsono[1,2], Geoffrey S. Mathews[1,3], William R. F. Dent[4,5], Michiel R. Hogerheijde[1], T. Birnstiel[6], Gwendolyn Meeus[7], Hideko Nomura[8], Yuri Aikawa[9], T. J. Millar[10], Göran Sandell[11]

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Astrophysical Journal Letters, published (2014ApJ...791L...6W)

HD 100546 is a well-studied Herbig Be star-disk system that likely hosts a close-in companion with compelling observational evidence for an embedded protoplanet at 68 AU. We present ALMA observations of the HD 100546 disk which resolve the gas and dust structure at (sub)mm wavelengths. The CO emission (at 345.795 GHz) originates from an extensive molecular disk (390±20 AU in radius) whereas the continuum emission is more compact (230±20 AU in radius) suggesting radial drift of the mm-sized grains. The CO emission is similar in extent to scattered light images indicating well-mixed gas and μm-sized grains in the disk atmosphere. Assuming azimuthal symmetry, a single-component power-law model cannot reproduce the continuum visibilities. The visibilities and images are better reproduced by a double-component model: a compact ring with a width of 21 AU centered at 26 AU and an outer ring with a width of 75±3 AU centered at 190±3 AU. The influence of a companion and protoplanet on the dust evolution is investigated. The companion at 10 AU facilitates the accumulation of mm-sized grains within a compact ring, $\approx$ 20–30 AU, by $\approx$ 10 Myr. The injection of a protoplanet at 1 Myr hastens the ring formation ($\approx$ 1.2 Myr) and also triggers the development of an outer ring ($\approx$ 100–200 AU). These observations provide additional evidence for the presence of a close-in companion and hint at dynamical clearing by a protoplanet in the outer disk.

Download/Website: `http://adsabs.harvard.edu/abs/2014ApJ...791L...6W`

Contact: `cwalsh@strw.leidenuniv.nl`

A laser-lock concept to reach cm/s-precision in Doppler experiments with Fabry-Pérot wavelength calibrators

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Astronomy & Astrophysics, in press (arXiv:1408.6111)

State-of-the-art Doppler experiments require wavelength calibration with precision at the $\mathrm{cm\,s^{-1}}$ level. A low-finesse Fabry-Pérot interferometer (FPI) can provide a wavelength comb with a very large bandwidth as required for astronomical experiments, but unavoidable spectral drifts are difficult to control. Instead of actively controlling the FPI cavity, we propose to passively stabilize the interferometer and track the time-dependent cavity length drift externally using the ^{87}Rb D_2 atomic line. A dual-finesse cavity allows drift tracking during observation. In the low-finesse spectral range, the cavity provides a comb transmission spectrum tailored to the astronomical spectrograph. The drift of the cavity length is monitored in the high-finesse range relative to an external standard: a single narrow

transmission peak is locked to an external cavity diode laser and compared to an atomic frequency from a Doppler-free transition. Following standard locking schemes, tracking at sub-mm s^{-1} precision can be achieved. This is several orders of magnitude better than currently planned high-precision Doppler experiments, and it allows freedom for relaxed designs including the use of a single-finesse interferometer under certain conditions. All components for the proposed setup are readily available, rendering this approach particularly interesting for upcoming Doppler experiments. We also show that the large number of interference modes used in an astronomical FPI allows us to unambiguously identify the interference mode of each FPI transmission peak defining its *absolute* wavelength solution. The accuracy reached in each resonance with the laser concept is then defined by the cavity length that is determined from the one locked peak and by the group velocity dispersion. The latter can vary by several 100 m s^{-1} over the relevant frequency range and severely limits the accuracy of individual peak locations, although their interference modes are known. A potential way to determine the absolute peak positions is to externally measure the frequency of each individual peak with a laser frequency comb (LFC). Thus, the concept of laser-locked FPIs may be useful for applying the absolute accuracy of an LFC to astronomical spectrographs without the need for an LFC at the observatory.

Download/Website: `http://arxiv.org/abs/1408.6111`

Contact: `Ansgar.Reiners@phys.uni-goettingen.de`

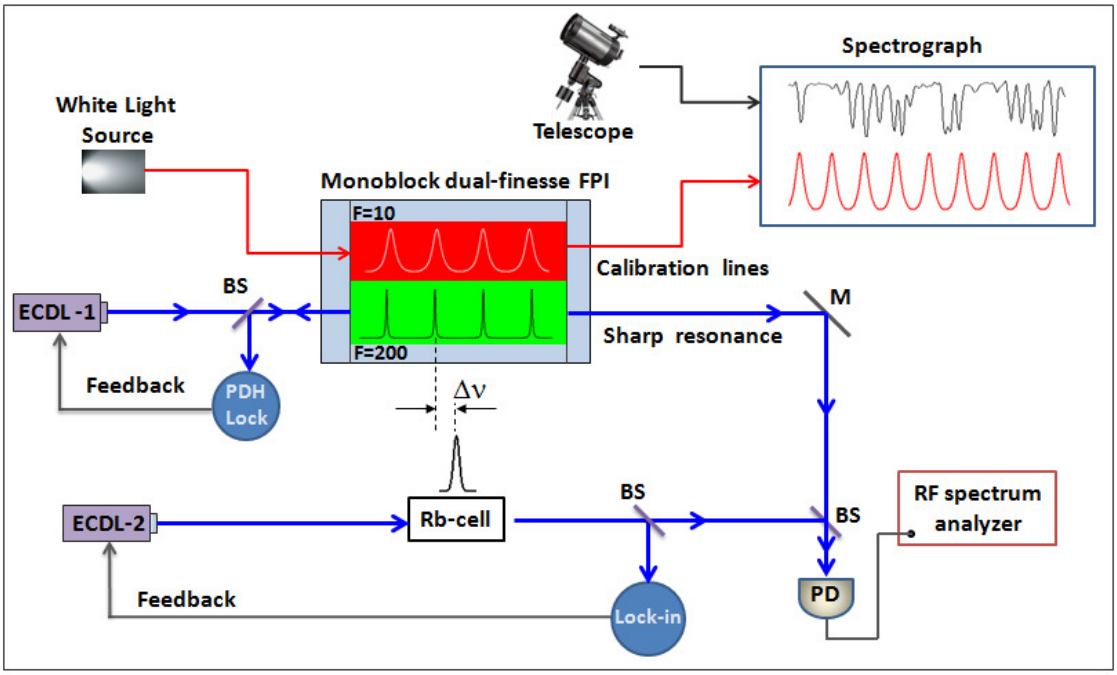

Figure 7: (Reiners et al.) Proposed laser-lock system for tracking the cavity. A white light continuum source illuminates the low-finesse Channel-1 interferometer (red block) to produce calibration lines for an Echelle spectrograph. The high-finesse Channel-2 (green block) provides an external reference for locking the frequency of the diode laser ECDL-1 to the FPI cavity. Both channels can share the same optical path if wavelength-selective coatings are used.

3 Non-refereed papers

Star-planet interactions

A. F. Lanza
INAF-Osservatorio Astrofisico di Catania, Via S. Sofia, 78 – 95123 Catania, Italy

Invited review at the 18th Cambridge Worshop on Cool Stars, Stellar Systems, and the Sun, Proc. of Lowell Obs., edited by G. van Belle and H. Harris, in press (arXiv:1408.6049)

Stars interact with their planets through gravitation, radiation, and magnetic fields. I shall focus on the interactions between late-type stars with an outer convection zone and close-in planets, i.e., with an orbital semimajor axis smaller than approximately 0.15 AU. I shall review the roles of tides and magnetic fields considering some key observations and discussing theoretical scenarios for their interpretation with an emphasis on open questions.

Download/Website: `http://arxiv.org/abs/1408.6049`
`or http://www2.lowell.edu/workshops/coolstars18/proceedings.html`

Contact: `nuccio.lanza@oact.inaf.it`

4 Jobs and Positions

2015 NASA Sagan Fellowship Program

Dr. Dawn M. Gelino
NASA Exoplanet Science Institute

Applications Due: Nov. 6, 2014, 4 pm PDT,

The NASA Exoplanet Science Institute announces the 2015 Sagan Postdoctoral Fellowship Program and solicits applications for fellowships to begin in the Fall of 2015.

The Sagan Fellowships support outstanding recent postdoctoral scientists to conduct independent research that is broadly related to the science goals of the NASA Exoplanet Exploration area. The primary goal of missions within this program is to discover and characterize planetary systems and Earth-like planets around nearby stars.

The proposed research may be theoretical, observational, or instrumental. This program is open to applicants of any nationality who have earned (or will have earned) their doctoral degrees on or after January 1, 2012, in astronomy, physics, or related disciplines. The fellowships are tenable at U.S. host institutions of the fellows' choice, subject to a maximum of one new fellow per host institution per year. The duration of the fellowship is up to three years: an initial one-year appointment and two annual renewals contingent on satisfactory performance and availability of NASA funds.

The Announcement of Opportunity, which includes detailed program policies and application instructions, is available at the web site: http://nexsci.caltech.edu/sagan/fellowship.shtml

Applicants must follow the instructions given in this Announcement. Applications must be submitted electronically through the above website. Inquiries about the Sagan Fellowships may be directed to saganfellowship@ipac.caltech.edu

The deadline for both applications and letters of reference is Thursday, November 6, 2014. Offers will be made before February 1, 2015 and new appointments are expected to begin on or about September 1, 2015.

Download/Website: `http://nexsci.caltech.edu/sagan/fellowship.shtml`

Contact: `saganfellowship@ipac.caltech.edu`

5 Conference announcements

UK Extrasolar Planets Meeting

D. Pollacco

Department of Physics, University of Warwick, Gibbet Hill Road, Coventry CV4 7AL, UK

University of Warwick, 30th March – 1st April, 2015

This is a preliminary announcement that the next (i.e. Second) UK Extrasolar Planets Community Meeting will be held from 30th March – 1st April 2015 at the University of Warwick. Check this newsletter for further announcements over the coming months.

Contact: `d.pollacco@warwick.ac.uk`

PLATO 2.0 Science Conference

Heike Rauer, Isabella Pagano (on behalf of the SOC)

[1] Institute for Planetary Research, DLR Berlin, Germany
[2] INAF-Catania Astrophysical Observatory, Italy

Taormina, Italy, 3–5 December 2014

PLATO 2.0, the third medium class mission in the ESA Cosmic Vision 2015-2025 program, is a survey project with the prime goals to detect planets down to Earth size and characterize the bulk planet parameters for a large sample of planets with orbital distances up to the habitable zone of solar-like stars.

With the launch scheduled in 2024, PLATO 2.0 will build on the foundations provided by CoRoT, Kepler and the forthcoming TESS and CHEOPS missions.

The goal of the conference is to bring together experts of the exoplanet and stellar physic communities already involved or willing to collaborate to the preparation of the mission to share ideas and expertise and to highlight the potential contribution of PLATO 2.0 to the (exo-)planetology in the next decades.

Taormina is a small town on the east coast of Sicily. The closest airport is the Catania (CTA) one. A web page dedicated to the conference is in preparation. Registration will be open on September 22. Stay tuned.

Download/Website: `http://www.plato-mission.eu`

Contact: `Heike.Rauer@dlr.de, Isabella.Pagano@inaf.it`

AGU Fall Meeting, Session ID 2026: Persistence of Earth Habitability

Toby Tyrrell[1]*, Jim Kasting*[2]
[1] University of Southampton, UK
[2] Pennsylvania State University, USA

San Francisco, 15th – 19th December 2014

The continuous presence of life (requiring liquid water) on Earth for about 3 billion years is made more surprising by: (1) the 25% increase in incoming radiation over that time ('Faint Young Sun'), (2) the potential volatility of atmospheric CO2 (residence time ¡0.001 billion years), and (3) the example from Mars that climate can be initially conducive to liquid water without needing to remain so. We invite data, models, and arguments which shed light on this question of why Earth remained continuously habitable, without interruption, over such an immensity of geological time. Contributions are welcome on mechanistic explanations (thermostats) suggesting that Earth was destined from the outset to remain habitable. Alternatively, contributions are also welcome that feature chance and observer selection effects, perhaps building on the emerging exoplanets information from Kepler. Other relevant perspectives include long-term climate data, and information on the ease or difficulty of eradicating all life.

Download/Website: `http://fallmeeting.agu.org/2014/scientific-program/`

Contact: `jfk4@psu.edu`

Science Discussion Meeting: A high resolution spectrograph proposal for the Isaac Newton Telescope

Didier Queloz [1]*, Isabelle Baraffe* [2] *(Conference co-Chairs)*
[1] University of Cambridge, Cavendish Laboratory, Cambridge, UK
[2] University of Exeter, Astrophysics Group, Exeter, UK

Royal Astronomical Society, London, 6 October 2014

We will be holding an afternoon (2pm start) meeting on **6th October 2014** to present and discuss the prospects of a new high resolution spectrograph installed on the Isaac Newton Telescope. This meeting is in light of the recent call for new instrument ideas (http://www.ing.iac.es/about-ING/int2014.html) put forward by the ING group in La Palma.

We are proposing to build and install a HARPS-like spectrograph for our study entitled "Terra Hunting Experiment". During this 10 year experiment we propose to share every night with open-time observations.

We welcome discussion and support from the community for this project. We hope to provide a mode of operation that is not currently available in the astronomical community that is the provision of a unique facility that will enable programmes requiring nightly data over long time periods. We are interested to hear from those who would be interested in this provision and to learn about other science cases other than our own.

Registration: There is no charge for this event. Please email Samantha Thompson (sjt20@cam.ac.uk) to be added to the participants list. If you wish to make a short presentation (up to a maximum duration of 15 minutes) to present a science case please indicate this in the email and include a title/short description and estimated length of talk. **Registration closes on 25th September** or when the venue capacity is reached (100 persons).

Meeting details: 14:00–17:00 hrs, 6th October 2014 at Burlington House, Piccadilly, London, W1J 0BQ. There will be a tea/coffee break provided in this meeting. The list of participants and agenda for the meeting will be posted on the website a week before the meeting date; selected speakers will be notified by email separately.

Organising committee: Didier Queloz (Cambridge), Isabelle Baraffe (Exeter), Samantha Thompson (Cambridge)

Download/Website:
http://www.mrao.cam.ac.uk/research/exoplanets/meetings/theint-science-discussion-meeting-6th-october-2014-ras-london/

Contact: sjt20@cam.ac.uk

6 Announcements

Fizeau exchange visitors program in optical interferometry - call for applications

European Interferometry Initiative

www.european-interferometry.eu, application deadline: 15th September 2014

The Fizeau exchange visitors program in optical interferometry funds (travel and accommodation) visits of researchers to an institute of his/her choice (within the European Community) to perform collaborative work and training on one of the active topics of the European Interferometry Initiative. The visits will typically last for one month, and strengthen the network of astronomers engaged in technical, scientific and training work on optical/infrared interferometry. The program is open for all levels of astronomers (Ph.D. students to tenured staff), non-EU based missions will only be funded if considered essential by the Fizeau Committee. Applicants are strongly encouraged to seek also partial support from their home or host institutions.

The deadline for applications is 15th September 2014 for visits starting in November 2014.

Further informations and application forms can be found at: www.european-interferometry.eu
The program is funded by OPTICON/FP7.

Looking forward to your applications,
Josef Hron & Laszlo Mosoni
(for the European Interferometry Initiative)

Download/Website: http://www.european-interferometry.eu

Contact: fizeau@european-interferometry.eu

2015A NASA Keck Call for General Observing Proposals

Dr. Dawn M. Gelino
NASA Exoplanet Science Institute

Proposals Due: September 18, 2014, 4 pm PDT

NASA is soliciting proposals for the use of the two 10m W. M. Keck Telescopes for the 2015A observing semester (February-July 2015). Complete call information is available on the website below and all proposals are due by **18 September 2014 at 4 pm PDT**.

The opportunity to propose as Principal Investigators for NASA time on the Keck Telescopes is open to all U.S.-based astronomers (a U.S.-based astronomer has his/her principal affiliation at a U.S. institution). *Investigators*

from institutions outside of the U.S. may participate as Co-Investigators.

NASA intends the use of the Keck telescopes to be highly strategic in support of on-going space missions and/or high priority, long term science goals. NASA Keck time is open to a wide range of disciplines and proposals are sought in the following 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 in any of the previous four areas.

The proposal process is being handled by the NASA Exoplanet Science Institute (NExScI) at Caltech.

Highlights for 2015A

Planetary Science and New Horizons/Pluto Monitoring Observations

General Proposals for the Use of Keck to Observe Kepler Targets

Data taken with ALL instruments are now included in the Keck Observatory Archive

Mission support letters must be requested from NASA HQ at least two weeks before submission deadline (i.e. by Sept. 4)

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 July and August 2014. If you see any that we missed, please let us know and we'll include them in the next issue.

July

astro-ph/1407.0181 : **Impact of micro-telluric lines on precise radial velocities and its correction** by *D. Cunha, et al.*

astro-ph/1407.0251 : **The GAPS programme with HARPS-N@TNG IV: A planetary system around XO-2S** by *S. Desidera, et al.*

astro-ph/1407.0495 : **Asymmetric evolution of magnetic reconnection in collisionless accretion disk** by *Keisuke Shirakawa, Masahiro Hoshino*

astro-ph/1407.0590 : **Astrometric planet search around M8–L2 dwarfs from the ground and with Gaia** by *J. Sahlmann, et al.*

astro-ph/1407.0617 : **Archival Legacy Investigations of Circumstellar Environments: Overview and First Results** by *Élodie Choquet, et al.*

astro-ph/1407.0700 : **The disk around the brown dwarf KPNO Tau 3** by *Hannah Broekhoven-Fiene, et al.*

astro-ph/1407.0712 : **Precise radial velocities of giant stars VI. A possible 2:1 resonant planet pair around the K giant star η Cet** by *Trifon Trifonov, et al.*

astro-ph/1407.0853 : **The Detection of Earth-mass Planets around Active Stars: The Mass of Kepler-78b** by *Artie P. Hatzes*

astro-ph/1407.0860 : **Transits of Planets with Small Intervals in Circumbinary Systems** by *Hui-Gen Liu, et al.*

astro-ph/1407.1009 : **Hubble Space Telescope High Resolution Imaging of Kepler Small and Cool Exoplanet Host Stars** by *Ronald L. Gilliland, et al.*

astro-ph/1407.1044 : **Planets and Stellar Activity: Hide and Seek in the CoRoT-7 system** by *R. D. Haywood, et al.*

astro-ph/1407.1049 : **Stellar Activity Masquerading as Planets in the Habitable Zone of the M dwarf Gliese 581** by *Paul Robertson, et al.*

astro-ph/1407.1057 : **Revision of Earth-sized Kepler Planet Candidate Properties with High Resolution Imaging by Hubble Space Telescope** by *Kimberly M. Star, et al.*

astro-ph/1407.1115 : **A Terrestrial Planet in a ~ 1 AU Orbit Around One Member of a ~ 15 AU Binary** by *A. Gould, et al.*

astro-ph/1407.1280 : **An analytical model for the 0.33 - 7.85 micron transmission spectrum of HD189733b : Effect of stellar spots** by *Ahmed Daassou, et al.*

astro-ph/1407.1313 : **Constraints on the Atmospheric Circulation and Variability of the Eccentric Hot Jupiter XO-3b** by *Ian Wong, et al.*

astro-ph/1407.1433 : **Accretion and Evolution of 2.5 Earth-mass Planets with Voluminous H/He Envelopes** by *Peter Bodenheimer, Jack J. Lissauer*

astro-ph/1407.1848 : **Adaptive Optics Images III: 87 Kepler Objects of Interest** by *Courtney D. Dressing, et al.*

astro-ph/1407.2066 : **Impact of occultations of stellar active regions on transmission spectra: Can occultation of a plage mimic the signature of a blue sky?** by *M. Oshagh, et al.*

astro-ph/1407.2245 : **Changing Phases of Alien Worlds: Probing Atmospheres of Kepler Planets with High-Precision Photometry** by *Lisa J. Esteves, et al.*

astro-ph/1407.2249 : **The Dynamics of the Multi-planet System Orbiting Kepler-56** by *Gongjie Li, et al.*

astro-ph/1407.2361 : **BEER analysis of Kepler and CoRoT light curves: II. Evidence for emission phase shift due to superrotation in four Kepler hot Jupiters** by *Simchon Faigler, Tsevi Mazeh*

astro-ph/1407.2462 : **Water Vapor in the Spectrum of the Extrasolar Planet HD 189733b: 1. the Transit** by *P. R. McCullough, et al.*

astro-ph/1407.2495 : **Polarimetry with the Gemini Planet Imager: Methods, Performance at First Light, and the Circumstellar Ring around HR 4796A** by *Marshall D. Perrin, et al.*
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