ExoPlanet News
An Electronic Newsletter

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1 Editorial

Welcome to the sixty third edition of ExoPlanet News. Along with the usual selection of great abstracts, it's good to see an excellent selection of job adverts this month, as well as a couple of announcements for upcoming conferences early next year. Remember, we're also happy to publish abstracts of theses related to Exoplanet studies, so if you, or your students, have recently completed a PhD – please send in the abstract for inclusion in a future edition.

The next edition of the newsletter is planned for early November 2013, so please send anything relevant over the next few weeks 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
The Open University

2 Abstracts of refereed papers

STIS Coronagraphic Imaging of Fomalhaut: Main Belt Structure and the Orbit of Fomalhaut b

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The Astrophysical Journal, published (2013ApJ...775...56K)

We present new optical coronagraphic data of Fomalhaut obtained with the HST/STIS in 2010 and 2012. Fomalhaut b is recovered at both epochs to high significance. The observations include the discoveries of tenuous nebulosity beyond the main dust belt detected to at least 209 AU projected radius, and a $\sim$50 AU wide azimuthal gap in the belt northward of Fomalhaut b. The two epochs of STIS photometry exclude optical variability greater than 35%. A MCMC analysis demonstrates that the orbit of Fomalhaut b is highly eccentric, with $e = 0.8 \pm 0.1$, $a = 177 \pm 68$ AU, and $q = 32 \pm 24$ AU. Fomalhaut b is apsidally aligned with the belt and 90% of allowed orbits have mutual inclination $\leq 36^{\circ}$. Fomalhaut b's orbit is belt-crossing in the sky plane projection, but only 12% of possible orbits have ascending or descending nodes within a 25 AU wide belt annulus. The high eccentricity invokes a dynamical history where Fomalhaut b may have experienced a significant dynamical interaction with a hypothetical planet Fomalhaut c, and the current orbital configuration may be relatively short-lived. The Tisserand parameter with respect to a hypothetical Fomalhaut planet at 30 AU or 120 AU lies in the range 2-3, similar to highly eccentric dwarf planets in our solar system. We argue that Fomalhaut b's minimum mass is that of a dwarf planet in order for a circumplanetary satellite system to remain bound to a sufficient radius from the planet to be consistent with the dust scattered light hypothesis. In the coplanar case, Fomalhaut b will collide with the main belt around 2032, and the subsequent emergent phenomena may help determine its physical nature.

Download/Website: `http://iopscience.iop.org/0004-637X/775/1/56/article`
`http://www.youtube.com/watch?v=kD9t2vAo3uQ`

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ExoMol line lists II: The rovibrational spectrum of SiO

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Monthly Notices of the Royal Astronomical Society, published (2013MNRAS.434.1469B)

Accurate rotationalvibrational line lists are calculated for silicon monoxide. Line lists are presented for the main isotopologue, $^{28}Si^{16}O$, and four monosubsituted isotopologues ($^{29}Si^{16}O$, $^{30}Si^{16}O$, $^{28}Si^{18}O$ and $^{28}Si^{17}O$), in their ground electronic states. These line lists are suitable for high temperatures (up to 9000 K), including those relevant to exoplanetary atmospheres and cool stars. A combination of empirical and *ab initio* methods is used: the potential energy curves are determined to high accuracy by fitting to extensive data from the analysis of both laboratory and sunspot spectra; a high-quality *ab initio* dipole moment curve is calculated at the large basis set, multireference configuration interaction level. A partition function plus full line lists of rotationalvibrational transitions are made available in an electronic form as Supplementary Information to this article and at `www.exomol.com`.

Download/Website: `http://mnras.oxfordjournals.org/content/434/2/1469`

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Local Enhancement of Surface Density in the Protoplanetary Ring Surrounding HD 142527

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Publications of the Astronomical Society of Japan, in press (arXiv:1309.7400)

We report ALMA observations of dust continuum, ^{13}CO $J = 3$–2, and C^{18}O $J = 3$–2 line emission toward a gapped protoplanetary disk around HD 142527. The outer horseshoe-shaped disk shows the strong azimuthal asymmetry in dust continuum with the contrast of about 30 at 336 GHz between the northern peak and the southwestern minimum. In addition, the maximum brightness temperature of 24 K at its northern area is exceptionally high at 160 AU from a star. To evaluate the surface density in this region, the grain temperature needs to be constrained and was estimated from the optically thick ^{13}CO $J = 3$–2 emission. The lower limit of the peak surface density was then calculated to be 28 g cm^{-2} by assuming a canonical gas-to-dust mass ratio of 100. This finding implies that the region is locally too massive to withstand self-gravity since Toomre's $Q <\sim 1$–2, and thus, it may collapse into a gaseous protoplanet. Another possibility is that the gas mass is low enough to be gravitationally stable and only dust grains are accumulated. In this case, lower gas-to-dust ratio by at least 1 order of magnitude is required, implying possible formation of a rocky planetary core.

Download/Website: `http://arxiv.org/abs/1309.7400`

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Magnetic shielding of exomoons beyond the circumplanetary habitable edge

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Astrophysical Journal Letters, accepted (arXiv:1309.0811)

With most planets and planetary candidates detected in the stellar habitable zone (HZ) being super-Earths and gas giants, rather than Earth-like planets, we naturally wonder if their moons could be habitable. The first detection of such an exomoon has now become feasible, and due to observational biases it will be at least twice as massive as Mars. But formation models predict moons can hardly be as massive as Earth. Hence, a giant planet's magnetosphere could be the only possibility for such a moon to be shielded from cosmic and stellar high-energy radiation. Yet, the planetary radiation belt could also have detrimental effects on exomoon habitability. We here synthesize models for the evolution of the magnetic environment of giant planets with thresholds from the runaway greenhouse (RG) effect to assess the habitability of exomoons. For modest eccentricities, we find that satellites around Neptune-sized planets in the center of the HZ around K dwarf stars will either be in an RG state and not be habitable, or they will be in wide orbits where they will not be affected by the planetary magnetosphere. Saturn-like planets have stronger fields, and Jupiter-like planets could coat close-in habitable moons soon after formation. Moons at distances between about 5 and 20 planetary radii from a giant planet can be habitable from an illumination and tidal heating point of view, but still the planetary magnetosphere would critically influence their habitability.

Download/Website: `http://arxiv.org/abs/1309.0811`

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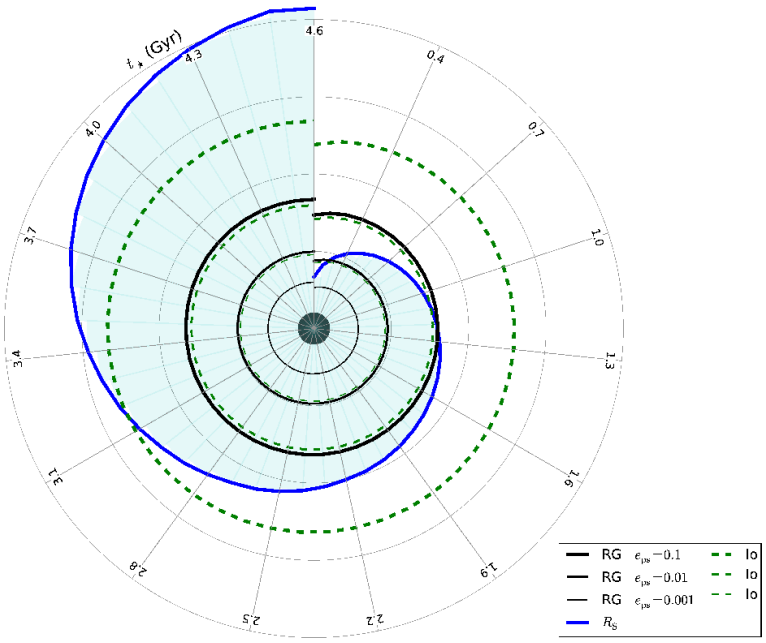

Figure 1: (Heller & Zuluaga) Evolution of the magnetic shielding R_S (blue curves) compared to the RG "habitable edges" (HEs) (solid black lines) and Io-like HEs (dashed green lines). Thick lines correspond to HEs for $e_{\rm ps} = 0.1$, intermediate thickness to $e_{\rm ps} = 0.01$, and thin circles to $e_{\rm ps} = 0.001$. Thin gray lines denote distances in intervals of 5 planetary radii. The filled circle in the center symbolizes the planetary radius of a Jupiter-like planet. Stellar age ($t_\star$) is denoted in units of Gyr along the snail, starting at 0.1 Gyr at "noon" and ending after 4.6 Gyr at "midnight". R_S, as well as the RG and Io HEs, are given in units of the planetary radius. For the HEs and the calculation of tidal heating, a Mars-sized moon is assumed, and the planet-moon binary orbits a K dwarf in the center of the stellar HZ.

Solar System Moons as Analogs for Compact Exoplanetary Systems

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The Astronomical Journal, in press (arXiv:1309.1467)

The field of exoplanetary science has experienced a recent surge of new systems that is largely due to the precision photometry provided by the Kepler mission. The latest discoveries have included compact planetary systems in which the orbits of the planets all lie relatively close to the host star, which presents interesting challenges in terms of formation and dynamical evolution. The compact exoplanetary systems are analogous to the moons orbiting the giant planets in our Solar System, in terms of their relative sizes and semi-major axes. We present a study that quantifies the scaled sizes and separations of the Solar System moons with respect to their hosts. We perform a similar study for a large sample of confirmed Kepler planets in multi-planet systems. We show that a comparison between the two samples leads to a similar correlation between their scaled sizes and separation distributions. The different gradients of the correlations may be indicative of differences in the formation and/or long-term dynamics of moon and planetary systems.

Download/Website: `http://adsabs.harvard.edu/abs/2013arXiv1309.1467K`

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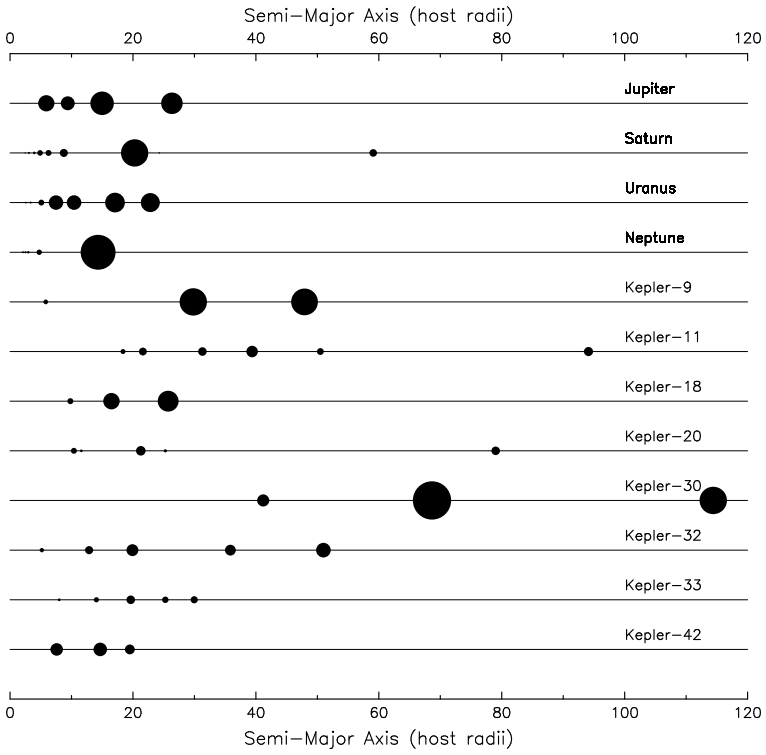

Figure 2: (Kane et al.) A visualization of the radii and semi-major axes of the Solar System moons and Kepler planets discussed in this paper. The radii are all scaled in units of the host, whether the host be a planet or a star. Similarly, the separations of the objects from their host are scaled in units of the host radii. In proportionality to the host, the largest moon is Triton and the largest planet is Kepler-30c.

Exoplanet Transit Variability: Bow Shocks and Winds Around HD 189733b

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Monthly Notices of the Royal Astronomical Society, in press (arXiv:1309.2938)

By analogy with the solar system, it is believed that stellar winds will form bow shocks around exoplanets. For hot Jupiters the bow shock will not form directly between the planet and the star, causing an asymmetric distribution of mass around the exoplanet and hence an asymmetric transit. As the planet orbits thorough varying wind conditions, the strength and geometry of its bow shock will change, thus producing transits of varying shape. We model this process using magnetic maps of HD 189733 taken one year apart, coupled with a 3D stellar wind model, to determine the local stellar wind conditions throughout the orbital path of the planet. We predict the time-varying geometry and density of the bow shock that forms around the magnetosphere of the planet and simulate transit light curves. Depending on the nature of the stellar magnetic field, and hence its wind, we find that both the transit duration and ingress time can vary when compared to optical light curves. We conclude that consecutive near-UV transit light curves may vary significantly and can therefore provide an insight into the structure and evolution of the stellar wind.

Download/Website: `http://arxiv.org/abs/1309.2938`

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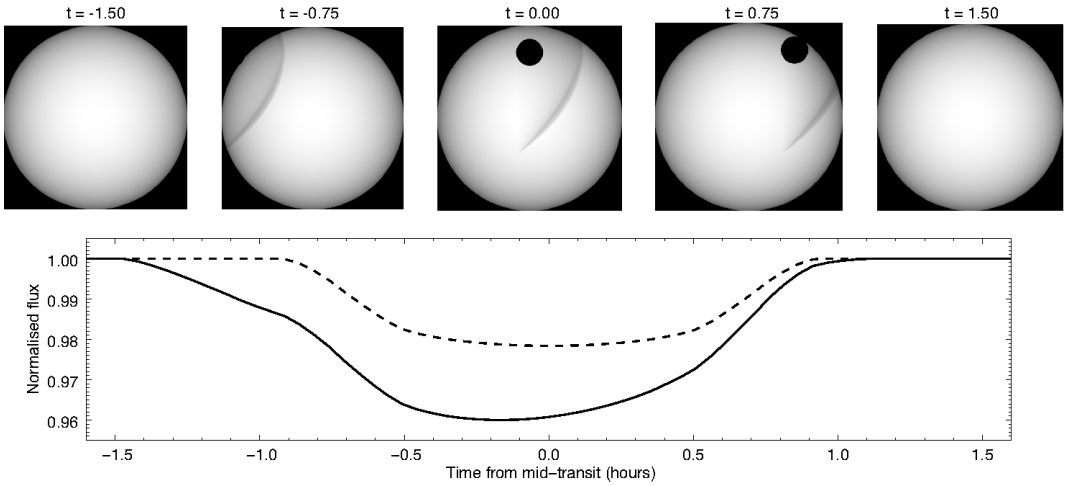

Figure 3: (llama et al.) A typical transit sequence of a planet and bow shock and resultant light curve for HD 189733 (top-row). The bottom graph shows the corresponding light curve (solid-line) with an optical transit (i.e. no bow shock detected) shown as a dashed line. The first image shows the limb-darkened stellar disc before either the planet or the bow shock begin occulting the stellar disc. Because HD 189733b is a hot Jupiter, the shock begins transiting over the stellar disc before the planet. In this scenario, the shock blocks star light before the planet and so the near-UV transit event begins before the optical transit. At mid-transit both the planet and bow shock are blocking star light, therefore the near-UV light curve has a deeper dip in flux than the optical light curve. Because the shock is transiting ahead of the planet, it leaves the stellar disc before the planet resulting in the near-UV transit ending simultaneously with the optical light curve. The final image shows the end of the transit, once both the planet and shock have left the stellar disc.

Constraints on a second planet in the WASP-3 system

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The Astronomical Journal, in press/arXiv:1309.6733

There have been previous hints that the transiting planet WASP-3 b is accompanied by a second planet in a nearby orbit, based on small deviations from strict periodicity of the observed transits. Here we present 17 precise radial velocity measurements and 32 transit light curves that were acquired between 2009 and 2011. These data were used to refine the parameters of the host star and transiting planet. This has resulted in reduced uncertainties for the radii and masses of the star and planet. The radial-velocity data and the transit times show no evidence for an additional planet in the system. Therefore, we have determined the upper limit on the mass of any hypothetical second planet, as a function of its orbital period.

Download/Website: `http://ttv.astri.umk.pl`

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Further evidence of the planetary nature of HD 95086 b from Gemini/NICI *H*-band data

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Astrophysical Journal Letters, published (2013ApJ...775L..40M)

We present our analysis of the Gemini/NICI *H*-band data of HD 95086, following the discovery of the planet HD 95086 b in *L'*. The *H*-band data reach a contrast of 12.7 mag relative to the host star at 5σ levels in the location of HD 95086 b, and no point source is found. Our non-detection and $H - L'$ color limit rules out the possibility that

the object is a foreground L/T dwarf and that, if it is bound to HD95086, it is a genuine planetary mass object. We estimate a new pre-main-sequence isochronal age for HD 95086 of 17±4 Myr, which is commensurate with previous mean age estimates for the Lower Cen-Crux subgroup. Adopting an age of 17 Myr, the color limit is inconsistent with the COND model, marginally consistent with the BT-SETTL model, and consistent with the DUSTY model.

Download/Website: `http://arxiv.org/abs/1309.0543`

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On the frequency of planetary systems around G-dwarfs

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Monthly Notices of the Royal Astronomical Society, in press (arXiv: 1308.6279)

We determine the fraction of G-dwarf stars that could host stable planetary systems based on the observed properties of binaries in the Galactic field, and in various postulated primordial binary populations, which assume that the primordial binary fraction is higher than that in the field. We first consider the frequency of Solar System analogues – planetary systems that form either around a single G-dwarf star, or a binary containing a G-dwarf where the binary separation exceeds 100–300 au. If the primordial binary fraction and period distribution is similar to that in the field, then up to 63 per cent of G-dwarf systems could potentially host a Solar System analogue. However, if the primordial binary fraction is higher, the fraction of G-dwarf systems that could host a planetary system like our own is lowered to 38 per cent.

We extend our analysis to consider the fraction of G-dwarf systems (both single and binary) that can host either circumprimary planets (orbiting the primary star of the binary) or circumbinary planets (orbiting both stars in the binary) for fiducial planetary separations between 1 – 100 au. Depending on the assumed binary population, in the circumprimary case between 65 and 95 per cent of systems can host a planet at 1 au, decreasing to between 20 and 65 per cent of systems that can host a planet at 100 au. In the circumbinary case, between 5 and 59 per cent of systems can host a planet at 1 au, increasing to between 34 and 75 per cent of systems that can host a planet at 100 au.

Our results suggest that the assumed binary fraction is the key parameter in determining the fraction of potentially stable planetary systems in G-dwarf systems and that using the present-day value may lead to significant overestimates if the binary fraction was initially higher.

Download/Website: `http://arxiv.org/abs/1308.6279`

Contact: `rparker@phys.ethz.ch`

HST hot Jupiter transmission spectral survey: evidence for aerosols and lack of TiO in the atmosphere of WASP-12b

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Monthly Notices of the Royal Astronomical Society, in press (arXiv-1309.5261)

We present *Hubble Space Telescope* (*HST*) optical transmission spectra of the transiting hot Jupiter WASP-12b, taken with the Space Telescope Imaging Spectrograph (STIS) instrument. The resulting spectra cover the range 2900 to 10300 Å which we combined with archival WFC3 spectra and *Spitzer* photometry to cover the full optical to infrared wavelength regions. With high spatial resolution, we are able to resolve WASP-12A's stellar companion in both our images and spectra, revealing that the companion is in fact a close binary M0V pair, with the three stars forming a triple-star configuration. We derive refined physical parameters of the WASP-12 system, including the orbital ephemeris, finding the exoplanet's density is ∼20% lower than previously estimated.
From the transmission spectra, we are able to decisively rule out prominent absorption by TiO in the exoplanet's atmosphere, as there are no signs of the molecule's characteristic broad features nor individual bandheads. Strong pressure-broadened Na and K absorption signatures are also excluded, as are significant metal-hydride features. We compare our combined broadband spectrum to a wide variety of existing aerosol-free atmospheric models, though none are satisfactory fits. However, we do find that the full transmission spectrum can be described by models which include significant opacity from aerosols: including Rayleigh scattering, Mie scattering, tholin haze, and settling dust profiles. The transmission spectrum follows an effective extinction cross section with a power-law of index α, with the slope of the transmission spectrum constraining the quantity $\alpha T = -3528 \pm 660$ K, where T is the atmospheric temperature. Rayleigh scattering ($\alpha = -4$) is among the best fitting models, though requires low terminator temperatures near 900 K. Sub-micron size aerosol particles can provide equally good fits to the entire transmission spectrum for a wide range of temperatures, and we explore corundum as a plausible dust aerosol. The presence of atmospheric aerosols also helps to explain the modestly bright albedo implied by *Spitzer* observations, as well as the near black body nature of the emission spectrum. Ti-bearing condensates on the cooler night-side is the most natural explanation for the overall lack of TiO signatures in WASP-12b, indicating the day/night cold-trap is an important effect for very hot Jupiters. These finding indicate that aerosols can play a significant atmospheric role for the entire wide range of hot-Jupiter atmospheres, potentially affecting their overall spectrum and energy balance.

Download/Website: `http://arxiv.org/abs/1309.5261`

Contact: `sing@astro.ex.ac.uk`

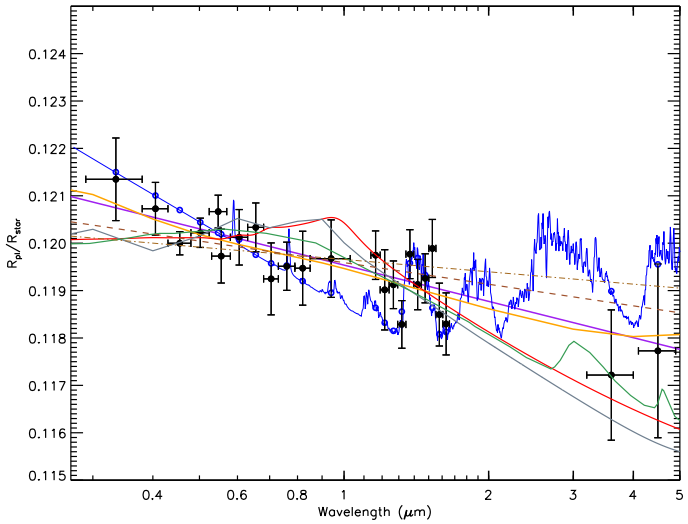

Figure 4: (Sing et al.) Plotted is the broadband HST transmission spectral data of WASP-12b compared to 6 different aerosol models including: Rayleigh scattering (purple), Mie scattering Al_2O_3 (orange), Settling dust $\beta = -3$ (brown dashed), Mie scattering Fe_2O_3 (red), Mie Scattering $CaTiO_3$ (gray), Settling Dust $\beta = -0$ (light brown dot-dashed), a partly cloudy model with enhanced Rayleigh scattering Fortney-noTiO_EnhancedRayleigh (blue), and Titan tholin (green).

Below One Earth: The Detection, Formation, and Properties of Subterrestrial Worlds

E. Sinukoff, B. Fulton, L. Scuderi, E. Gaidos
Institute for Astronomy, University of Hawai'i at Mānoa, Honolulu, HI 96822

Space Science Reviews, in press (arXiv:1308.6308)

The Solar System includes two planets — Mercury and Mars — significantly less massive than Earth, and all evidence indicates that planets of similar size orbit many stars. In fact, one of the first exoplanets to be discovered is a lunar-mass planet around a millisecond pulsar. Novel classes of exoplanets have inspired new ideas about planet formation and evolution, and these "sub-Earths" should be no exception: they include planets with masses between Mars and Venus for which there are no Solar System analogs. Advances in astronomical instrumentation and recent space missions have opened the sub-Earth frontier for exploration: the *Kepler* mission has discovered dozens of confirmed or candidate sub-Earths transiting their host stars. It can detect Mars-size planets around its smallest stellar targets, as well as exomoons of comparable size. Although the application of the Doppler method is currently limited by instrument stability, future spectrographs may detect equivalent planets orbiting close to nearby bright stars. Future space-based microlensing missions should be able to probe the sub-Earth population on much wider orbits. A census of sub-Earths will complete the reconnaissance of the exoplanet mass spectrum and test predictions of planet formation models, including whether low-mass M dwarf stars preferentially host the smallest planets. The properties of sub-Earths may reflect their low gravity, diverse origins, and environment, but they will be elusive: Observations of eclipsing systems by the *James Webb* Space Telescope may give us our first clues to the properties of these small worlds.

Download/Website: `http://arxiv.org/pdf/1308.6308v1.pdf`

Contact: `sinukoff@ifa.hawaii.edu`

Viscoelastic Tidal Dissipation in Giant Planets and Formation of Hot Jupiters Through High-Eccentricity Migration

Natalia Storch, Dong Lai
Department of Astronomy, Cornell University, Ithaca, NY 14853, USA

Monthly Notices of the Royal Astronomical Society, submitted (arXiv:1308.4968)

We study the possibility of tidal dissipation in the solid cores of giant planets and its implication for the formation of hot Jupiters through high-eccentricity migration. We present a general framework by which the tidal evolution of planetary systems can be computed for any form of tidal dissipation, characterized by the imaginary part of the complex tidal Love number, $\mathrm{Im}[\tilde{k}_2(\omega)]$, as a function of the forcing frequency ω. Using the simplest viscoelastic dissipation model (the Maxwell model) for the rocky core and including the effect of nondissipative fluid envelope, we show that with reasonable (but uncertain) physical parameters for the core (size, viscosity and shear modulus), tidal dissipation in the core can accomodate the tidal-Q constraint of the Solar System gas giants and at the same time allows exoplanetary hot Jupiters to form via tidal circularization in the high-e migration scenario. By contrast, the often-used weak friction theory of equilibrium tide would lead to a discrepancy between the Solar System constraint and the amount of dissipation necessary for high-e migration. We also show that tidal heating in the rocky core can lead to modest radius inflation of the planets, particularly when the planets are in the high-eccentricity phase ($e \sim 0.6$) during their high-e migration. Finally, as an interesting by-product of our study, we note that for a generic tidal response function $\mathrm{Im}[\tilde{k}_2(\omega)]$, it is possible that spin-orbit pseudosynchronization (at a given e) can be achieved for multiple spin frequencies.

Download/Website: `http://arxiv.org/abs/1308.4968`

Contact: `dong@astro.cornell.edu`

Towards the Minimum Inner Edge Distance of the Habitable Zone

A. Zsom, S. Seager, J. de Wit, V. Stamenković

Department of Earth, Atmospheric and Planetary Sciences, Massachusetts Institute of Technology, Cambridge, MA 02139, USA

The Astrophysical Journal, accepted for publication (arXiv:1304.3714)

We explore the minimum distance from a host star where an exoplanet could potentially be habitable in order not to discard close-in rocky exoplanets for follow-up observations. We find that the inner edge of the Habitable Zone for hot desert worlds can be as close as 0.38 AU around a solar-like star, if the greenhouse effect is reduced ($\sim$ 1% relative humidity) and the surface albedo is increased. We consider a wide range of atmospheric and planetary parameters such as the mixing ratios of greenhouse gases (water vapor and CO_2), surface albedo, pressure and gravity. Intermediate surface pressure ($\sim$1-10 bars) is necessary to limit water loss and to simultaneously sustain an active water cycle. We additionally find that the water loss timescale is influenced by the atmospheric CO_2 level, because it indirectly influences the stratospheric water mixing ratio. If the CO_2 mixing ratio of dry planets at the inner edge is smaller than 10^{-4}, the water loss timescale is $\sim$1 billion years, which is considered here too short for life to evolve. We also show that the expected transmission spectra of hot desert worlds are similar to an Earth-like planet. Therefore, an instrument designed to identify biosignature gases in an Earth-like atmosphere can also identify similarly abundant gases in the atmospheres of dry planets. Our inner edge limit is closer to the host star than previous estimates. As a consequence, the occurrence rate of potentially habitable planets is larger than previously thought.

Download/Website: `http://arxiv.org/abs/1304.3714`

Contact: `zsom@mit.edu`

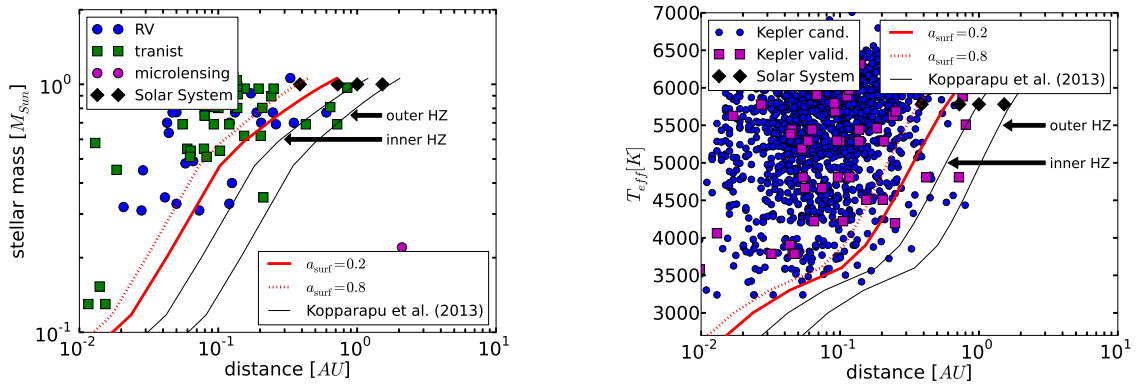

Figure 5: (Zsom et al.) *Left:* The semi-major axes of confirmed/validated super-Earth planets ($m \sin i$ less than 10 $M_\oplus$, and/or a radius less than 2.5 $R_\oplus$) as a function of their host stars' mass. The inner edge of the Habitable Zone for hot desert worlds assuming a surface albedo of 0.2 (solid red line) and 0.8 (dotted red line) are also shown. Exoplanets discovered by various detection methods are included in the figure, as well as the Earth-centric Habitable Zone limits of Kopparapu (2013), and the positions of the four rocky Solar System planets. *Right:* The semi-major axes of confirmed/validated and candidate Kepler super-Earth planets as a function of the host stars' effective temperatures. The number of potentially habitable exoplanets increases by a factor of 2-3 compared to previous estimates. However, follow-up observations aimed to characterize super-Earth atmospheres are necessary to determine whether these exoplanets are really habitable.

3 Jobs and Positions

2014 NASA Sagan Fellowship Program

Dr. Dawn M. Gelino, NASA Exoplanet Science Institute

US host institutions, Applications Due: Nov. 7, 2013, 4 pm PDT

The NASA Exoplanet Science Institute announces the 2014 Sagan Postdoctoral Fellowship Program and solicits applications for fellowships to begin in the Fall of 2014.

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, 2011, 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 7, 2013. Offers will be made before February 1, 2014 and new appointments are expected to begin on or about September 1, 2014.

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

Contact: `saganfellowship@ipac.caltech.edu`

Research Scientist Positions at ELSI, Tokyo Institute of Technology

Shigeru Ida
Earth-Life Science Institute, Tokyo Institute of Technology, Japan

ELSI, Tokyo Institute of Technology, January 1, 2014 or earliest possible date thereafter

The Earth-Life Science Institute (ELSI) at the Tokyo Institute of Technology (http://www.elsi.jp/en/) is now providing opportunities for ELSI Research Scientist positions. ELSI aims to answer the fundamental questions of how the Earth was formed, how life originated in the environment of early Earth, and how this life evolved into complexity. ELSI will pursue these questions by studying the "origin and evolution of life" and the "origin and evolution of the Earth" through an interdisciplinary collaboration between the fields of Earth, Life, and Planetary Sciences. By understanding the early Earth context that allowed for the rise of initial life, we will also contribute to a greater understanding of the likelihood of extraterrestrial life in our solar and extrasolar systems.

ELSI is a young and innovative institute (launched Dec. 2012) with a vision to become a world-leading interdisciplinary research hub for Origins of Earth and Life studies. In order to succeed in this mission, ELSI seeks to assemble a team of talented, highly motivated individuals from around the world who wish to pursue original research and also actively engage in cross-disciplinary discussions and synergistic research projects. ELSI as a young institute will provide a unique opportunity for those who wish to play a contributing role in the direction and development of an exciting new research institute.
ELSI will provide the environment and assistance necessary to support this endeavor. The ELSI Research Scientist positions provide highly flexible connections to ELSI Principal Investigators or research groups. A research fund of at least JPY 0.5 million/year up to JPY 1.0 million/year will be available to each scholar.
Tokyo is one of the most exciting and vibrant cities in the world. ELSI is situated in the Meguro Ward of Tokyo, with convenient and quick train access to all major city centers and attractions. ELSI has experienced staff who are dedicated to providing full relocation assistance to ease the transition to Japan, including help with immigration procedures, housing, health care, and all other basic needs.
We welcome all qualified candidates, regardless of nationality or gender. We encourage and support our candidates' close collaborations with overseas research institutes. Our institutional language is English; Japanese language skills are not required.

1) Research Fields: Scientific fields related to research themes pursued at ELSI include but are not limited to: **Formation of the Earth**, Early Earth environment and evolution, Deep Earth properties and dynamics, Solar system exploration, **Formation and characterization of exoplanets**, Abiotic chemical evolution, Origin of Life, Early biological evolution, Bacterial ecology, Metagenomics, High performance computing, Bioinformatics
2) Requirements: ELSI Research Fellows must hold a Ph.D. degree from an accredited institution in a relevant field at the time of appointment.
3) Number of Openings: **Up to 20 positions** are offered in the present recruitment.
4) Place of Work: Earth-Life Science Institute, Tokyo Institute of Technology, 2-12-1-IE-1 Ookayama, Meguro-ku, Tokyo 152-8550, Japan
5) Starting Date: January 1, 2014 or earliest possible date thereafter, preferably no later than September 2014. Please discuss with us if this schedule poses potential problems.
6) Period of Employment: Three years, with a possible extension to five based on performance.
7) Salary and Benefits: Salary: JPY 4,800,000 to JPY 7,000,000 per year depending on experience, including social insurance, taxes, and all allowances (commuting, housing, etc.).
8) Bonus and retirement allowances are not provided. The following social insurance is covered:
- Medical and dental insurance called "Ministry of Education, Culture, Sports, Science and Technology Mutual Society of Health Insurance" ("Monbukagakusho Kyousai Kumiai" in Japanese.)
- Employment Insurance ("Koyou Hoken")
- Worker's Accident Compensation Insurance ("Rosai Hoken")
9) Application Procedure: see http://www.elsi.jp/en/recruitment/research-scientist-positions-2013/
10) Deadline for Application: **Applications will be accepted until the positions are filled.**

Download/Website: `http://www.elsi.jp/en/recruitment/research-scientist-positions-2013/`

Contact: `recruitment@elsi.jp`

Exoplanet Postdoctoral Scholar Position

Dr. David R. Ciardi
NASA Exoplanet Science Institute, Caltech, Pasadena, CA, 91125 USA

NExScI/Caltech, Position Available Immediately

The NASA Exoplanet Science Institute (NExScI) at Caltech invites applications for a research position in the area of extrasolar planet detection and high contrast imaging. The research involves Kepler planetary candidates and the use of near-infrared adaptive optics imaging and optical speckle high resolution imaging to validate the planetary nature of the candidates and the stellar multiplicity of the Kepler candidate sample.

Dr. David Ciardi will serve as postdoctoral advisor to the selected candidate. The successful candidate will lead the adaptive optics and speckle observing program and will work with existing high spatial resolution adaptive optics and speckle imaging data obtained at the Keck, Palomar, Lick, WIYN, and Gemini Observatories. The successful candidate will lead the validation of Kepler planetary candidates with the high resolution imaging, and will be encouraged to pursue their own scientific program related to the Kepler planetary candidates, and stellar multiplicity and variability. The appointee will work within the exoplanet group at the NExScI, and will be guided by the NExScI advisor to ensure that the research work will result in publications in the open literature.

Applicants should have a Ph.D. in physics, astronomy, or a closely related field; at least two years of post-graduate experience is highly desired. The appointment is contingent upon evidence of completion of Ph.D. Experience with high spatial resolution imaging observing is highly desired. Excellent written, verbal, and personal skills are essential to this position. Postdoctoral scholar positions are awarded initially for a two-year period, and may be renewed for a third year.

Interested individuals should send a CV, bibliography, statement of research interests, and a list of three people who may be contacted for letters of reference to Ms. Mary Ellen Barba (meb@ipac.caltech.edu) by 09 December 2013.

Caltech is an Equal Opportunity/Affirmative Action employer. Women, minorities, veterans and disabled persons are encouraged to apply.

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

Contact: `ciardi@ipac.caltech.edu`

Research Associate in Experimental Astrophysics on Exoplanets

Prof Didier Queloz
University of Cambridge, UK

Cavendish Lab, Cambridge University, 1 December 2013

The Astrophysics Group of the Department of Physics, University of Cambridge, invites applications for a postdoctoral research associate to work on astronomical instrumentation related to exoplanet research. The Astrophysics Group conducts a broad programme of astrophysics research involving instrumentation, observation, and theory and modelling. Most relevant for this application, the group is involved in a new optical instrumentation programme with emphasis on high-resolution spectrometry for the ESO E-ELT and a stable fibre-fed spectrograph for the Issac Newton Telescope.
The candidate must be experienced in instrument development. A good background in optics is expected. The post holder will take responsibilities in the building and the management of new instrumentation programs and will actively participate in a wide research program on exoplanets.

The exoplanet research is a new activity at the Cavendish. It is led by Professor Didier Queloz who recently joined Cambridge University. The group at the Cavendish is involved in different observational programs on the theme of the detection and characterisation of planets. Other programs related to exoplanet research are being carried out at the Institute of Astronomy and at the Department of Applied Mathematics and Theoretical Physics. Opportunities of collaboration with these programs will be encouraged. The post holder will interact with our technology team as well as with the research team, including postdocs and PhD students.
Applicants should have a PhD in experimental astronomy or physics, or other scientific discipline. He/she should have a proven track record in the implementation of astronomical instruments and a solid background in optics.
The funds for this post are available for 2 years in the first instance.

Download/Website: `http://www.jobs.cam.ac.uk/job/2075/`

Contact: `Mrs Karen Scrivener karen@mrao.cam.ac.uk`

Two Postdoctoral Positions in Exoplanet Atmospheres

David K. Sing
[1] Astrophysics Group, School of Physics, University of Exeter, Stocker Road, Exeter, EX4 4QL

University of Exeter, Applications Due: November 30, 2013

The astrophysics group at the University of Exeter invites applications for 2 postdoc positions to work primarily with Dr. David Sing on observational and theoretical aspects of transiting exoplanets. The two posts are funded by a European Research Council grant, with both positions funded until November 2018 ($\sim$5 years each). The post is subject to a 12-month probationary period.

The post-docs will work on a program performing an atmospheric survey of hot Jupiter extrasolar planets, with one postdoc focused primarily on reduction and analysis of the space and ground based observations, while the other focuses on atmospheric modeling and interpretation. The overall aims are to compare the atmospheric properties, probe the diversities between possible sub-classes, and investigate the effects of clouds and hazes. Prior experience observing transiting exoplanets or modeling atmospheres (1D or 3D) is preferred.

The position is for up to five years, tenable contingent upon satisfactory performance during the first year. The prospective applicants must have a PhD in (Astro)physics, Astronomy, or an equivalent degree. The starting salary will range from 24,766 on Grade E to 32,267 per annum on Grade F, depending on qualifications and experience. Extensive supercomputing resources and substantial funding for computing equipment and travel will be available.

For further information please contact David Sing (sing@astro.ex.ac.uk). Applications should email a CV, publication list as well as a brief description of their research interests as well as contact details of 3 referees. Applications received by 30 Nov. 2013 will receive full consideration.

Download/Website: `https://jobs.exeter.ac.uk/hrpr_webrecruitment/wrd/run/ETREC107GF.open?VACANCY_ID=6271818g9g&WVID=3817591jNg&LANG=USA`

Contact: `sing@astro.ex.ac.uk`

PhD scholarships in Solar System Science at the Max Planck Institute for Solar System Research in Göttingen, Germany

S. Schuh, IMPRS Scientific Coordinator

Max-Planck-Institut für Sonnensystemforschung, Max-Planck-Straße 2, 37191 Katlenburg-Lindau, Germany (currently)/
Max-Planck-Institut für Sonnensystemforschung, Justus-von-Liebig-Weg 3, 37077 Göttingen, Germany (from early 2014)
in collaboration with Georg-August-University of Göttingen, Germany

Location: Göttingen, Date: Review of applications begins on 15 November 2013 for starting dates in 2014

The Solar System School invites applications for PhD scholarships in Solar System Science.
The International Max Planck Research School for Solar System Science at the University of Göttingen (”Solar System School”) offers a research-oriented doctoral program covering the physical aspects of Solar system science. It is jointly run by the Max Planck Institute for Solar System Research (MPS) and the University of Göttingen. Research at the MPS covers three main research areas: ”Sun and heliosphere”, ”Stellar and Solar Interiors” and ”Planets and Comets”. Solar System School students collaborate with leading scientists in these fields and graduates are awarded a doctoral degree from the renowned University of Göttingen or, if they choose, another university.
The Solar System School is open to students from all countries and offers an international three-year PhD program in an exceptional research environment with state-of-the-art facilities on the Göttingen Research Campus. Successful applicants receive an attractive scholarship covering relocation support, housing and living expenses and are exempt from tuition fees. The language of the structured graduate program is English, with complimentary German language courses offered (optional). The program includes an inspiring curriculum of scientific lectures and seminars as well as advanced training workshops and provides travel funds to attend international conferences.
Applicants to the Solar System School should have a keen interest in Solar system science and a record of academic excellence. They must have, or must be about to obtain, an M.Sc. degree or equivalent in physics or a related field, including a written Masters thesis (or a scientific publication), and must document a good command of the English language.
Review of applications for a starting date of September 2014 will begin on 15 November 2013, but other starting times are also negotiable. Scholarships are awarded on a competitive basis. The Solar System School is committed to increase the diversity of its student body and particularly encourages applications from members of underrepresented groups.

Applications should be prepared following the instructions at `http://www.solar-system-school.de`.

Download/Website: `http://www.solar-system-school.de`

Contact: `info@solar-system-school.de`

Multidisciplinary PhD in planet formation

Prof. Michael Meyer

ETH Zürich, Start date early/mid 2014

The Institute for Astronomy (D-PHYS) and the Institute of Geophysics (D-ERDW) at ETH Zurich invite applications for a new PhD position which will test planet formation theory from an astronomical, cosmochemical, and geophysical perspective.
The young Solar System is believed to have been enriched in certain radioactive isotopes that could only be produced by the supernova explosion of a massive star, and the internal energy from the decay of these isotopes has been shown to influence the subsequent formation and evolution of planets. You will use state-of-the-art computer models to determine the typical yield of radioactive isotopes in star forming environments, and the influence of these isotopes for forming planets. The results of this project will be used to assess how common planetary systems like our own may be, which has profound implications for the frequency of life in the Universe.
We are looking for a student with a strong background in physics, and in particular astrophysics and/or geophysics. Experience of computer programming is highly desirable, but not a prerequisite.
Salaries for PhD students start at CHF 52 500. You will have the opportunity to study experimental and theoretical aspects of astronomy and geophysics through formal coursework, conducting research with local experts in star and planet formation and geophysics, as well as our international network of collaborators, and utilize state-of-the-art facilities.
The Institute for Astronomy and the Institute of Geophysics maintain a range of high performance computing options, including stand-alone machines, large clusters, and the resources of the Swiss National Supercomputing Center (CSCS). Members of both institutes also play a leading role in the interdisciplinary PLANET-Z initiative linking research groups at ETH Zurich in astronomy, earth sciences, and computational astrophysics at the University of Zurich.
Applications are invited from all nationalities and should consist of a CV, description of relevant research experience, academic transcripts, scores from relevant standardized tests (e.g. TOEFL, Physics GRE) a personal statement of interests and goals, and the names of three references that can be contacted if necessary.
The ETH Zurich provides benefits for maternity leave, retirement, accident insurance, and relocation costs, see also http://www.pa.ethz.ch/
Materials should be sent electronically in a single pdf file to eth-astro-star-planet@phys.ethz.ch before December 1st 2013. Review of applications will begin immediately.

Download/Website: `http://www.astro.ethz.ch/jobs/sepecific_pd_positions/Open_PhD_positions`

Contact: `eth-astro-star-planet@phys.ethz.ch`

4 Conference announcements

The Search for Life Beyond the Solar System: Exoplanets, Biosignatures & Instruments

Paul Gabor[1], *Dániel Apai*[2]

[1] Vatican Observatory Research Group, Dpt of Astronomy, University of Arizona, Tucson AZ 85721-0065
[2] Department of Astronomy and Department of Planetary Sciences, University of Arizona, Tucson AZ 85721-0065

Tucson, Arizona, **March 17-21, 2014**

Second Announcement

Motivated by the rapidly increasing number of known earth-sized planets, the increasing range of extreme conditions in which life on Earth can persist, and the progress toward a technology that will ultimate enable the search for life on exoplanets, the Vatican Observatory and the Steward Observatory announce a major conference entitled Exoplanets, Observations & Biosignatures: The Search for Life Beyond the Solar System.

The goal of the meeting is to help the international astronomical community toward the long-term goal of finding life beyond the solar system by bringing together the communities working on the observations and modeling of extrasolar planets, the development of exoplanet-focused instrumentation, biosignatures suitable for remote sensing, and the limits of life on Earth.

The sessions of the five-day meeting will include invited review and contributed talks, followed by extended discussions. There will be posters, but no parallel sessions. We will limit the number of attendees to 250 to allow interactions between the participants. The conference will include a banquet (Wednesday evening) and an afternoon break (Tuesday) and two evening slots for collaborative team meetings. The Friday morning session will include a coordinated discussion that will provide input for a conference summary.

The conference proceedings will be published as a special issue of the International Journal of Astrobiology (Cambridge University Press). Contributions will be available through the NASA ADS system.

Registration and Abstract Submission

Registration and abstract submission is open on the conference website *www.ebi2014.org*. Registration is available at a discounted rate until November 1st. For other important dates see the website.

INVITED SPEAKERS

John Baross (U Washington)
Natalia Batalha (NASA Ames)
Phil Hinz (U Arizona)
Markus Kasper (ESO)
Alain Léger (Orsay)
Heike Rauer (DLR)
Ignas Snellen (Leiden)
Steve Benner (FFAME)
Olivier Guyon (U Arizona, NAOJ)
Lisa Kaltenegger (MPIA, CfA)
Peter Lawson (NASA JPL)
Victoria Meadows (U Washington)
Sara Seager (MIT)
Jill Tarter (SETI)

SCIENTIFIC ORGANIZING COMMITTEE

Chairs: Daniel Apai & Paul Gabor

Ariel Anbar (ASU)
John Baross (U Washington)
Malcolm Fridlund (ESA)
Thomas Henning (MPIA)
Phil Hinz (U Arizona)
Chris Impey (U Arizona)
Jim Kasting (Penn State)
Dante Minniti (P U Chile)
Mercedes López-Morales (CfA)
Peter R. Lawson (NASA JPL)
Jonathan Lunine (Cornell)
Daniel Rouan (Paris Obs.)
Wes Traub (NASA JPL)
Sara Seager (MIT)

LOCAL ORGANIZING COMMITTEE

Chairs: Daniel Apai & Paul Gabor

Nick Ballering (U Arizona)
Cathi Duncan (U Arizona)
Davin Flateau (U Arizona)
Kate Follette (U Arizona)
Juan Lora (U Arizona)
Benjamin Rackham (U Arizona)
Timothy Rodigas (U Arizona)
Andy Skemer (U Arizona)
Johanna Teske (U Arizona)
Donna Viola (U Arizona)
Ya-Lin Wu (U Arizona)

VENUE

The event will be in the new *El Conquistador Hilton Resort* close to Tucson, next to the scenic Catalina Mountains. Tucson has an international airport and can also be reached via the major airline hub in Phoenix, AZ. Tucson is a favorite tourist destination in the spring and hosts world-class golf courses, and offers excellent hiking, cycling, rock-climbing, canyoning, and other outdoor activities. Optional social programs will include visits to the Grand Canyon, the UA's Mirror Lab, the MMT and LBT telescopes, the Biosphere 2, and the Mt Lemmon Sky Center.

ASTROBIOLOGY SCHOOL

An independently organized 3-day astrobiology school will precede the conference. The school will provide an introduction to graduate students and postdoctoral researchers to the multiple disciplines and concepts the conference builds upon. The school will be held at the University of Arizona's unique Biosphere 2 facility and lectures will be given by some of the invited speakers and University of Arizona faculty. The school, including accommodation and food, will be free for 25 competitively selected participants of the EBI2014 conference. The Dean of the Astrobiology School is Dr Rory Barnes (University of Washington). Instructors of the school include Rory Barnes, John Baross, Olivier Guyon, and George Ricker.

LBT SCIENCE MEETING An independently organized LBT science meeting will follow the conference.

Download/Website: `http://www.ebi2014.org/`

Contact: `loc@ebi2014.org`

Exoplanet observations with the European Extremely Large Telescope

Didier Queloz[1], *Jason Spyromilio*[2]
[1] Cambridge & Geneva University
[2] ESO

ESO Garching, Germany, 3–6 February 2014

Exoplanet research is one of the major science drivers for the future 39-m European Extremely Large Telescope (E-ELT). The E-ELT project is organising a community workshop that will explore the science cases as well as selected and planned capabilities of the E-ELT in the field of exoplanets. The purpose of this workshop is to provide a forum to synthesize a vision of the goals to be achieved by the E-ELT in the field of exoplanets, considering on the one hand the planned capabilities of the E-ELT and its instrumentation, and on the other hand, the most relevant issues in exoplanet science of the next decade. Registration opens on 1 October 2013.

Download/Website: `http://www.eso.org/exoelt2014/`

Contact: `exoelt2014@eso.org`

5 As seen on astro-ph

The following list contains all the entries relating to exoplanets that we spotted on astro-ph during September 2013. If you see any that we missed, please let us know and we'll include them in the next issue.

astro-ph/1309.0009 : **Habitable Planets Around White Dwarfs: an Alternate Mission for the Kepler Spacecraft** by *Mukremin Kilic, et al.*

astro-ph/1309.0011 : **Warm Jupiters Need Close "Friends" for High-Eccentricity Migration – A Stringent Upper Limit on the Perturber's Separation** by *Subo Dong, Boaz Katz, Aristotle Socrates*

astro-ph/1309.0045 : **Non-radial Oscillations in Rotating Giant Planets with Solid Cores: Application to Saturn and its Rings** by *Jim Fuller, Dong Lai, Natalia I. Storch*

astro-ph/1309.0107 : **Nonlinear evolution of the tidal elliptical instability in gaseous planets and stars** by *Adrian J. Barker, Yoram Lithwick*

astro-ph/1309.0108 : **Nonlinear evolution of the elliptical instability in the presence of weak magnetic fields** by *Adrian J. Barker, Yoram Lithwick*

astro-ph/1309.0329 : **Astrometric detection of exoplanets from the ground** by *J. Sahlmann, et al.*

astro-ph/1309.0508 : **Characterising thermal sweeping: a rapid disc dispersal mechanism** by *James E. Owen, et al.*

astro-ph/1309.0543 : **Further Evidence of the Planetary Nature of HD 95086 b from Gemini/NICI H-band Data** by *T. Meshkat, et al.*

astro-ph/1309.0763 : **Habitable worlds with no signs of life** by *Charles S Cockell*

astro-ph/1309.0654 : **Maximizing Kepler science return per telemetered pixel: Searching the habitable zones of the brightest stars** by *Benjamin T. Montet, et al.*

astro-ph/1309.0811 : **Magnetic shielding of exomoons beyond the circumplanetary habitable edge** by *René Heller, Jorge I. Zuluaga*

astro-ph/1309.0813 : **A Deep Keck/NIRC2 Search for Thermal Emission from Planetary Companions Orbiting Fomalhaut** by *Thayne Currie, et al.*

astro-ph/1309.0823 : **Substellar Objects in Nearby Young Clusters VII: The substellar mass function revisited** by *Aleks Scholz et al.*

astro-ph/1309.0905 : **SOPHIE velocimetry of Kepler transit candidates IX. KOI-415 b: a long-period, eccentric transiting brown dwarf to an evolved Sun** by *C. Moutou, et al.*

astro-ph/1309.0918 : **New Uses for the Kepler Telescope: A Survey of the Ecliptic Plane For Transiting Planets and Star Formation** by *Charles Beichman, et al.*
astro-ph/1309.1025 : **The effects of disc warping on the inclination of planetary orbits** by *Caroline Terquem*
astro-ph/1309.1039 : **Imaging diagnostics for transitional discs** by *M. de Juan Ovelar, et al.*
astro-ph/1309.1078 : **Searching for Terrestrial Planets Orbiting in the Habitable Zone of Ultra-Cool Stars and Brown Dwarfs** by *Brice-Olivier Demory, et al.*
astro-ph/1309.1176 : **Kepler's Unparalleled Exploration of the Time Dimension** by *William Welsh, et al.*
astro-ph/1309.1177 : **A Habitable Zone Census via Transit Timing and the Imperative for Continuing to Observe the Kepler Field** by *Daniel C. Fabrycky, et al.*
astro-ph/1309.1247 : **Position angles and coplanarity of multiple systems from transit timing** by *Aviv Ofir*
astro-ph/1309.1457 : **Qatar-1: indications for possible transit timing variations** by *C. von Essen, et al.*
astro-ph/1309.1462 : **The Gemini NICI Planet-Finding Campaign: The Frequency of Planets around Young Moving Group Stars** by *Beth A. Biller, et al.*
astro-ph/1309.1466 : **Star - Planet - Debris Disk Alignment in the HD 82943 system: Is planetary system coplanarity actually the norm?** by *G. M. Kennedy, et al.*
astro-ph/1309.1467 : **Solar System Moons as Analogs for Compact Exoplanetary Systems** by *Stephen R. Kane, Natalie R. Hinkel, Sean N. Raymond*
astro-ph/1309.1499 : **Looking for Very Short-Period Planets with Re-Purposed Kepler** by *Brian Jackson*
astro-ph/1309.1520 : **Targeting Young Stars with Kepler: Planet Formation, Migration Mechanisms and the Early History of Planetary Systems** by *James P. Lloyd et al.*
astro-ph/1309.1624 : **Elliptical instability in hot Jupiter systems** by *David Cébron et al.*
astro-ph/1309.1675 : **A resolved debris disk around the candidate planet-hosting star HD95086** by *A. Moór, et al.*
astro-ph/1309.1998 : **New and updated stellar parameters for 90 transit hosts. The effect of the surface gravity** by *A. Mortier, et al.*
astro-ph/1309.2133 : **Probing the radial temperature structure of protoplanetary disks with Herschel/HIFI** by *D. Fedele et al.*
astro-ph/1309.2159 : **Rotation Periods, Variability Properties and Ages for Kepler Exoplanet Candidate Host Stars** by *Lucianne M. Walkowicz, Gibor S. Basri*
astro-ph/1309.2289 : **SMACK: A New Algorithm for Modeling Collisions and Dynamics of Planetesimals in Debris Disks** by *Erika R. Nesvold, et al.*
astro-ph/1309.2329 : **Transit Timing Variation of Near-Resonance Planetary Pairs. II. Confirmation of 30 planets in 15 Multiple Planet Systems** by *Ji-Wei Xie*
astro-ph/1309.2559 : **A Discovery of a Candidate Companion to a Transiting System KOI-94: A Direct Imaging Study for a Possibility of a False Positive** by *Yasuhiro H. Takahashi, et al.*
astro-ph/1309.2871 : **Global hydromagnetic simulations of a planet embedded in a dead zone: gap opening, gas accretion and formation of a protoplanetary jet** by *Oliver Gressel, et al.*
astro-ph/1309.2899 : **Mapping a star with transits: orbit precession effects in the Kepler-13 system** by *Gy. M. Szabó, A. E. Simon, L. L. Kiss*
astro-ph/1309.2938 : **Exoplanet Transit Variability: Bow Shocks and Winds Around HD 189733b** by *J Llama, et al.*
astro-ph/1309.3283 : **Hot Big Planets Kepler Survey: Measuring the Repopulation Rate of the Shortest-Period Planets** by *Stuart F. Taylor*
astro-ph/1309.3290 : **Planet formation in binaries: dynamics of planetesimals perturbed by the eccentric protoplanetary disk and the secondary** by *Kedron Silsbee, Roman R. Rafikov*
astro-ph/1309.3372 : **The Kappa Andromedae System: New Constraints on the Companion Mass, System Age & Further Multiplicity** by *Sasha Hinkley, et al.*
astro-ph/1309.3486 : **Structure, stability and evolution of 3D Rossby vortices in protoplanetary disks** by *Samuel Richard, Pierre Barge, Stephane Le Dizes*

astro-ph/1309.3881 : **Main-sequence progenitor configurations of the NN Ser candidate circumbinary planetary system are dynamically unstable** by *Alexander J Mustill, et al.*

astro-ph/1309.3967 : **Radiative forces on macroscopic porous bodies in protoplanetary disks: laboratory experiments** by *Christoph Duermann, Gerhard Wurm, Markus Kuepper*

astro-ph/1309.4679 : **Circumbinary Planet Formation in the Kepler-16 System. II. A Model for In-situ Planet Formation within a Debris Belt** by *Stefano Meschiari*

astro-ph/1309.4729 : **Astrobiology: An Astronomer's Perspective** by *Edwin A. Bergin*

astro-ph/1309.5261 : **HST hot Jupiter transmission spectral survey: evidence for aerosols and lack of TiO in the atmosphere of WASP-12b** by *D. K. Sing, et al.*

astro-ph/1309.5363 : **Dynamical Measurements of the Interior Structure of Exoplanets** by *Juliette C. Becker, Konstantin Batygin*

astro-ph/1309.5537 : **Perturbations to aquatic photosynthesis due to high-energy cosmic ray induced muon flux in the extragalactic shock model** by *Lien Rodriguez, Rolando Cardenas, Oscar Rodriguez*

astro-ph/1309.5956 : **Understanding Trends Associated with Clouds in Irradiated Exoplanets** by *Kevin Heng, Brice-Olivier Demory*

astro-ph/1309.6014 : **A Biomass-based Model to Estimate the Plausibility of Exoplanet Biosignature Gases** by *S. Seager, W. Bains, R. Hu*

astro-ph/1309.6016 : **Biosignature Gases in H2-Dominated Atmospheres on Rocky Exoplanets** by *S. Seager, W. Bains, R. Hu*

astro-ph/1309.6032 : **Carbon and Oxygen Abundances in Cool Metal-rich Exoplanet Hosts: A Case Study of the C/O Ratio of 55 Cancri** by *Johanna K. Teske et al.*

astro-ph/1309.6279 : **Spin-driven tidal pumping: Tidally driven changes in planetary spin coupled with secular interactions between planets** by *Richard Greenberg, Christa Van Laerhoven, Rory Barnes*

astro-ph/1309.6480 : **Hiding in the Shadows: Searching for Planets in Pre–transitional and Transitional Disks** by *Jack Dobinson, et al.*

astro-ph/1309.6500 : **Dynamic transition of supercritical hydrogen in gas giants: defining the boundary between interior and atmosphere** by *K. Trachenko, V. V. Brazhkin, D. Bolmatov*

astro-ph/1309.6537 : **X-ray ionization rates in protoplanetary discs** by *B. Ercolano, A. Glassgold*

astro-ph/1309.6663 : **A Systematic Retrieval Analysis of Secondary Eclipse Spectra II: A Uniform Analysis of Eight Planets and Their C to O Ratios** by *Michael R Line, et al.*

astro-ph/1309.6679 : **A Systematic Retrieval Analysis of Secondary Eclipse Spectra III: Diagnosing Chemical Disequilibrium in Planetary Atmospheres** by *Michael R Line, Yuk Yung*

astro-ph/1309.6733 : **Constraints on a second planet in the WASP-3 system** by *G. Maciejewski, et al.*

astro-ph/1309.6861 : **A semi-empirical stability criterion for real planetary systems** by *C.A. Giuppone, M.H.M. Morais, A.C.M. Correia*

astro-ph/1309.6916 : **MHD Simulations of Global Accretion Disks with Vertical Magnetic Fields** by *Takeru K. Suzuki, Shu-ichiro Inutsuka*

astro-ph/1309.6998 : **The optical transmission spectrum of the hot Jupiter HAT-P-32b: clouds explain the absence of broad spectral features?** by *N. P. Gibson et al.*

astro-ph/1309.7052 : **The Influence of Differential Irradiation and Circulation on the Thermal Evolution of Gas Giant Planets. I. Upper Limits from Radiative Equilibrium** by *E. Rauscher, A. P. Showman*

astro-ph/1309.7097 : **Influence of Stellar Multiplicity On Planet Formation. I. An Insight From** $Kepler$ **Multiple Planet Candidate Systems** by *Ji Wang, et al.*

astro-ph/1309.7714: **MOA-2010-BLG-328Lb: a sub-Neptune orbiting very late M dwarf ?** by *K.Furusawa, et al.*

astro-ph/1309.7894: **Inference of Inhomogeneous Clouds in an Exoplanet Atmosphere** by *Brice-Olivier Demory et al.*