ExoPlanet News
An Electronic Newsletter

No. 84, December 1st, 2015

Editor: Andrew J. Norton
Department of Physical Sciences, The Open University, Milton Keynes MK7 6AA, UK
exoplanet@open.ac.uk, http://exoplanet.open.ac.uk/

Contents

1 Editorial

Welcome to the 84th edition of Exoplanet News. This is the last edition of the newsletter for 2015, so I'd like to thank all subscribers and contributors for their support over the last year. I'm pleased that so many people still find this newsletter useful, particularly when there are so many other ways of obtaining information about this area of research. The newsletter will take a break over New Year, so I plan to send out the next edition at the beginning of February 2016.

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 note that my updates to the website only become live over-night. So if you want to get the newsletter as soon as it is ready, please subscribe and get it by email on the day it's released.

Best wishes
Andrew Norton
The Open University

2 Abstracts of refereed papers

A Chemical Kinetics Network for Lightning and Life in Planetary Atmospheres

P. B. Rimmer & Ch. Helling
SUPA School of Physics and Astronomy, University of St Andrews, St Andrews KY16 9SS, UK

The Astrophysical Journal Supplement Series, in press (arXiv:1510.07052)

There are many open questions about prebiotic chemistry in both planetary and exoplanetary environments. The increasing number of known exoplanets and other ultra-cool, substellar objects has propelled the desire to detect life and prebiotic chemistry outside the solar system. We present an ion-neutral chemical network constructed from scratch, Stand2015, that treats hydrogen, nitrogen, carbon and oxygen chemistry accurately within a temperature range between 100 K and 30000 K. Formation pathways for glycine and other organic molecules are included. The network is complete up to H6C2N2O3. Stand2015 is successfully tested against atmospheric chemistry models for HD209458b, Jupiter and the present-day Earth using a simple 1D photochemistry/diffusion code. Our results for the early Earth agree with those of Kasting (1993) for CO2, H2, CO and O2, but do not agree for water and atomic oxygen. We use the network to simulate an experiment where varied chemical initial conditions are irradiated by UV light. The result from our simulation is that more glycine is produced when more ammonia and methane is present. Very little glycine is produced in the absence of any molecular nitrogen and oxygen. This suggests that production of glycine is inhibited if a gas is too strongly reducing. Possible applications and limitations of the chemical kinetics network are also discussed.
My hope is that the community can make good use of this network. The network itself is contained in a plain text table on the website listed below. Please contact me using the e-mail below if you would like help implementing this network in your research, or if predictions from our 1D Photochemistry/Diffusion code would be useful for a present or future project.

Download/Website: `http://www-star.st-and.ac.uk/~pr33/chemistry.html`

Contact: `pr33@st-andrews.ac.uk`

Spectral Eclipse Timing

Ian Dobbs-Dixon[1], *Eric Agol*[2,3], *Drake Deming*[3,4]

[1] Department of Physics, NYU Abu Dhabi PO Box 129188 Abu Dhabi, UAE
[2] Department of Astronomy, University of Washington, Seattle WA 98195 USA
[3] NASA Astrobiology Institute Virtual Planet Laboratory
[4] Department of Astronomy, University of Maryland, College Park, MD 20742 USA

The Astrophysical Journal, in press (arXiv:1511.06064)

We utilize multi-dimensional simulations of varying equatorial jet strength to predict wavelength dependent variations in the eclipse times of gas-giant planets. A displaced hot-spot introduces an asymmetry in the secondary eclipse light curve that manifests itself as a measured offset in the timing of the center of eclipse. A multi-wavelength observation of secondary eclipse, one probing the timing of barycentric eclipse at short wavelengths and another probing at longer wavelengths, will reveal the longitudinal displacement of the hot-spot and break the degeneracy between this effect and that associated with the asymmetry due to an eccentric orbit. The effect of time offsets was first explored in the IRAC wavebands by Williams *et. al.* (2006). Here we improve upon their methodology, extend to a broad ranges of wavelengths, and demonstrate our technique on a series of multi-dimensional radiative-hydrodynamical simulations of HD 209458b with varying equatorial jet strength and hot-spot displacement. Simulations with the largest hot-spot displacement result in timing offsets of up to 100 seconds in the infrared. Though we utilize a particular radiative hydrodynamical model to demonstrate this effect, the technique is model independent. This technique should allow a much larger survey of hot-spot displacements with JWST then currently accessible with time-intensive phase curves, hopefully shedding light on the physical mechanisms associated with thermal energy advection in irradiated gas-giants.

Contact: `idd1@nyu.edu`

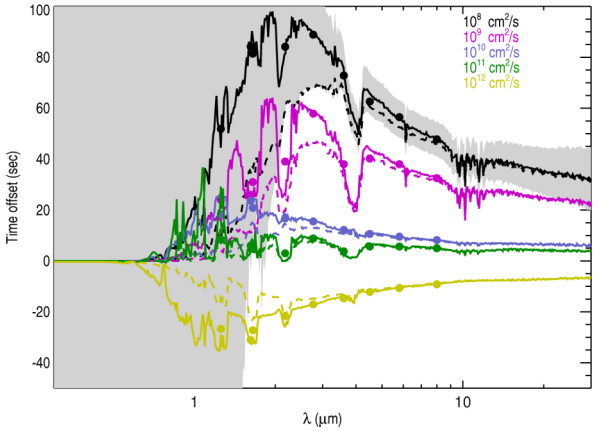

Figure 1: (Dobbs-Dixon, Agol & Deming) Variation in the time of secondary eclipse for models of HD209458b with varying viscosities and jet strengths. Solid lines assuming an albedo of 0.05 while the dashed lines assume a value of 0.35. The shaded region shows the extent of the observational errors on the time offset for a planet with a viscosity of $10^8\,cm^2/s$ around sun-like star at 10 parsecs viewed by JWST.

Characterizing transiting exoplanet atmospheres with JWST

T. P. Greene[1], M. R. Line[1,2,3,4], C. Montero[4], J. J. Fortney[4], J. Lustig-Yaeger[4,5], K. Luther[4,6]

[1] NASA Ames Research Center, Moffett Field, CA 94035, USA
[2] Hubble Postdoctoral Fellow
[3] School of Earth and Space Exploration, Arizona State University, Tempe, AZ 85287, USA
[4] Department of Astronomy and Astrophysics, University of California, Santa Cruz, CA 95064, USA
[5] Department of Astronomy, Box 351580, University of Washington, Seattle, WA 98195, USA
[6] Department of Physics, University of California, 366 LeConte Hall MC 7300, Berkeley, CA 94720, USA

The Astrophysical Journal, in press (arXiv:1511.05528)

We explore how well James Webb Space Telescope (JWST) spectra will likely constrain bulk atmospheric properties of transiting exoplanets. We start by modeling the atmospheres of archetypal hot Jupiter, warm Neptune, warm sub-Neptune, and cool super-Earth planets with clear, cloudy, or high mean molecular weight atmospheres. Next we simulate the $\lambda = 1-11$ μm transmission and emission spectra of these systems for several JWST instrument modes for single transit and eclipse events. We then perform retrievals to determine how well temperatures and molecular mixing ratios (CH_4, CO, CO_2, H_2O, NH_3) can be constrained. We find that $\lambda = 1 - 2.5$ μm transmission spectra will often constrain the major molecular constituents of clear solar composition atmospheres well. Cloudy or high mean molecular weight atmospheres will often require full $1 - 11$ μm spectra for good constraints, and emission data may be more useful in cases of sufficiently high F_p and high F_p/F_*. Strong temperature inversions in the solar composition hot Jupiter atmosphere should be detectable with $1 - 2.5+$ μm emission spectra, and $1 - 5+$ μm emission spectra will constrain the temperature-pressure profiles of warm planets. Transmission spectra over $1-5+$ μm will constrain [Fe/H] values to better than 0.5 dex for the clear atmospheres of the hot and warm planets studied. Carbon-to-oxygen ratios can be constrained to better than a factor of 2 in some systems. We expect that these results will provide useful predictions of the scientific value of single event JWST spectra until its on-orbit performance is known.

Download/Website: `http://arxiv.org/abs/1511.05528`

Contact: `tom.greene@nasa.gov`

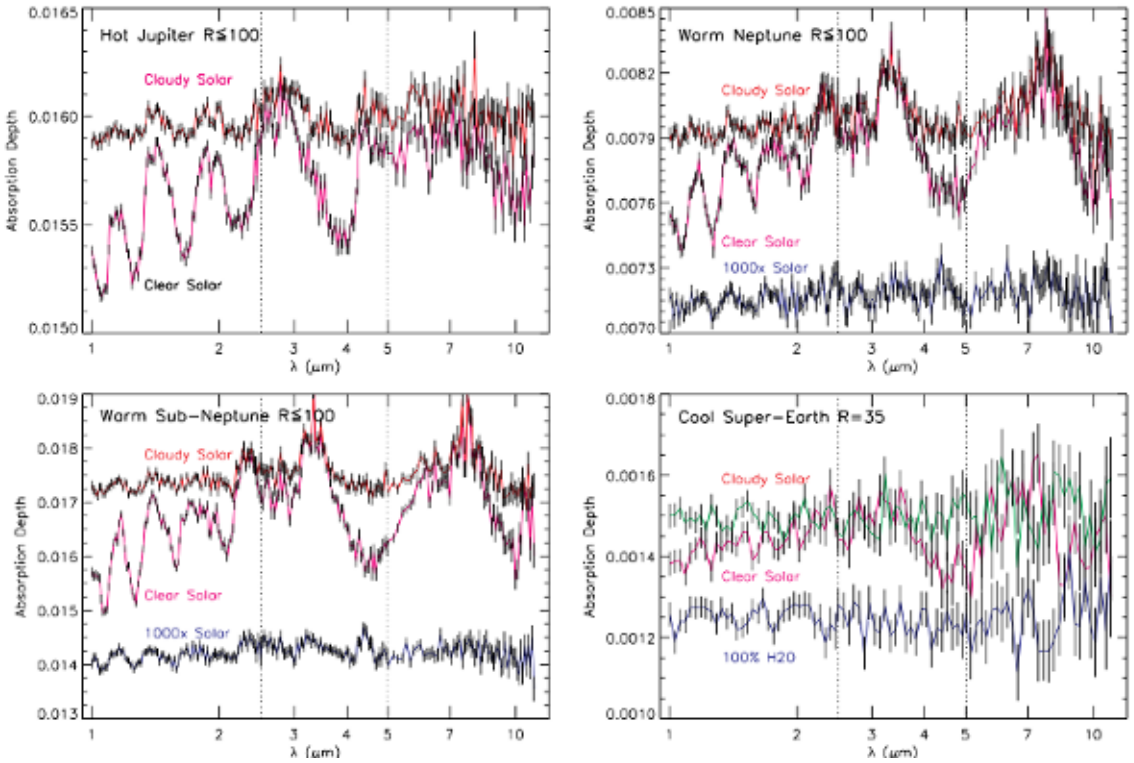

Figure 2: (Greene et al.) Final simulated transmission spectra of the fiducial planets and atmospheres. The $Tr_\lambda = (R_{p,\lambda}/R_*)^2$ spectra are for a single transit with equal time on the star alone for each of the simulated instrument modes. Spectra have been been binned to resolution $R \leq 100$ (hot Jupiter, warm Neptune, warm sub-Neptune) as used for all retrievals or $R = 35$ (cool super-Earth) for display purposes only. The simulated spectra include a noise instance and are presented as colored curves. The black error bars denote 1σ of noise composed of random and systematic components. Dashed lines show the wavelength range boundaries of the chosen NIRISS, NIRCam, and MIRI instrument modes.

Modelling the photosphere of active stars for planet detection and characterization

E. Herrero[1], *I. Ribas*[1], *C. Jordi*[2], *J. C. Morales*[1,3], *M. Perger*[1], *A. Rosich*[1]

[1] Institut de Ciències de l'Espai (CSIC-IEEC), Campus UAB, Carrer de Can Magrans s/n, 08193 Cerdanyola del Vallès, Spain
[2] Dept. d'Astronomia i Meteorologia, Institut de Ciències del Cosmos (ICC), Universitat de Barcelona (IEEC-UB), Martí Franquès 1, E08028 Barcelona, Spain
[3] LESIA-Observatoire de Paris, CNRS, UPMC Univ. Paris 06, Univ. Paris-Diderot, 5 Pl. Jules Janssen, 92195 Meudon CEDEX, France

Astronomy & Astrophysics, in press (arXiv: 1511.06717)

Stellar activity patterns are responsible for jitter effects that are observed at different timescales and amplitudes in the measurements obtained from photometric and spectroscopic time series observations. These effects are currently in the focus of many exoplanet search projects, since the lack of a well-defined characterization and correction strategy hampers the detection of the signals associated with small exoplanets.

Accurate simulations of the stellar photosphere based on the most recent available models for main-sequence stars can provide synthetic photometric and spectroscopic time series data. These may help to investigate the relation between activity jitter and stellar parameters when considering different active region patterns. Moreover, jitters can be analysed at different wavelength scales (defined by the passbands of given instruments or space missions) to design strategies to remove or minimize them.

We present the `StarSim` tool, which is based on a model for a spotted rotating photosphere built from the integration of the spectral contribution of a fine grid of surface elements. The model includes all significant effects affecting the flux intensities and the wavelength of spectral features produced by active regions and planets. The resulting synthetic time series data generated with this simulator were used to characterize the effects of activity jitter in extrasolar planet measurements from photometric and spectroscopic observations.

Several cases of synthetic data series for Sun-like stars are presented to illustrate the capabilities of the methodology. A specific application for characterizing and modelling the spectral signature of active regions is considered, showing that the chromatic effects of faculae are dominant for low-temperature contrasts of spots. Synthetic multi-band photometry and radial velocity time series are modelled for HD 189733 by adopting the known system parameters and fitting for the map of active regions with `StarSim`. Our algorithm reproduces both the photometry and the radial velocity (RV) curves to good precision, generally better than the studies published to date. We evaluate the RV signature of the activity in HD 189733 by exploring a grid of solutions from the photometry. We find that the use of RV data in the inverse problem could break degeneracies and allow for a better determination of some stellar and activity parameters, for example, the configuration of active regions, the temperature contrast of spots, and the amount of faculae. In addition, the effects of spots are studied for a set of simulated transit photometry, showing that these can introduce variations in R_p/R_* measurements with a spectral signature and amplitude that are very similar to the signal of an atmosphere dominated by dust.

Download/Website: `http://arxiv.org/abs/1511.06717`

Contact: `eherrero@ice.cat`

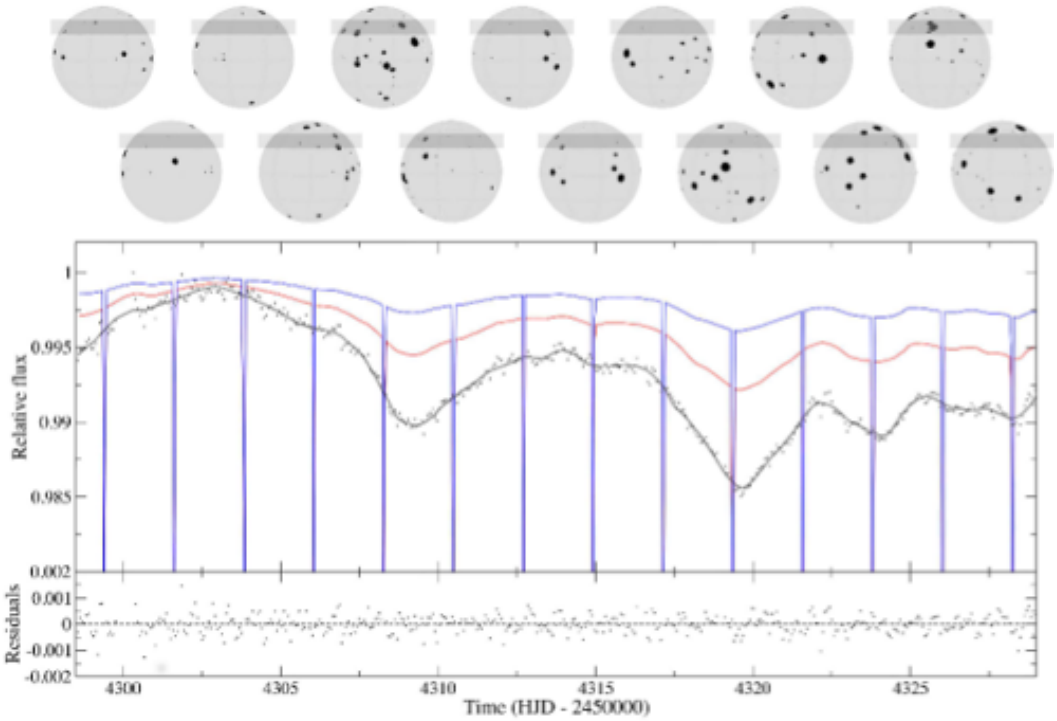

Figure 3: (Herrero et al.) Synthetic light curves for HD 189733 generated with `StarSim` assuming our modelled activity map for the MOST (black line), 2 MASS J (red line), and IRAC 2 (blue line) passbands. The flux is in relative units with respect to the maximum along the light curve and shows the 14 analysed transit events. Observed data from MOST are plotted with black dots. The projected maps of the stellar surface at the mid-transit times are plotted in the upper part, including a dark grey band that indicates the region of the star occulted by the planet.

The HARPS search for southern extra-solar planets. XXXIX. HD175607, the most metal-poor G dwarf with an orbiting sub-Neptune

A. Mortier[1], J.P. Faria[2,3], N.C. Santos[2,3], V. Rajpaul[4], P. Figueira[2], I. Boisse[5], A. Collier Cameron[1], X. Dumusque[6], G. Lo Curto[7], C. Lovis[8], M. Mayor[8], C. Melo[7], F. Pepe[8], D. Queloz[8,9], A. Santerne[2], D. Ségransan[8], S.G. Sousa[2], A. Sozzetti[10], S. Udry[8]

[1] SUPA, School of Physics and Astronomy, University of St Andrews, St Andrews KY16 9SS, UK
[2] Instituto de Astrofísica e Ciências do Espaço, Universidade do Porto, CAUP, Rua das Estrelas, 4150-762 Porto, Portugal
[3] Departamento de Física e Astronomia, Faculdade de Ciências, Universidade do Porto, Portugal
[4] Sub-department of Astrophysics, Department of Physics, University of Oxford, Oxford OX1 3RH, UK
[5] Aix Marseille Université, CNRS, LAM (Laboratoire d'Astrophysique de Marseille) UMR 7326, 13388, Marseille, France
[6] Harvard-Smithsonian Center for Astrophysics, 60 Garden Street, Cambridge, Massachusetts 02138, USA
[7] European Southern Observatory, Casilla 19001, Santiago, Chile
[8] Observatoire de Genève, Université de Genève, 51 ch. des Maillettes, CH-1290 Sauverny, Switzerland
[9] Institute of Astronomy, University of Cambridge, Madingley Road, Cambridge, CB3 0HA, UK
[10] INAF - Osservatorio Astrofisico di Torino, Via Osservatorio 20, I-10025 Pino Torinese, Italy

Astronomy & Astrophysics, in press (arXiv:1511.03941)

Context. The presence of a small-mass planet (M_p <0.1 M_{Jup}) seems, to date, not to depend on metallicity. However, theoretical simulations have shown that stars with subsolar metallicities may be favoured for harbouring smaller planets. A large dedicated survey of metal-poor stars with the HARPS spectrograph has thus been carried out to search for Neptunes and super-Earths.
Aims. In this paper we present the analysis of HD 175607, an old G6 star with metallicity [Fe/H] = -0.62. We gathered 119 radial velocity measurements in 110 nights over a timespan of more than 9 years.
Methods. The radial velocities were analysed using Lomb-Scargle periodograms, a genetic algorithm, a Markov-Chain Monte-Carlo analysis, and a Gaussian processes analysis. The spectra were also used to derive stellar properties. Several activity indicators were analysed to study the effect of stellar activity on the radial velocities.
Results. We find evidence for the presence of a small Neptune-mass planet ($M_p \sin i = 8.98 \pm 1.10\,M_\oplus$) orbiting this star with an orbital period $P = 29.01 \pm 0.02$ days in a slightly eccentric orbit ($e = 0.11 \pm 0.08$). The period of this Neptune is close to the estimated rotational period of the star. However, from a detailed analysis of the radial velocities together with the stellar activity, we conclude that the best explanation of the signal is indeed due to the presence of a planetary companion rather than stellar related. An additional longer period signal ($P \sim 1400$ d) is present in the data, for which more measurements are needed to constrain its nature and its properties.
Conclusions. HD 175607 is the most metal-poor FGK dwarf with a detected low mass planet amongst the currently known planet hosts. This discovery may thus have important consequences for planet formation and evolution theories.

Download/Website: `http://arxiv.org/abs/1511.03941`

Contact: `am352@st-andrews.ac.uk`

Radii, masses, and ages of 18 bright stars using interferometry and new estimations of exoplanetary parameters

R.Ligi[1,2], O. Creevey[2,3], D. Mourard[2], A. Crida[2], A.M. Lagrange[4], N. Nardetto[2], K. Perraut[4], M. Schultheis[2], I. Tallon-Bosc[5], and T. ten Brummelaar[6].

[1] Aix Marseille Université, CNRS, LAM (Laboratoire d'Astrophysique de Marseille), UMR 7326, 13388, Marseille, France
[2] Laboratoire Lagrange, Université Côte d'Azur, Observatoire de la Côte d'Azur, CNRS, Boulevard de l'Observatoire, CS 34229, 06304 Nice Cédex 4, France
[3] Institut d'Astrophysique Spatiale, CNRS, UMR 8617, Université Paris XI, Batiment 121, F-91405 Orsay Cedex
[4] Univ. Grenoble Alpes, IPAG, F-38000 Grenoble, France & CNRS, IPAG, F-38000 Grenoble, France
[5] UCBL/CNRS CRAL, 9 avenue Charles André, 69561 Saint-Genis-Laval Cédex, France
[6] Georgia State University, PO Box 3969, Atlanta GA 30302-3969, USA

Astronomy & Astrophysics, in press (arxiv.org/abs/1511.03197)

Accurate stellar parameters are needed in numerous domains of astrophysics. The position of stars on the Hertzsprung-Russell diagram is an important indication of their structure and evolution, and it helps improve stellar models. Furthermore, the age and mass of stars hosting planets are required elements for studying exoplanetary systems.
We aim at determining accurate parameters of a set of 18 bright exoplanet host and potential host stars from interferometric measurements, photometry, and stellar models.
Using the VEGA/CHARA interferometer operating in the visible domain, we measured the angular diameters of 18 stars, ten of which host exoplanets. We combined them with their distances to estimate their radii. We used photometry to derive their bolometric flux and, then, their effective temperature and luminosity to place them on the H-R diagram. We then used the PARSEC models to derive their best fit ages and masses, with error bars derived from Monte Carlo calculations.
Our interferometric measurements lead to an average of 1.9% uncertainty on angular diameters and 3% on stellar radii. There is good agreement between measured and indirect estimations of angular diameters (either from SED fitting or from surface brightness relations) for main sequence (MS) stars, but not as good for more evolved stars. For each star, we provide a likelihood map in the mass-age plane; typically, two distinct sets of solutions appear (an old and a young age). The errors on the ages and masses that we provide account for the metallicity uncertainties, which are often neglected by other works. From measurements of its radius and density, we also provide the mass of 55 Cnc independently of models. From the stellar masses, we provide new estimates of semi-major axes and minimum masses of exoplanets with reliable uncertainties. We also derive the radius, density, and mass of 55 Cnc e, a super-Earth that transits its stellar host. Our exoplanetary parameters reflect the known population of exoplanets.
This work illustrates how precise interferometric measurements of angular diameters and detailled modeling allow fundamental parameters of exoplanet host stars to be constrained at a level permiting analysis of the planet's parameters.

Download/Website: `http://arxiv.org/abs/1511.03197`

Contact: `roxanne.ligi@lam.fr`

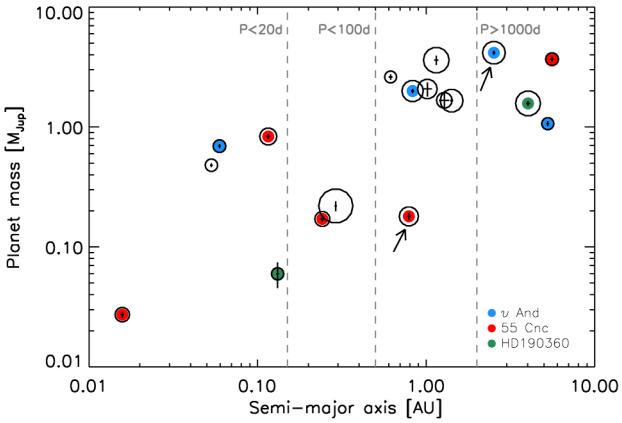

Figure 4: (Ligi et al.) Minimum masses of exoplanets versus their distance to the star from the old solution for the stellar mass (except for 55 Cnc, whose planetary minimum masses come from a direct estimate of the mass). Symbol sizes are an increasing function of the eccentricity of planets. The arrows indicate the planets in the habitable zone, and multiple planet systems are shown in color.

Kozai-Lidov cycles towards the limit of circumbinary planets

D. V. Martin[1], *A. H. M. J. Triaud*[2,3]

[1] Observatoire de Genève, Université de Genève, 51 chemin des Maillettes, Sauverny 1290, Switzerland
[2] Centre for Planetary Science, University of Toronto at Scarborough, 1265 Military Trail, Toronto, ON, M1C 1A4, Canada
[3] Department of Astronomy & Astrophysics, University of Toronto, Toronto, M5S 3H4, Canada

Monthly Notices of the Royal Astronomical Society, published (2016, 455, L46-L50)

In this paper we answer a simple question: can a misaligned circumbinary planet induce Kozai-Lidov cycles on an inner stellar binary? We use known analytic equations to analyse the behaviour of the Kozai-Lidov effect as the outer mass is made small. We demonstrate a significant departure from the traditional symmetry, critical angles and amplitude of the effect. Aside from massive planets on near-polar orbits, circumbinary planetary systems are devoid of Kozai-Lidov cycles. This has positive implications for the existence of highly misaligned circumbinary planets: an observationally unexplored and theoretically important parameter space.

Download/Website: `http://mnrasl.oxfordjournals.org/content/455/1/L46.full.pdf`

Contact: `david.martin@unige.ch`

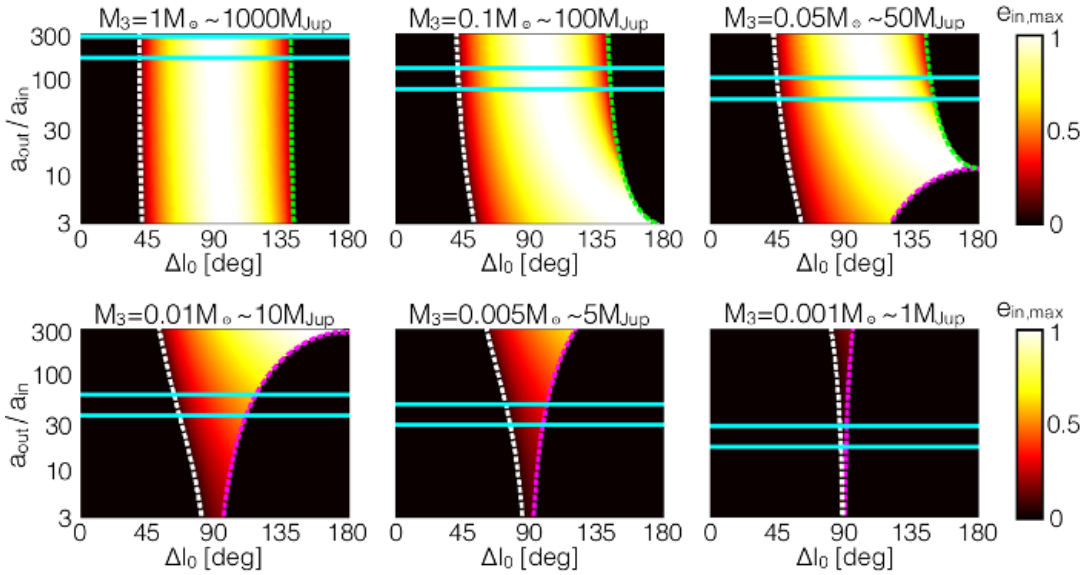

Figure 5: (Martin & Triaud) Maximum inner eccentricity obtained during Kozai-Lidov (K-L) cycles according to the analytic equation from Liu, Munoz & Lai 2015 & Naoz et al. 2013, as a function of $a_{\rm out}/a_{\rm in}$ and I_0, for six different values of the outer mass M_3. The inner masses are set at $M_1 = 1M_\odot$ and $M_2 = 0.5M_\odot$. The initial eccentricities are both zero (and $e_{\rm out}$ is constant). The black regions correspond to where K-L cycles do not occur. These are separated from the K-L active regimes by a lower limit of I_0 (white dashed line on the left-hand limit) and an upper limit of I_0 (green and/or pink dashed lines on the right-hand limit). The light blue horizontal lines are upper limits on $a_{\rm out}/a_{\rm in}$ for K-L cycles to occur without being quenched by GR precession, for $a_{\rm in} = 0.0655$ au ($P_{\rm in} = 5$ d) as the lower line and $a_{\rm in} = 0.3041$ au ($P_{\rm in} = 50$ d) as the upper line.

A tunnel and a traffic jam: How transition disks maintain a detectable warm dust component despite the presence of a large planet-carved gap

P. Pinilla[1], L. Klarmann[2], T. Birnstiel[3], M. Benisty[4], C. Dominik[2], and C. P. Dullemond[5]

[1] Leiden Observatory, Leiden University, P.O. Box 9513, 2300RA Leiden, The Netherlands
[2] Astronomical Institute Anton Pannekoek, University of Amsterdam, PO Box 94249, 1090 GE Amsterdam, The Netherlands
[3] Harvard-Smithsonian Center for Astrophysics, 60 Garden Street, Cambridge, MA 02138, USA
[4] Univ. Grenoble Alpes, IPAG, F-38000 Grenoble, France CNRS, IPAG, F-38000 Grenoble, France
[5] Universität Heidelberg, Zentrum für Astronomie, Institut für Theoretische Astrophysik, Albert-Ueberle-Str. 2, 69120 Heidelberg, Germany

Astronomy & Astrophysics, in press (arXiv:1511.04105)

Context. Transition disks are circumstellar disks that show evidence of a dust cavity, which may be related to dynamical clearing by embedded planet(s). Most of these objects show signs of significant accretion, indicating that the inner disks are not truly empty, but that gas is still streaming through to the star. A subset of transition disks, sometimes called pre-transition disks, also shows a strong near-infrared excess, interpreted as an optically thick dusty belt located close to the dust sublimation radius within the first astronomical unit.
Aims. We study the conditions for the survival and maintenance of such an inner disk in the case where a massive planet opens a gap in the disk. In this scenario, the planet filters out large dust grains that are trapped at the outer edge of the gap, while the inner regions of the disk may or may not be replenished with small grains.
Methods. We combined hydrodynamical simulations of planet-disk interactions with dust evolution models that include coagulation and fragmentation of dust grains over a large range of radii and derived observational properties using radiative transfer calculations. We studied the role of the snow line in the survival of the inner disk of transition disks.
Results. Inside the snow line, the lack of ice mantles in dust particles decreases the sticking efficiency between grains. As a consequence, particles fragment at lower collision velocities than in regions beyond the snow line. This effect allows small particles to be maintained for up to a few Myrs within the first astronomical unit. These particles are closely coupled to the gas and do not drift significantly with respect to the gas. For lower mass planets (1 $M_{\rm Jup}$), the pre-transition appearance can be maintained even longer because dust still trickles through the gap created by the planet, moves invisibly and quickly in the form of relatively large grains through the gap, and becomes visible again as it fragments and gets slowed down inside of the snow line.
Conclusions. The global study of dust evolution of a disk with an embedded planet, including the changes of the dust aerodynamics near the snow line, can explain the concentration of millimetre-sized particles in the outer disk and the survival of the dust in the inner disk if a large dust trap is present in the outer disk. This behaviour solves the conundrum of the combination of both near-infrared excess and ring-like millimetre emission observed in several transition disks.

Download/Website: `http://arxiv.org/pdf/1511.04105v2.pdf`

Contact: `pinilla@strw.leidenuniv.nl`

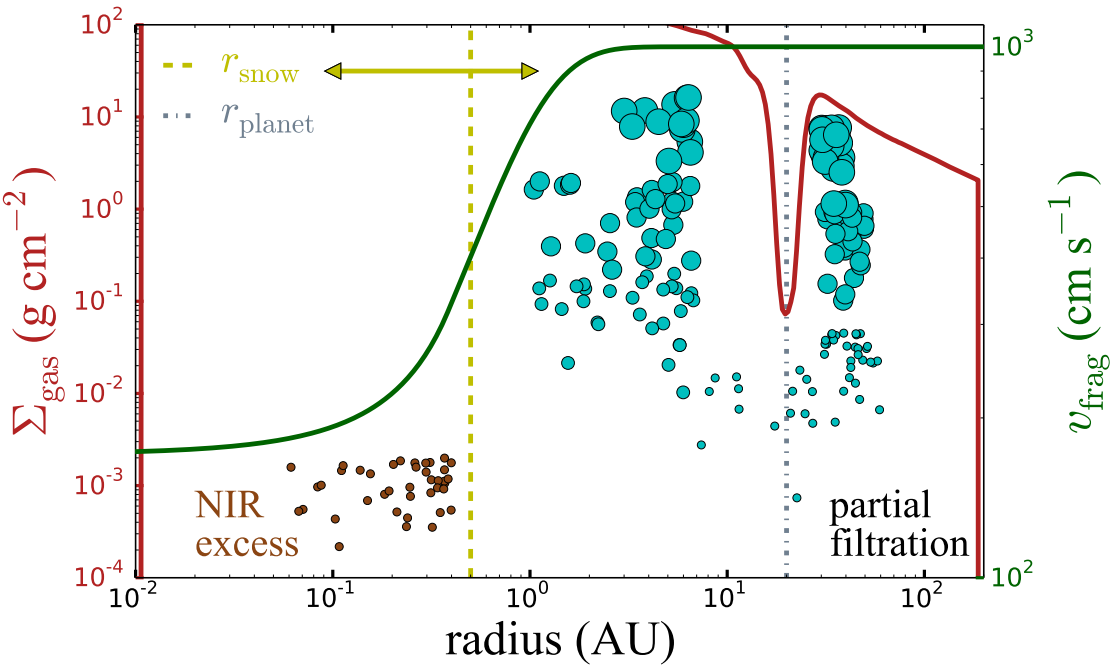

Figure 6: (Pinilla et al.) Sketch of how transition disks maintain a detectable warm dust component despite the presence of a large planet-carved gap.

On the Detection of Carbon Monoxide as an Anti-Biosignature in Exoplanetary Atmospheres

Yuwei Wang[1], *Feng Tian*[2,3], *Tong Li*[2], *Yongyun Hu*[1]

[1] Laboratory for Climate and Ocean-Atmosphere Sciences, Department of Atmospheric and Oceanic Sciences, School of Physics, Peking University, Beijing, China
[2] Ministry of Education Key Laboratory for Earth System Modeling, Center for Earth System, Science, Tsinghua University, Beijing, China
[3] Joint Center for Global Change Studies (JCGCS), Beijing, China

Icarus, in press (10.1016/j.icarus.2015.11.010)

Recent works suggest that oxygen can be maintained on lifeless exoplanets in the habitable zones of M dwarfs as the results of photochemical reactions. However, the same photochemical models also predict high concentrations of carbon monoxide (CO) in the corresponding atmospheres. Here we use a line-by-line radiative transfer model to investigate the observation requirements of O_2 and CO in such atmospheres. The results show that

- 10^{-3} level of photochemically produced O_2 is detectable at 0.76 μm, in agreement with the findings in previous works;
- 10^{-3} level of CO in the corresponding atmospheres is also detectable at NIR absorption bands (1.58, 2.34, and 4.67 μm);
- The optimistic estimate on JWST observation time needed for exoplanets with Earth-like climate are 4.3 hours at 0.76 μm for O_2 detection and 1.7, 0.1, 0.03 hours at 1.58, 2.34 and 4.67 μm for CO detection. On desiccated planets the observation time are much less.

Thus simultaneous observations of O_2 and CO are feasible and will be useful to distinguish true biosignature (O_2 without CO) from photochemically produced false positive biosignature (O_2 + CO). We suggest that simultaneous observations of O_2 and CO be considered by future exoplanet atmosphere characterization observations.

Download/Website: `http://www.sciencedirect.com/science/article/pii/S0019103515005205`

Contact: `tianfengco@mail.tsinghua.edu.cn`

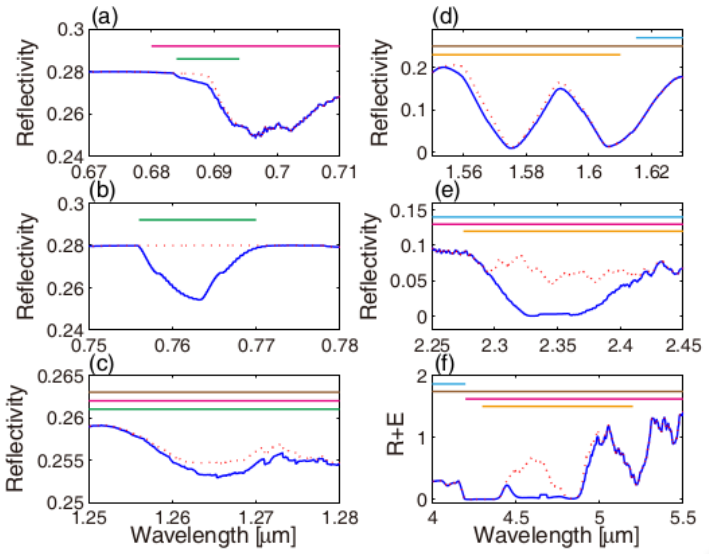

Figure 7: (Wang et al.) (a)-(e) Reflectivity as functions of wavelength with spectral resolution of R=100. (f) The sum of reflection and planetary emission as a function of wavelength with R=100. The blue solid curves represent results from composition profiles are from Titan et al. (2014). The red dashed curves represent results without O_2 for (a-c) or CO for (d-f). The straight lines in green, orange, pink, brown, and light blue indicate strong absorption bands for O_2, CO, H_2O, CO_2, and CH_4 respectively.

3 Conference announcements

2016 Sagan Summer Workshop: Looking for Planets in Astronomical Data

D. Gelino, R. Paladini
NASA Exoplanet Science Institute, California Institute of Technology, Pasadena, CA, USA

Pasadena, CA, July 18-22, 2016

The 2016 Sagan Summer Workshop will focus on data analysis techniques used to find planets in various types of data. In particular, leaders in the field will discuss Monte Carlo Markov Chain (MCMC) and Bayesian inference relevant to transit analysis and spectral retrieval as well as RV analysis. Image processing techniques such as Principal Component Analysis (PCA), LOCI, and KLIP methods will also be discussed. In addition, for each of these areas, noise sources and mitigation strategies will be highlighted. Attendees will participate in hands-on group projects and will have the opportunity to present their own work through short presentations (research POPs) and posters.

Important Dates

- February 5, 2016: On-line Registration and Financial Support application period open
- March 11, 2016: Financial Support application due
- March 25, 2016: Financial Support decisions announced via email
- April 7, 2016: POP/Poster/Talk submission period open
- July 8, 2016: On-line Registration closed; final agenda posted
- July 18-22, 2016: Sagan Exoplanet Summer Workshop

Download/Website: `http://nexsci.caltech.edu/workshop/2016`
Contact: `sagan_workshop@ipac.caltech.edu`

4^{th} CHEOPS Science Workshop

LOC Chair: Vincent Bourrier
Geneva Observatory, Chemin des Maillettes 51, 1290 Sauverny, Switzerland

Geneva, Switzerland, 21 - 23 June 2016

The CHaracterizing ExOPlanet Satellite (CHEOPS) will be dedicated to search for transits by means of ultra-high precision photometry on bright stars already known to host planets. It is the first S-class mission from ESA. CHEOPS is targeted for a launch at the end of 2017, for a nominal lifetime of 3.5 years. The purpose of this fourth CHEOPS science workshop is to bring together the community interested in the mission, providing information about its current status and preparing its scientific exploitation. A focus of the meeting will be the implementation of Guest Observation programmes for the 20% time opened on CHEOPS for the general scientific community. Registrations for the workshop will be opened in February 2016.

Download/Website: `http://cheops.unige.ch/meetings/science-workshop-04/`
Contact: `vincent.bourrier@unige.ch`

4 Jobs and Positions

Assistant Professor of Physics and Astronomy

Michael E. Summers
George Mason University, 4400 University Drive, Fairfax, VA 22030, USA

George Mason University, 31 January 2016

The Department of Physics and Astronomy at George Mason University is accepting applications for a tenure-track position at the Assistant Professor level in the field of extra-solar planets. Applicants should have a Ph.D. in Physics or Astronomy as well as post-doctoral experience, and show promise for developing an independent and externally funded research program. Candidates with expertise in all areas of observational and theoretical studies of extra-solar planets, including detection, characterization, and their formation and evolution, will be considered. The successful applicant will teach courses in the Department of Physics and Astronomy. George Mason University is located in Fairfax, Virginia in the suburban Washington DC area. This location offers prospects for collaboration at several nearby institutions and Federal laboratories such as the Goddard Space Flight Center, the Carnegie Department of Terrestrial Magnetism, the Space Telescope Science Institute, the National Institute of Science and Technology, and the Naval Research Laboratory. Applicants should complete the online faculty application for position number F9967z at http://jobs.gmu.edu. Review of applications will begin Nov. 15, 2015 and continue until the position is filled. George Mason University is an Affirmative Action, Equal Opportunity Employer committed to excellence through diversity. Women and under-represented minorities are strongly encouraged to apply.

Download/Website: `http://jobs.gmu.edu`

Contact: `msummers@gmu.edu`

Research Associate in Exoplanetary Astrophysics and Planet Formation Theory

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

Cornell University, September 2016

Applications are invited for a Research Associate (Postdoc) position at Cornell University to work with Professor Dong Lai on Exoplanetary Astrophysics Theory. The research area includes various aspects of exoplanetary sciences, including orbital dynamics, internal and atmosphere dynamics, planet-star interactions, protoplanetary disks and planet formation. Candidates with relevant theoretical/computational astrophysics and planetary scienece expertise, with or without prior research experience on exoplanets, are encouraged to apply. The successful applicant will join the research group of Prof. Dong lai (see http://astro.cornell.edu/∼dong/research.html), the Cornell Center for Astrophsyics and Planetary Science and the Carl Sagan Institute, all housed in the Astronomy Department. He/she will also have opportunity to do independent research.

The position is for one year, renewable to up to a total of 3 years contingent on funding and performance. The nominal starting date is September 1, 2016 but an earlier date is possible.

Inquiries may be addressed to Prof. Dong Lai (dong@astro.cornell.edu). Applicants should submit a CV (including a list of publications) and a brief (1-3 pages) description of research interests, all in a single pdf file, to **Ms. Lynda Sovocool at lmk3@cornell.edu** (Please note "Research Associate Position of Prof. Dong Lai" in the subject heading.) They should also arrange for three letters of recommendation to be sent to the same email address (Please note the applicant's name, followed by "Research Associate Position of Prof. Dong Lai" in in the subject heading). All materials should be received by January 15, 2016. Later applications will be accepted until the position is filled.

Download/Website: `http://astro.cornell.edu/∼dong/research.html`

Contact: `dong@astro.cornell.edu`

Research Associate

Professor Didier Queloz
Astrophysics Group of the Department of Physics, Cambridge University, UK

Astrophysics Group of the Department of Physics, University of Cambridge, 2016

The Astrophysics Group of the Department of Physics, University of Cambridge, invites applications for a Postdoctoral Research Associate to work in the Exoplanet Research Team of Professor Queloz.
The team is involved in observation programmes and is active in the development of instrumentation for the detection and characterisation of planets.
The post holder will be expected to conduct independent research programmes and to actively participate in the exploitation of the Speculoos experiment.
The candidate must be familiar with the exoplanet field of research and data analysis in general. Experience with astronomical equipment and precise photometry is desirable.
Other exoplanet research programmes are additionally being carried out at the Institute of Astronomy and in the Department of Applied Mathematics and Theoretical Physics. Opportunities of collaboration and exchanges with researchers of other departments are encouraged. A Cambridge Exoplanet Research Centre has been recently established to stimulate and promote collaboration between all these teams working on various aspects of exoplanet research.
The successful candidate will hold or be closing to obtaining a PhD in Experimental Astronomy, Physics or another relevant scientific discipline. They should have a proven track record in astronomy research, and scientific exploitation of data.

Additional information may be found on:
http://www.astro.phy.cam.ac.uk/research/research-activities/exoplanets
http://www.orca.ulg.ac.be/SPECULOOS/Speculoos_main/Home.html

To apply online: http://www.jobs.cam.ac.uk/job/8751/

Download/Website: `http://www.jobs.cam.ac.uk/job/8751/`

Contact: `karen@mrao.cam.ac.uk.`

Post-doctoral fellowship calls of the Research Foundation Flanders

Prof. Dr. Leen Decin
Institute of Astronomy, KU Leuven, Belgium

Leuven, Belgium, Between 1/01/2017 and 31/05/2017

At the University of Leuven, we are soliciting for excellent candidates who are interested in applying for a highly-ranked 3-year post-doctoral fellowship. There are currently 2 open calls of the Research Foundation Flanders (FWO - www.fwo.be). One fellowship is the so-called [Pegasus]2 Marie Curie fellowship, the other one is the regular FWO post-doctoral fellowship. The eligibility criterion is that one obtained his/her PhD less than 3 years ago. The difference between both programs is that for the regular FWO post-doctoral fellowship the starting date is fixed (1/10/2016), while for the Marie Curie Fellowship the starting date is flexible (between 1/01/2017 and 31/05/2017). The application deadline for both fellowships is 1/02/2016; For the Marie Curie fellowship there is another deadline at 1/05/2016 . For more information on the differences, see the link below. If you are interested in applying for these prestigious fellowships, you can contact Prof. Leen Decin.

Download/Website: `http://www.fwo.be/media/447329/PEGASUS2_differences_regularFWOpostdoc_overview_pdf.pdf`

Contact: `leen.decin@ster.kuleuven.be`

5 Announcements

STFC Exoplanet Science Review 2015

Paul O'Brien
University of Leicester, University Road, Leicester, LE1 7RH, UK

STFC, 2015

The final report of the STFC Exoplanet Science Review 2015 is now available from the STFC web site (link given below). A summary of the main findings of the review will be presented during the 8 January 2016 RAS meeting.

Download/Website: `http://www.stfc.ac.uk/files/exoplanet-science-review-2015/`

Contact: `paul.obrien@leicester.ac.uk`

6 As seen on astro-ph

The following list contains all the entries relating to exoplanets that we spotted on astro-ph during October 2015. If you see any that we missed, please let us know and we'll include them in the next issue.

astro-ph/1511.00009 : **Oscillations of Relative Inclination Angles in Compact Extrasolar Planetary Systems** by *Juliette C. Becker, Fred C. Adams*

astro-ph/1511.00135 : **Extended Heat Deposition in Hot Jupiters: Application to Ohmic Heating** by *Sivan Ginzburg, Re'em Sari*

astro-ph/1511.00303 : **The Role of the Cooling Prescription for Disk Fragmentation: Numerical Convergence & Critical Cooling Parameter in Self-Gravitating Disks** by *Hans Baehr, Hubert Klahr*

astro-ph/1511.00508 : **A New Concept for Spectro-photometry of Exoplanets with Space-based Telescopes** by *Taro Matsuo, et al.*

astro-ph/1511.00643 : **SOPHIE velocimetry of Kepler transit candidates XVII. The physical properties of giant exoplanets within 400 days of period** by *A. Santerne, et al.*

astro-ph/1511.00698 : **Influence of the UV Environment on the Synthesis of Prebiotic Molecules** by *Sukrit Ranjan, Dimitar Sasselov*

astro-ph/1511.00768 : **The Possible Orbital Decay and Transit Timing Variations of the Planet WASP-43b** by *Ing-Guey Jiang, C et al.*

astro-ph/1511.00944 : **Secular dynamics of hierarchical multiple systems composed of nested binaries, with an arbitrary number of bodies and arbitrary hierarchical structure. First applications to multiplanet and multistar systems** by *Adrian S. Hamers, Simon F. Portegies Zwart*

astro-ph/1511.01068 : **Characterization of Kepler-91b and the Investigation of a Potential Trojan Companion Using EXONEST** by *Ben Placek, et al.*

astro-ph/1511.01082 : **Combining Photometry From Kepler and TESS to Improve Short-Period Exoplanet Characterization** by *Ben Placek, Kevin H. Knuth, Daniel Angerhausen*

astro-ph/1511.01083 : **A Search for Ringed Exoplanets using Kepler Photometry** by *Matthew Z. Heising, Geoffrey W. Marcy, Hilke E. Schlichting*

astro-ph/1511.01144 : **A Response to Elvis' 2015 Critique of the AURA Report "From Cosmic Birth to Living Earths"** by *Sara Seager, et al.*

astro-ph/1511.01178 : **Inferring Planet Mass from Spiral Structures in Protoplanetary Disks** by *Jeffrey Fung, Ruobing Dong*

astro-ph/1511.01199 : **Development of a Method for the Observation of Lightning in Protoplanetary Disks Using Ion Lines** by *Takayuki Muranushi, et al.*

astro-ph/1511.01417 : **On the migration of three planets in a protoplanetary disc and the formation of chains of mean motion resonances** by *Cezary Migaszewski*
astro-ph/1511.01424 : **Probing exoplanet clouds with optical phase curves** by *A. Garcia Munoz, K. G. Isaak*
astro-ph/1511.01492 : **Thermal Emission and Albedo Spectra of Super Earths with Flat Transmission Spectra** by *Caroline V. Morley, et al.*
astro-ph/1511.01533 : **On the Stellar Companion to the Exoplanet Hosting Star 30 Arietis B** by *Stephen R. Kane, et al.*
astro-ph/1511.01606 : **Radio SETI Observations of the Anomalous Star KIC 8462852** by *G. R. Harp, et al.*
astro-ph/1511.01786: **Evaluating Galactic Habitability Using High Resolution Cosmological Simulations of Galaxy Formation** by *Duncan Forgan, et al.*
astro-ph/1511.02230 : **Doppler-imaging of the planetary debris disc at the white dwarf SDSS J122859.93+104032.9** by *Christopher J. Manser, et al.*
astro-ph/1511.02526 : **Resolving the HD 100546 Protoplanetary System with the Gemini Planet Imager: Evidence for Multiple Forming, Accreting Planets** by *Thayne Currie, et al.*
astro-ph/1511.02549 : **Quantifying the Origins of Life on a Planetary Scale** by *Caleb Scharf, Leroy Cronin*
astro-ph/1511.02813 : **Viscous Instability Triggered by Layered Accretion in Protoplanetary Disks** by *Yasuhiro Hasegawa, Taku Takeuchi*
astro-ph/1511.02837 : **Magnetic games between a planet and its host star: the key role of topology** by *A. Strugarek, et al.*
astro-ph/1511.02856 : **'Modal-noise' in single-mode fibers: A cautionary note for high precision radial velocity instruments** by *Samuel Halverson, et al.*
astro-ph/1511.02861 : **The Eccentricity Distribution of Short-Period Planet Candidates Detected by Kepler in Occultation** by *Megan Shabram, et al.*
astro-ph/1511.02882 : **Stability of Earth-mass Planets in the Kepler-68 System** by *Stephen R. Kane*
astro-ph/1511.02894 : **Magellan Adaptive Optics first-light observations of the exoplanet beta Pic b. II. 3-5 micron direct imaging with MagAO+Clio, and the empirical bolometric luminosity of a self-luminous giant planet** by *Katie M. Morzinski, et al.*
astro-ph/1511.02988 : **On shocks driven by high-mass planets in radiatively inefficient disks. II. Three-dimensional global disk simulations** by *Wladimir Lyra, et al.*
astro-ph/1511.03063 : **On the Radius Anomaly of Hot Jupiters: Reexamination of the Possibility and Impact of Layered Convection** by *Hiroyuki Kurokawa, Shu-ichiro Inutsuka*
astro-ph/1511.03197 : **Radii, masses, and ages of 18 bright stars using interferometry. And new estimations of exoplanetary parameters** by *Roxanne Ligi, et al.*
astro-ph/1511.03274 : **On the Fate of Unstable Circumbinary Planets: Tatooine's Close Encounters with a Death Star** by *Adam P. Sutherland, Daniel C. Fabrycky*
astro-ph/1511.03431 : **Consistent dust and gas models for protoplanetary disks. I. Disk shape, dust settling, opacities, and PAHs** by *P. Woitke, et al.*
astro-ph/1511.03550 : **A rocky planet transiting a nearby low-mass star** by *Zachory K. Berta-Thompson, et al.*
astro-ph/1511.03647 : **The Evolution of Stellar Rotation and the hydrogen atmospheres of habitable-zone Terrestrial Planets** by *C. P. Johnstone, et al.*
astro-ph/1511.03663 : **Giant Impacts on Earth-like Worlds** by *Elisa V. Quintana, et al.*
astro-ph/1511.03664 : **The capabilities and performance of the Automated Planet Finder Telescope with the implementation of a dynamic scheduler** by *Jennifer Burt, et al.*
astro-ph/1511.03689 : **Spatially resolved eastward winds and rotation of HD 189733b** by *Tom Louden, Peter J. Wheatley*
astro-ph/1511.03779 : **Retrieval of Planetary Rotation and Albedo from DSCOVR data** by *S.R. Kane, et al.*
astro-ph/1511.03903 : **On the growth of pebble-accreting planetesimals** by *Rico G. Visser, Chris W. Ormel*
astro-ph/1511.03941 : **The HARPS search for southern extra-solar planets. XXXIX. HD175607 b, the most metal-poor G dwarf with an orbiting sub-Neptune** by *A. Mortier, et al.*

astro-ph/1511.04072 : **First light of the VLT planet finder SPHERE. II. The physical properties and the architecture of the young systems PZ Tel and HD 1160 revisited** by *A.-L. Maire, et al.*

astro-ph/1511.04076 : **First light of the VLT planet finder SPHERE. I. Detection and characterization of the sub-stellar companion GJ 758 B** by *A. Vigan, et al.*

astro-ph/1511.04082 : **First light of the VLT planet finder SPHERE. IV. Physical and chemical properties of the planets around HR8799** by *M. Bonnefoy, et al.*

astro-ph/1511.04083 : **First light of the VLT planet finder SPHERE. III. New spectrophotometry and astrometry of the HR8799 exoplanetary system** by *A. Zurlo, et al.*

astro-ph/1511.04105 : **A tunnel and a traffic jam: How transition disks maintain a detectable warm dust component despite the presence of a large planet-carved gap** by *Paola Pinilla, et al.*

astro-ph/1511.04415 : **Reflected Light Curves, Spherical and Bond Albedos of Jupiter- and Saturn-like Exoplanets** by *Ulyana Dyudina, et al.*

astro-ph/1511.04444 : **Water On -and In- Terrestrial Planets** by *Nicolas B. Cowan*

astro-ph/1511.04497 : **Two Transiting Low Density Sub-Saturns from K2** by *Erik A. Petigura, et al.*

astro-ph/1511.04822 : **Planetary System Formation in Protoplanetary Disk around HL Tauri** by *Eiji Akiyama, et al.*

astro-ph/1511.04920 : **Atmospheric effects of stellar cosmic rays on Earth-like exoplanets orbiting M-dwarfs** by *F. Tabataba-Vakili, et al.*

astro-ph/1511.05152 : **Inferring Planetary Obliquity Using Rotational & Orbital Photometry** by *Joel C. Schwartz, et al.*

astro-ph/1511.05171 : **Physical properties of the planetary systems WASP-45 and WASP-46 from simultaneous multi-band photometry** by *S. Ciceri, et al.*

astro-ph/1511.05207 : **Models of the Eta Corvi debris disk from the Keck Interferometer, Spitzer and Herschel** by *J. Lebreton, et al.*

astro-ph/1511.05306 : **The Host Stars of Keplers Habitable Exoplanets: Superflares, Rotation and Activity** by *D. J. Armstrong, et al.*

astro-ph/1511.05528 : **Characterizing transiting exoplanet atmospheres with JWST** by *Thomas P. Greene, et al.*

astro-ph/1511.05563 : **C/O and Snowline Locations in Protoplanetary Disks: The Effect of Radial Drift and Viscous Gas Accretion** by *Ana-Maria A. Piso, et al.*

astro-ph/1511.05570 : **Are Tidal Effects Responsible for Exoplanetary Spin-Orbit Alignment?** by *Gongjie Li, Joshua N. Winn*

astro-ph/1511.05601 : **Rayleigh Scattering in the Atmosphere of the Warm Exo-Neptune GJ 3470b** by *Diana Dragomir, et al.*

astro-ph/1511.05954 : **WASP-135b: a highly irradiated, inflated hot Jupiter orbiting a G5V star** by *Jessica J. Spake, et al.*

astro-ph/1511.05973 : **Evidence for Gas from a Disintegrating Extrasolar Asteroid** by *S. Xu et al.*

astro-ph/1511.06287 : **Forced libration of tidally synchronized planets and moons** by *Valeri V. Makarov, Julien Frouard, Bryan Dorland*

astro-ph/1511.06305 : **HATS-15 b and HATS-16 b: Two massive planets transiting old G dwarf stars** by *S. Ciceri, et al.*

astro-ph/1511.06402 : **The DEdicated MONitor of EXotransits (DEMONEX): Seven Transits of XO-4b** by *S. Villanueva Jr., J. D. Eastman, B. S. Gaudi*

astro-ph/1511.06471 : **The Enigmatic and Ephemeral M Dwarf System KOI 6705: Cheshire Cat or Wild Goose?** by *Eric Gaidos, Andrew W. Mann, Megan Ansdell*

astro-ph/1511.06717 : **Modelling the photosphere of active stars for planet detection and characterization** by *Enrique Herrero, et al.*

astro-ph/1511.06762 : **Direct imaging of the water snow line at the time of planet formation using two ALMA continuum bands** by *Andrea Banzatti, et al.*

astro-ph/1511.06767 : **First Scattered-Light Image of the Debris Disk around HD 131835 with the Gemini Planet Imager** by *Li-Wei Hung, et al.*
astro-ph/1511.06769 : **Magneto-thermal Disk Wind from Protoplanetary Disks** by *Xue-Ning Bai, et al.*
astro-ph/1511.07199 : **On the Grain-Modified Magnetic Diffusivities in Protoplanetary Disks** by *Rui Xu, Xue-Ning Bai*
astro-ph/1511.07283 : **Exploring the Inner Edge of the Habitable Zone with Fully Coupled Oceans** by *M. J. Way, et al.*
astro-ph/1511.07385 : **The initial physical conditions of Kepler-36 b & c** by *James E. Owen, Timothy D. Morton*
astro-ph/1511.07435 : **Application of Gas Dynamical Friction for Planetesimals: II. Evolution of Binary Planetesimals** by *Evgeni Grishin, Hagai B. Perets*
astro-ph/1511.07441 : **Asteroseismology of Exoplanet Host Stars** by *Daniel Huber*
astro-ph/1511.07456 : **Accreting Protoplanets in the LkCa 15 Transition Disk** by *S. Sallum, et al.*
astro-ph/1511.07468 : **Radial velocity information content of M dwarf spectra in the near-infrared** by *P. Figueira, et al.*
astro-ph/1511.07583 : **Giant planet formation via pebble accretion** by *O. M. Guilera*
astro-ph/1511.07762 : **A panoptic model for planetesimal formation and pebble delivery** by *Sebastiaan Krijt, et al.*
astro-ph/1511.07796 : **A new approach to analysing HST spatial scans: the transmission spectrum of HD 209458b** by *A. Tsiaras, et al.*
astro-ph/1511.07820 : **Planetary Candidates from the First Year of the K2 Mission** by *Andrew Vanderburg, et al.*
astro-ph/1511.07831 : **A proposal for climate stability on H2-greenhouse planets** by *Dorian S. Abbot*
astro-ph/1511.07854 : **The Mass-Metallicity Relation for Giant Planets** by *Daniel P. Thorngren, Jonathan J. Fortney, Eric D. Lopez*
astro-ph/1511.08226 : **Evidence for Water in the Atmosphere of HAT-P-26b Using LDSS-3C** by *Kevin B. Stevenson, et al.*
astro-ph/1511.08397 : **The SOPHIE search for northern extrasolar planets VIII. Follow-up of ELODIE candidates: long-period brown-dwarf companions** by *F. Bouchy, et al.*
astro-ph/1511.08508 : **The K2-ESPRINT Project III: A Close-in Super-Earth around a Metal-rich Mid-M Dwarf** by *Teruyuki Hirano, et al.*
astro-ph/1511.08534 : **3D Modeling of Spectra and Light Curves of Hot Jupiters; A First Approach** by *Juan J. Jiménez-Torres*
astro-ph/1511.08679 : **Evidence for Reflected Light from the Most Eccentric Exoplanet Known** by *Stephen R. Kane, et al.*
astro-ph/1511.08727 : **Dynamics of the 3/1 planetary mean-motion resonance. An application to the HD60532 b-c planetary system** by *A. J. Alves, T. A. Michtchenko, M. Tadeu dos Santos*
astro-ph/1511.08821 : **KIC 8462852: Transit of a Large Comet Family** by *Eva H. L. Bodman, Alice Quillen*
astro-ph/1511.08901 : **Detection of an atmosphere around the super-Earth 55 Cancri e** by *A. Tsiaras, et al.*
astro-ph/1511.09068 : **Stellar Wind – Magnetosphere Interactions in Hot Jupiters** by *Derek L. Buzasi*
astro-ph/1511.09097 : **The Kepler-454 System: A Small, Not-rocky Inner Planet, a Jovian World, and a Distant Companion** by *Sara Gettel, et al.*
astro-ph/1511.09157 : **In Situ Formation and Dynamical Evolution of Hot Jupiter Systems** by *Konstantin Batygin, Peter H. Bodenheimer, Gregory P. Laughlin*
astro-ph/1511.09183 : **The LEECH Exoplanet Imaging Survey: Characterization of the Coldest Directly Imaged Exoplanet, GJ 504 b, and Evidence for Super-Stellar Metallicity** by *Andrew J. Skemer, et al.*
astro-ph/1511.09211 : **Dynamical considerations for life in multihabitable planetary systems** by *Jason H. Steffen, Gongjie Li*
astro-ph/1511.09213 : **Ten Multi-planet Systems from K2 Campaigns 1 & 2 and the Masses of Two Hot Super-Earths** by *Evan Sinukoff, et al.*

astro-ph/1511.09287 : **The detailed chemical composition of the terrestrial planet host Kepler-10** by *F. Liu, et al.*

astro-ph/1511.09443 : **The Influence of Non-Uniform Cloud Cover on Transit Transmission Spectra** by *Michael R. Line, Vivien Parmentier*

astro-ph/1511.09472 : **Resonant Removal of Exomoons During Planetary Migration** by *Christopher Spalding, Konstantin Batygin, Fred C. Adams*