ExoPlanet News
An Electronic Newsletter

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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 92nd edition of Exoplanet News. This month's newsletter contains almost as many conference and workshop announcements as abstracts of papers, which is probably not something we've seen before. The newsletter mailing list now exceeds 1350 subscribers, so please do submit your abstracts for any papers as soon as they are available, in order to reach this wide readership. Please keep these coming in time for the next issue in December which will be the last one of the year.

best wishes
Andrew Norton

2 Abstracts of refereed papers

Limits to the presence of transiting circumbinary planets in CoRoT data

P. Klagyivik[1,2,3], *H.J. Deeg*[1,2], *J. Cabrera*[4], *Sz. Csizmadia*[4], *J.M. Almenara*[5]

[1] Instituto de Astrofísica de Canarias, C. Via Lactea S/N, E-38205 La Laguna, Tenerife, Spain
[2] Universidad de La Laguna, Dept. de Astrofísica, E-38206 La Laguna, Tenerife, Spain
[3] Konkoly Observatory, Research Centre for Astronomy and Earth Sciences, Hungarian Academy of Sciences, H-1121 Budapest, Konkoly Thege Miklós út 15-17, Hungary
[4] Institute of Planetary Research, German Aerospace Center, Rutherfordstrasse 2, D-12489, Berlin, Germany
[5] Observatoire Astronomique de l'Université de Genève, 51 chemin des Maillettes, 1290 Versoix, Switzerland

Astronomy & Astrophysics, in press (arXiv:1610.08471)

The CoRoT mission during its flight-phase 2007-2012 delivered the light-curves for over 2000 eclipsing binaries. Data from the *Kepler* mission have proven the existence of several transiting circumbinary planets. Albeit light-curves from CoRoT have typically lower precision and shorter coverage, CoRoT's number of targets is similar to *Kepler*, and some of the known circumbinary planets could potentially be detected in CoRoT data as well. The aim of this work has been a revision of the entire CoRoT data-set for the presence of circumbinary planets, and the derivation of limits to the abundances of such planets. We developed a code which removes the light curve of the eclipsing binaries and searches for quasi-periodic transit-like features in a light curve after removal of binary eclipses and instrumental features. The code needs little information on the sample systems and can be used for other space missions as well, like *Kepler, K2, TESS and PLATO*. The code is broad in the requirements leading to detections, but was tuned to deliver an amount of detections that is manageable in a subsequent, mainly visual, revision about their nature. In the CoRoT sample we identified three planet candidates whose transits would have arisen from a single pass across the central binary. No candidates remained however with transit events from multiple planetary orbits. We calculated the upper limits for the number of Jupiter, Saturn and Neptune sized planets in co-planar orbits for different orbital period ranges. We found that there are much less giant planets in short-periodic orbits around close binary systems than around single stars.

Download/Website: `https://arxiv.org/abs/1610.08471`

Contact: `hdeeg@iac.es`

A consistent retrieval analysis of 10 Hot Jupiters observed in transmission

J. K. Barstow[1,2], *S. Aigrain*[2], *P. G. J. Irwin* [2], *D. K. Sing*[3]
[1] Physics and Astronomy, University College London, London, UK
[2] Department of Physics, University of Oxford, Oxford, UK
[3] School of Physics, University of Exeter, Exeter, UK

The Astrophysical Journal, in press (arXiv:1610.01841)

We present a consistent optimal estimation retrieval analysis of ten hot Jupiter exoplanets, each with transmission spectral data spanning the visible to near-infrared wavelength range. Using the NEMESIS radiative transfer and retrieval tool, we calculate a range of possible atmospheric states for WASP-6b, WASP-12b, WASP-17b, WASP-19b, WASP-31b, WASP-39b, HD 189733b, HD 209458b, HAT-P-1b and HAT-P-12b. We find that the spectra of all ten planets are consistent with the presence of some atmospheric aerosol; WASP-6b, WASP-12b, WASP-17b, WASP-19b, HD 189733b and HAT-P-12b are all fit best by Rayleigh scattering aerosols, whereas WASP-31b, WASP-39b and HD 209458b are better represented by a grey cloud model. HAT-P-1b has solutions that fall into both categories. WASP-6b, HAT-P-12b, HD 189733b and WASP-12b must have aerosol extending to low atmospheric pressures (below 0.1 mbar). In general, planets with equilibrium temperatures between 1300 and 1700 K are best represented by deeper, grey cloud layers, whereas cooler or hotter planets are better fit using high Rayleigh scattering aerosol. We find little evidence for the presence of molecular absorbers other than H_2O. Retrieval methods can provide a consistent picture across a range of hot Jupiter atmospheres with existing data, and will be a powerful tool for the interpretation of *James Webb Space Telescope* observations.

Download/Website: `https://arxiv.org/abs/1610.01841`

Contact: `j.eberhardt@ucl.ac.uk`

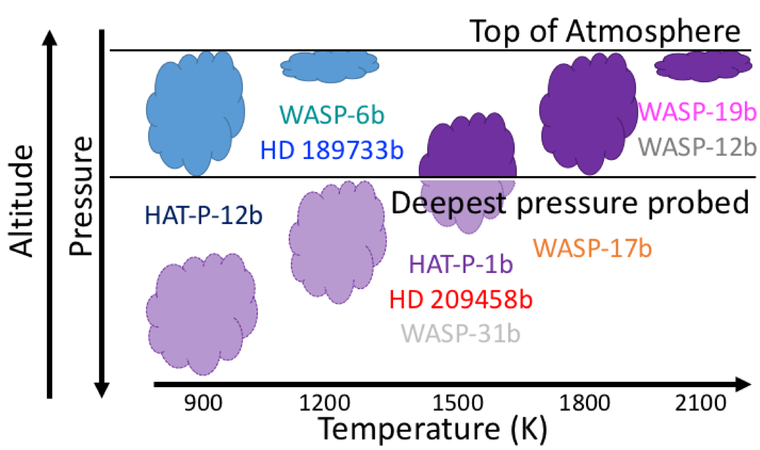

Figure 1: (Barstow et al.) A schematic illustrating how cloud structure for hot Jupiters may vary with temperature, inferred from our retrieval results. For the hottest planets in the sample, WASP-19b and WASP-12b, the condensate we see can only exist relatively high in the atmosphere. For slightly cooler planets such as WASP-17b the cloud that originally forms high up in the atmosphere can extend downwards. Eventually, the cloud particles become large enough to sediment out and the cloud is only seen deep in the atmosphere (WASP-33b, HD 209458b, HAT-P-1b). For even cooler atmospheres, new species start to condense out and the sequence is repeated (WASP-6b, HD 189733b, HAT-P-12b).

Tatooine's Future: The Eccentric Response of *Kepler's* Circumbinary Planets to Common-Envelope Evolution of their Host Stars

Veselin B. Kostov[1,6], *Keavin Moore*[2], *Daniel Tamayo*[3,4,5], *Ray Jayawardhana*[2], *Stephen A. Rinehart*[1]

[1] NASA Goddard Space Flight Center, Mail Code 665, Greenbelt, MD, 20771, USA
[2] Faculty of Science, York University, 4700 Keele Street, Toronto, ON M3J1P3, Canada
[3] Department of Physical & Environmental Sciences, University of Toronto at Scarborough, Toronto, Ontario M1C 1A4, Canada
[4] Canadian Institute for Theoretical Astrophysics, 60 St. George St, University of Toronto, Toronto, Ontario M5S 3H8, Canada
[5] CPS Postdoctoral Fellow
[6] NASA Postdoctoral Fellow

The Astrophysical Journal, Accepted (arXiv: 1610.03436)

Inspired by the recent *Kepler* discoveries of circumbinary planets (CBPs) orbiting nine close binary stars, we explore the fate of the former as the latter evolve off the main sequence. We combine binary star evolution models with dynamical simulations to study the orbital evolution of these planets as their hosts undergo common-envelope stages, losing in the process a tremendous amount of mass on dynamical timescales. Five of the systems experience at least one Roche-lobe overflow and common-envelope stages (Kepler-1647 experiences three), and the binary stars either shrink to very short orbits or coalesce; two systems trigger a double-degenerate supernova explosion. *Kepler's* circumbinary planets predominantly remain gravitationally bound at the end of the common-envelope phase, migrate to larger orbits, and may gain significant eccentricity; their orbital expansion can be more than an order of magnitude and can occur over the course of a single planetary orbit. The orbits these planets can reach are qualitatively consistent with those of the currently known post-common-envelope, eclipse-time variations circumbinary candidates. Our results also show that circumbinary planets can experience both modes of orbital expansion (adiabatic and non-adiabatic) if their host binaries undergo more than one common-envelope stage; multiplanet circumbinary systems like Kepler-47 can experience both modes during the same common-envelope stage. Additionally, unlike Mercury orbiting the Sun, a circumbinary planet with the same semi-major axis can survive the common envelope evolution of a close binary star with a total mass of 1 $M_\odot$.

Download/Website: `https://arxiv.org/abs/1610.03436`

Contact: `veselin.b.kostov@nasa.gov`

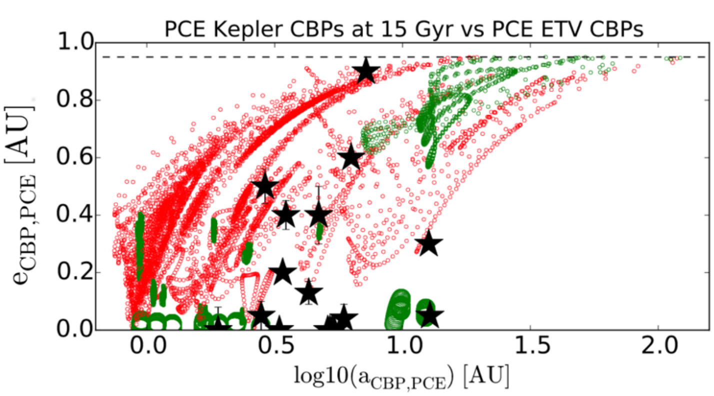

Figure 2: (Kostov et al.) Comparison between the post common-envelope semi-major axes vs eccentricities of *Kepler's* circumbinary planets at 15 Gyr (red and green symbols for various common envelope treatments) and those of the currently known post common-envelope eclipse-time variations circumbinary planet candidates (black symbols). Given the associated observational and numerical uncertainties, our forward-evolution results are qualitatively consistent with the observed orbital configurations of these candidates.

EVEREST: Pixel level decorrelation of *K2* light curves

R. Luger[1,2], *E. Agol*[1,2], *E. Kruse*[1], *R. Barnes*[1,2], *A. Becker*[1], *D. Foreman-Mackey*[1], *D. Deming*[3]
[1] Astronomy Department, University of Washington, Box 351580, Seattle, WA 98195, USA
[2] Virtual Planetary Laboratory, Seattle, WA 98195, USA
[3] Department of Astronomy, University of Maryland, College Park, MD 20742, USA

The Astronomical Journal, published (DOI:10.3847/0004-6256/152/4/100)

We present *EPIC Variability Extraction and Removal for Exoplanet Science Targets* (EVEREST), an open-source pipeline for removing instrumental noise from *K2* light curves. EVEREST employs a variant of pixel level decorrelation to remove systematics introduced by the spacecraft's pointing error and a Gaussian process to capture astrophysical variability. We apply EVEREST to all *K2* targets in campaigns 0–7, yielding light curves with precision comparable to that of the original *Kepler* mission for stars brighter than $K_p \approx 13$, and within a factor of two of the *Kepler* precision for fainter targets. We perform cross-validation and transit injection and recovery tests to validate the pipeline, and compare our light curves to the other de-trended light curves available for download at the MAST High Level Science Products archive. We find that EVEREST achieves the highest average precision of any of these pipelines for unsaturated *K2* stars. The improved precision of these light curves will aid in exoplanet detection and characterization, investigations of stellar variability, asteroseismology, and other photometric studies. The EVEREST pipeline can also easily be applied to future surveys, such as the *TESS* mission, to correct for instrumental systematics and enable the detection of low signal-to-noise transiting exoplanets. The EVEREST light curves and the source code used to generate them are freely available online.

Download/Website: `https://github.com/rodluger/everest`

Contact: `rodluger@uw.edu`

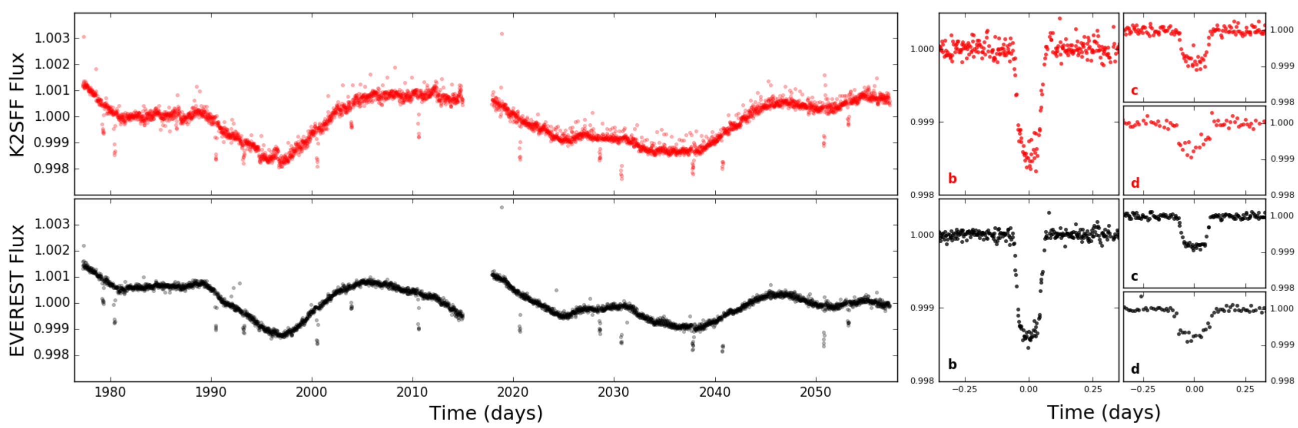

Figure 3: (Luger et al.) De-trended light curves for the campaign 1 star EPIC 201367065 (K2-3, Crossfield et al. 2015). *Top*: the de-trended K2SFF flux (left) and the GP-smoothed flux folded on the periods of the planets b, c, and d (right). *Bottom*: the de-trended EVEREST flux. The 6 hr CDPP is 30.9 ppm for K2SFF and 16.6 ppm for EVEREST, a factor of ~2 improvement.

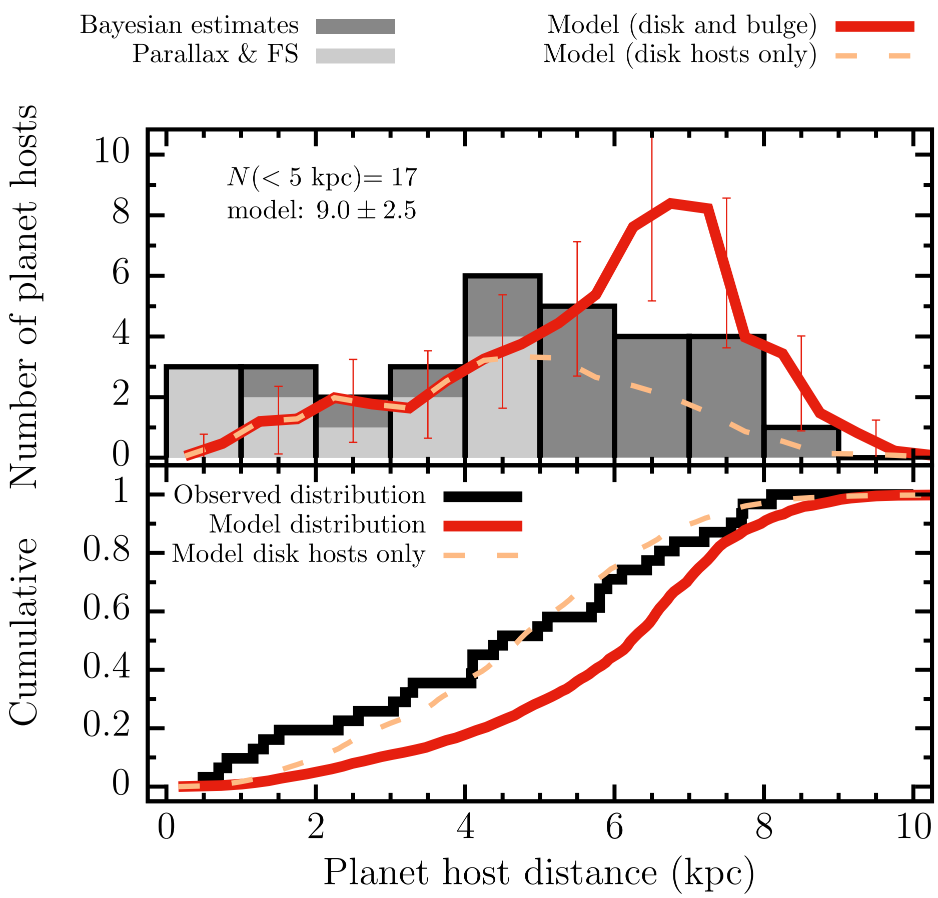

Figure 4: (Penny, Henderson & Clanton) Histogram and cumulative distribution (black lines) of microlensing planet host distance estimates, shaded by measurement method. Light gray shading represents events with distance *measurements* made by detecting parallax and finite source effects, dark gray represents distance *estimates* usually made using Bayesian techniques. The expected distance distribution from our model is plotted with a red solid line; error bars show the Poisson interval of the model for each bin. The expected contribution from disk hosts is plotted with a dashed orange line. Without accounting for (1) trends in intrinsic planet abundance with host mass and metallicity, (2) the removal of one event that was erroneously interpreted as a planet and (3) optimistic detection efficiencies for short-timescale events in our model, one could conclude that our model with an equal planet abundance in the bulge and disk ($f_{\rm bulge} = 1$) is a poor fit to the data, and that a model where only disk stars have planets ($f_{\rm bulge} = 0$) is a much better fit. However, accounting for these three effects produces a distance distribution that is consistent with the data for any value of $f_{\rm bulge} \leq 1.7$.

Is the Galactic bulge devoid of planets?

M. T. Penny[1,2], C. B. Henderson[3,4] and C. Clanton[5,4]

[1] Department of Astronomy, Ohio State University, 140 West 18th Avenue, Columbus, OH 43210, USA
[2] Sagan Fellow
[3] Jet Propulsion Laboratory, California Institute of Technology, 4800 Oak Grove Drive, Pasadena, CA 91109, USA
[4] NASA Postdoctoral Program Fellow
[5] NASA Ames Research Center, Moffett Field, CA 94035, USA

The Astrophysical Journal, 2016ApJ...830..150P

Considering a sample of 31 exoplanetary systems detected by gravitational microlensing, we investigate whether or not the estimated distances to these systems conform to the Galactic distribution of planets expected from models. We derive the expected distribution of distances and relative proper motions from a simulated microlensing survey, correcting for the dominant selection effects that affect the planet detection sensitivity as a function of distance, and compare it to the observed distribution using Anderson-Darling (AD) hypothesis testing. Taking the relative abundance of planets in the bulge to that in the disk, $f_{\rm bulge}$, as a model parameter, we find that our model is only consistent with the observed distribution for $f_{\rm bulge} < 0.54$ (for a p-value threshold of 0.01) implying that the bulge may be devoid of planets relative to the disk. Allowing for a dependence of planet abundance on metallicity and host mass, or an additional dependence of planet sensitivity on event timescale does not restore consistency for $f_{\rm bulge} = 1$. We examine the distance estimates of some events in detail, and conclude that some parallax-based distance estimates could be significantly in error. Only by combining the removal of one problematic event from our sample and the inclusion of strong dependences of planet abundance or detection sensitivity on host mass, metallicity and event timescale are we able to find consistency with the hypothesis that the bulge and disk have equal planet abundance.

Download/Website: `http://adsabs.harvard.edu/abs/2016ApJ...830..150P`

Contact: `penny@astronomy.ohio-state.edu`

Binary star influence on post-main-sequence multi-planet stability

Dimitri Veras[1], Nikolaos Georgakarakos[2], Ian Dobbs-Dixon[2], Boris T. Gaensicke[1]

[1] Department of Physics, University of Warwick, Coventry CV4 7AL, UK
[2] New York University Abu Dhabi, Saadiyat Island, P.O. Box 129188, Abu Dhabi, UAE

Monthly Notices of the Royal Astronomical Society, in press (arXiv:1610.05307)

Nearly every star known to host planets will become a white dwarf, and nearly 100 planet-hosts are now known to be accompanied by binary stellar companions. Here, we determine how a binary companion triggers instability in otherwise unconditionally stable single-star two-planet systems during the giant branch and white dwarf phases of the planet host. We perform about 700 full-lifetime (14 Gyr) simulations with A0 and F0 primary stars and secondary K2 companions, and identify the critical binary distance within which instability is triggered at any point during stellar evolution. We estimate this distance to be about seven times the outer planet separation, for circular binaries. Our results help characterize the fates of planetary systems, and in particular which ones might yield architectures that are conducive to generating observable heavy metal pollution in white dwarf atmospheres.

Download/Website: `http://arxiv.org/abs/1610.05307`

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

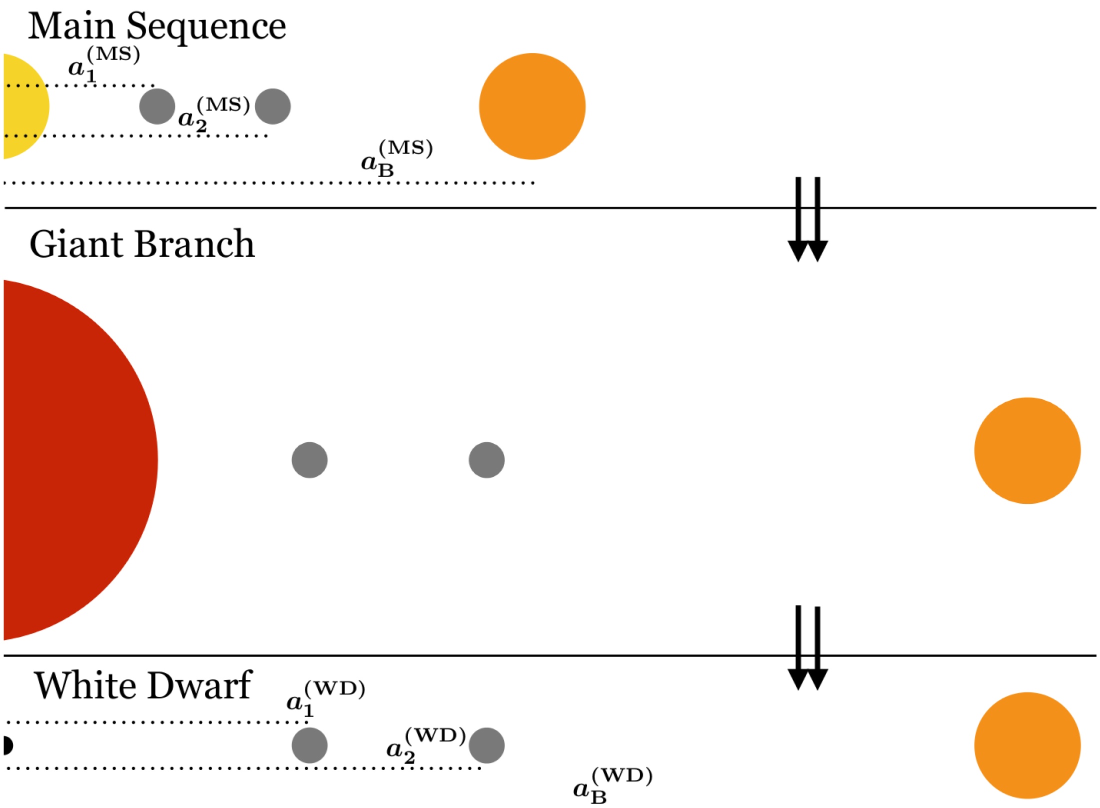

Figure 5: (Veras et al.) Cartoon (not to scale) of our setup: two planets (small grey circles) orbiting the primary (yellow, red then black star at left), plus a secondary (orange star at right). As the primary evolves from the main sequence (top region) to the giant branch phase (middle region) to the white dwarf phase (bottom region), the star expands and then contracts. Concurrently, the planets and secondary all expand their orbits. This paper explores what binary separations would create instability, and during what phases.

Explaining the variability of WD 1145+017 with simulations of asteroid tidal disruption

Dimitri Veras[1], *Philip J. Carter*[2], *Zoe M. Leinhardt*[2], *Boris T. Gaensicke*[1]
[1] Department of Physics, University of Warwick, Coventry CV4 7AL, UK
[2] School of Physics, University of Bristol, Bristol BS8 1TL, UK

Monthly Notices of the Royal Astronomical Society, in press (arXiv:1610.06926)

Post-main-sequence planetary science has been galvanised by the striking variability, depth and shape of the photometric transit curves due to objects orbiting white dwarf WD 1145+017, a star which also hosts a dusty debris disc and circumstellar gas, and displays strong metal atmospheric pollution. However, the physical properties of the likely asteroid which is discharging disintegrating fragments remain largely unconstrained from the observations. This process has not yet been modelled numerically. Here, we use the N-body code PKDGRAV to compute dissipation properties for asteroids of different spins, densities, masses, and eccentricities. We simulate both homogeneous and differentiated asteroids, for up to two years, and find that the disruption timescale is strongly dependent on density and eccentricity, but weakly dependent on mass and spin. We find that primarily rocky differentiated bodies with moderate ($\sim$3-4 g/cm^3) bulk densities on near-circular ($e \lesssim 0.1$) orbits can remain intact while occasionally shedding mass from their mantles. These results suggest that the asteroid orbiting WD 1145+017 is differentiated, resides just outside of the Roche radius for bulk density but just inside the Roche radius for mantle density, and is more akin physically to an asteroid like Vesta instead of one like Itokawa.

Download/Website: `http://arxiv.org/abs/1610.06926`

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

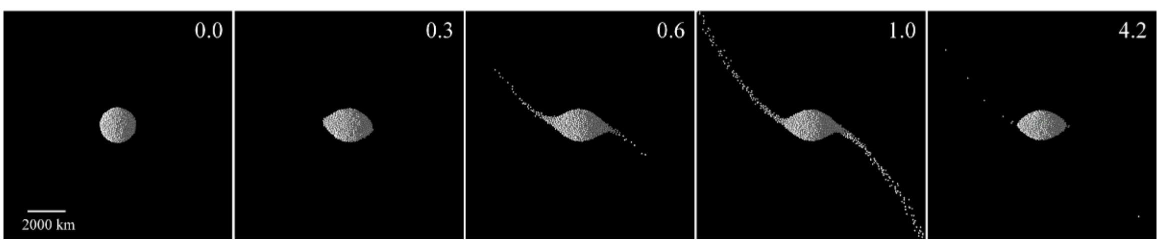

Figure 6: (Veras et al.) Mantle disruption of a differentiated synchronously-spinning rubble pile on a circular orbit with $\rho = 3.5$ g cm^{-3}. The white particles are mantle particles, and the green core particles underneath remain hidden. After about half of an orbit, mantle particles start streaming from the L1 and L2 Lagrange points. After about four orbits, the streaming became intermittent. An animation accompanying this figure may be found here: http://www.star.bris.ac.uk/pcarter/WD1145_asteroid_disruption/

High temperature condensate clouds in super-hot Jupiter atmospheres

H.R. Wakeford[1], *C. Visscher*[2], *N.K. Lewis*[3], *T. Kataria*[4], *M.S. Marley*[5], *J.J. Fortney*[6], *& A. Mandell*[1]

[1] Planetary Systems Lab, NASA Goddard Space Flight Center, Greenbelt, MD 20771, USA
[2] Department of Chemistry, Dordt College, Sioux Center, Iowa 51250, USA
[3] Space Telescope Science Institute, 3700 San Martin Drive, Baltimore, MD 21218, USA
[4] NASA Jet Propulsion Laboratory, 4800 Oak Grove Dr, Pasadena, CA 91109, USA
[5] NASA Ames Research Center, MS 245-5, Moffett Field, CA 94035, USA
[6] Department of Astronomy & Astrophysics, University of California, Santa Cruz, CA 95064, USA

Monthly Notices of the Royal Astronomical Society, in press/published
(doi:10.1093/mnras/stw2639/arXiv:1610.03325)

Deciphering the role of clouds is central to our understanding of exoplanet atmospheres, as they have a direct impact on the temperature and pressure structure, and observational properties of the planet. Super-hot Jupiters occupy a temperature regime similar to low mass M-dwarfs, where minimal cloud condensation is expected. However, observations of exoplanets such as WASP-12b ($T_{eq} \sim$2500 K) result in a transmission spectrum indicative of a cloudy atmosphere. We re-examine the temperature and pressure space occupied by these super-hot Jupiter atmospheres, to explore the role of the initial Al- and Ti-bearing condensates as the main source of cloud material. Due to the high temperatures a majority of the more common refractory material is not depleted into deeper layers and would remain in the vapor phase. The lack of depletion into deeper layers means that these materials with relatively low cloud masses can become significant absorbers in the upper atmosphere. In this paper we provide condensation curves for the initial Al- and Ti-bearing condensates that may be used by the community to provide quantitative estimates of the effect of metallicity on cloud masses, as planets with metal-rich hosts potentially form more opaque clouds because more mass is available for condensation. Increased metallicity also pushes the point of condensation to hotter, deeper layers in the planetary atmosphere further increasing the density of the cloud. We suggest that planets around metal-rich hosts are more likely to have thick refractory clouds, and in the paper discuss the implication on the observed spectra of WASP-12b.

Download/Website: `http://adsabs.harvard.edu/abs/2016arXiv161003325W`

Contact: `hannah.wakeford@nasa.gov`

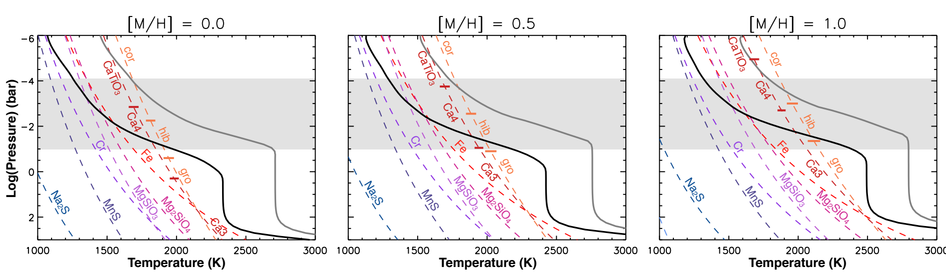

Figure 7: (Wakeford et al.) Each panel displays the 1D T-P profile (Fortney et al. 2008) of typical super-hot Jupiters orbiting a G0V star with $T_{eq} \approx$1860 K (left profile) and $T_{eq} \approx$2500 K (right profile), $g_p = 10\,ms^{-2}$, and $T_{int} = 100$ K. These have been computed for [M/H] = 0.0, 0.5, 1.0, and plotted against the corresponding condensation curves. Condensation curves are computed for Al- and Ti-bearing species following the equations outlined in Section 3.1 of this paper. Following the convention of Lodders (2002), abbreviated condensate names are *gro* = grossite ($CaAl_4O_7$), *hib* = hibonite ($CaAl_{12}O_{19}$), *cor* = corundum (Al_2O_3), *Ca3* = Ca titanate $Ca_3Ti_2O_7$, and *Ca4* = Ca titanate $Ca_4Ti_3O_{10}$. The short horizontal lines on the Al- and Ti- bearing condensation curves show the point of initial condensation, with each portion of the curve labeled for the initial Al-bearing or Ti-bearing condensate, respectively. The grey shaded regions show the pressures observed with transmission spectroscopy.

How to design a planetary system for different scattering outcomes: giant impact sweet spot, maximising exocomets, scattered disks

M. C. Wyatt[1], *A. Bonsor*[1], *A. P. Jackson*[2], *S. Marino*[1], *A. Shannon*[3,4]

[1] Institute of Astronomy, University of Cambridge, Madingley Road, Cambridge CB3 0HA, UK
[2] School of Earth & Space Exploration, Arizona State University, 781 E Terrace Mall, Tempe, AZ 85287-6004, USA
[3] Department of Astronomy & Astrophysics, The Pennsylvania State University, State College, PA, USA
[4] Center for Exoplanets and Habitable Worlds, The Pennsylvania State University, State College, PA, USA

Monthly Notices of the Royal Astronomical Society, in press (arXiv:1610.00714)

This paper considers the dynamics of scattering of planetesimals or planetary embryos by a planet on a circumstellar orbit. We classify six regions in the planet's mass versus semimajor axis parameter space according to the dominant outcome for scattered objects: ejected, accreted, remaining, escaping, Oort Cloud, depleted Oort Cloud. We use these outcomes to consider which planetary system architectures maximise the observability of specific signatures, given that signatures should be detected first around systems with optimal architectures (if such systems exist in nature). Giant impact debris is most readily detectable for $0.1 - 10M_\oplus$ planets at 1-5 au, depending on detection method and spectral type. While A stars have putative giant impact debris at $4 - 6$ au consistent with this sweet spot, that of FGK stars is typically $\ll 1$ au contrary to expectations; an absence of $1 - 3$ au giant impact debris could indicate a low frequency of terrestrial planets there. Three principles maximise cometary influx from exo-Kuiper belts: a chain of closely separated planets interior to the belt, none of which is a Jupiter-like ejector; planet masses not increasing strongly with distance (for a net inward torque on comets); ongoing replenishment of comets, possibly by embedded low-mass planets. A high Oort Cloud comet influx requires no ejector and architectures that maximise the Oort Cloud population. Cold debris disks are usually considered classical Kuiper belt analogues. Here we consider the possibility of detecting scattered disk analogues, which could be betrayed by a broad radial profile and lack of small grains, as well as spherical 100-1000 au mini-Oort Clouds. Some implications for escaping planets around young stars, detached planets akin to Sedna, and the formation of super-Earths, are also discussed.

Download/Website: `http://arxiv.org/abs/1610.00714`

Contact: `wyatt@ast.cam.ac.uk`

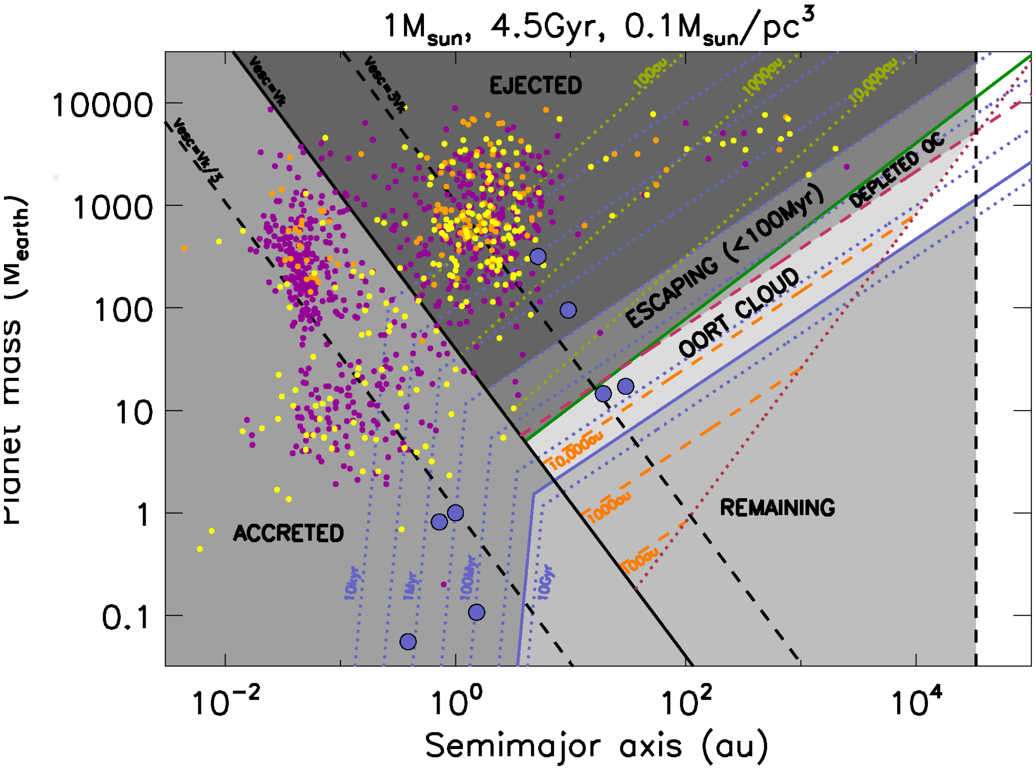

Figure 8: (Wyatt et al.) Planet mass versus semimajor axis parameter space. The yellow, purple and orange dots show the known exoplanets found around $M_\star < 0.6$, $0.6 < M_\star < 1.4$ and $M_\star > 1.4$ stars, respectively; blue dots are the Solar System planets. The shading shows the dominant outcome of scattering interactions with a planet of given parameters (and density $1\,\mathrm{g\,cm^{-3}}$) orbiting a $1 M_\odot$ star for 4.5 Gyr of evolution in an environment with mass density $0.1\,M_\odot\,\mathrm{pc}^{-3}$. The timescales to achieve these outcomes are given by the blue dotted lines; the solid blue line corresponds to 4.5 Gyr. The semimajor axes at which planets eject particles are shown with yellow dashed lines, and those at which particles are implanted in the Oort Cloud are shown with orange dashed lines. The black diagonal lines correspond to planets with a constant ratio of escape velocity to Keplerian velocity. The red dashed line is that at which stellar encounters strip particles from the Oort Cloud, and the vertical black dashed line is the radius at which these encounters would have removed the planet over the system age.

3 Conference announcements

The Third Workshop on Extremely Precise Radial Velocities (ERPV III)

Jason T. Wright, Sharon X. Wang
The Pennsylvania State University, University Park, PA, USA

The Pennsylvania State University, during the week of August 14-17, 2017

This workshop is for teams around the world to share techniques for advancing precise radial velocity work towards 10 cm/s precision in coming years. Building on the success of the first two workshops at Penn State in 2010 and Yale in 2015, the focus on this workshop will be on the performance of the next generation of precise Doppler instruments, including hardware, statistical techniques for signal extraction and interpretation, and stellar jitter modeling and mitigation.

Contact: `jtw13@psu.edu, sharonw@carnegiescience.edu`

Planetary Systems Beyond the Main Sequence II

Hagai Perets (SOC Chair), Amy Bonsor, John Debes, Jay Farihi, Boris Gaensicke, Roman Rafikov, Sonja Schuh, Dimitri Veras, Alexander Wolszczan, Siyi Xu

Technion, Israel, 5-10 March, 2017

To keep up with the latest developments in the blossoming interdisciplinary field of post-main-sequence exoplanetary science, the second "Planetary Systems Beyond the Main Sequence" conference will be held from 5-10 March, 2017 at the Technion – Israel Institute of Technology. There is *no registration fee* for the conference, and we welcome participants from all related fields, including exoplanets, stellar evolution, the Solar System, astrochemistry, debris discs and astrobiology. If you are interested in attending and would like to receive future announcements, then please add your email address to the pre-registration list here: http://planets-beyond-ms.weebly.com/registration.html

Download/Website: `http://planets-beyond-ms.weebly.com/registration.html`

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

2017 AAS Division of Dynamical Astronomy Meeting

LOC: Craig Agnor[1] (chair), Apostolos Christou[2], Alice Monet[3], Carl Murray[1]
[1] Queen Mary University of London, UK
[2] Armagh Observatory, Northern Ireland
[3] United States Naval Observatory, USA

Queen Mary University of London, UK, June 11-15, 2017

The annual DDA meeting brings together researchers in astronomy, astrophysics, planetary science, and astrodynamics for discussions and talks on all aspects of dynamics in the space sciences. Prof. Rosemary F. G. Wyse (FRAS) will be honoured at the 2017 meeting with the AAS-DDA Brouwer Award. The DDA meeting features invited talks on a range of topics, contributed talks (with no parallel sessions), and posters that can be displayed throughout the entire conference. The 2017 DDA meeting is being co-sponsored by the Royal Astronomical Society. Additional details can be found on the conference website.

Download/Website: `https://dda.aas.org/meetings/2017`

Exoclipse 2017

Brian Jackson
Dept. of Physics, Boise State University, Boise ID USA

Boise State University, 2017 Aug 20-24

Exoclipse is an exoplanet conference with focus on direct, RV, and transit detection and characterization of exoplanets, including presentations on observations and instrumentation. Hosted by Boise State University, the conference spans five days and includes a trip to view the total solar eclipse. Friends and family are welcome to attend the eclipse-viewing, although space will be limited.

SCIENTIFIC ORGANIZING COMMITTEE:
Charles Beichman (California Institute of Technology), David Bennett (NASA Goddard Space Flight Center), Beth Biller (University of Edinburgh), Sarah Dodson-Robinson (University of Delaware), Hannah Jang-Condell (University of Wyoming), Bruce Macintosh (Stanford University), Stan Metchev (University of Western Ontario), & Aki Roberge (NASA Goddard Space Flight Center)

LOCAL ORGANIZING COMMITTEE:
Christine Chang (Boise State University), Brian Jackson (Boise State University), Daryl Macomb (Boise State University), Christian Marois (NRC-Herzberg), Angelle Tanner (Mississippi State University), & Tiffany Watkins (Boise State University)

Download/Website: `https://physics.boisestate.edu/exoclipse/`

Contact: `bjackson@boisestate.edu`

Chronology of the Formation of the Solar System VI : The outer Solar System and its relationship with the Interstellar Medium

Aurélien CRIDA[1], *Karine* DEMYK[2], *Guy* LIBOUREL[1], *Alessandro* MORBIDELLI[1], *and the S.O.C.*
[1] University Côte d'Azur, Observatoire de la Côte d'Azur – Lagrange, Nice, France
[2] I.R.A.P. – Institut de Recherche en Astrophysique et Planétologie, Toulouse, France

Les Houches Physics centre, France, 12-17 February, 2017

A new, one week school is organized from Feb 12 to 17, 2017, at the conference center in Les Houches (France) on the subject of the interactions between the outer solar system and the interstellar medium.
The goal of the school is to review our current knowledge on the formation of stars and protoplanetary disks, as well as of planetesimals and planets in these disks. The focus will be on the heritage of chemical and structural properties from the parent interstellar medium, with an emphasis on the most recent results. This is an interdisciplinary school, at the frontier between planetary science, chemistry of interstellar medium and cosmochemistry.
The school is open to Ph.D. students and researchers who wish to broaden their knowledge in an interdisciplinary spirit. The lectures will be accessible to non specialists, but a background in planetary science or astrophysics is required. The lectures can be grouped in three categories: (a) chemistry and mineralogy of grains in the interstellar medium, (b) evolution of molecular clouds and protoplanetary disks, (c) constraints from observations of molecular clouds, disks and solar system objects.
The lectures will take place each morning from 8h30 to 12h30 and from 16h30 to 19h00. The free time till the afternoon session will be used for informal exchanges among the participants and with the lecturers. Seminars from the participants are possible in the evenings. The school will end at 12h30 on Friday (Feb 17). The total time of lectures will be 27,5 hours. The participants will arrive in the afternoon of Sunday (Feb 12) and leave on Friday (Feb 17) after lunch.
List of lectures (all in English) and lecturers :

- Chemistry from dark molecular clouds to disks, by Pierre Hily-Blant
- The environment of the forming Sun, by Matthieu Gounelle
- Dynamics of the collapse of the molecular cloud and disk formation,
  by Benoit Commercon & Anaelle Maury
- Observation of proto-planetary disks, by Anne Dutrey
- Chemistry and mineralogy of interstellar grains, by Larry Nittler
- Interstellar dust and dust evolution in disks, by Emmanuel Dartois et Hugues Leroux
- Chemical and Isotopic heterogeneity in the solar system disk (lecturer to be confirmed)
- Radial mixing of grains and planetesimal precursors in the protoplanetary disk, by Fred Ciesla
- Ultra-carbonated micrometeorites and results of Rosetta/COSIMA, by Cecile Engrand
- The lessons of the Rosetta mission, by Dominique Bockelee-Morvan
- The nature of Ceres, by Cristina De Sanctis

Practical informatino :
The number of participants is limited to 70 (including the lecturers).
The registration fees are not determined yet (numerous proposals for funds have been submitted), but they will not be more than 460 euros, including full-board living expenses at the Les Houches conference center (https://houches.univ-grenoble-alpes.fr/)

If you are interested in this school, please send an email to the chair of the LOC and SOC, Aurélien Crida (crida@oca.eu), with the title ”pre registration for Les Houches school”, with a short letter of motivation. For Ph.D. students, a letter of endorsement from the thesis supervisor is also required. If the number of pre-registrations exceeds 70, the applicants will be selected by the SOC on the basis of scientific affinity. The selected participants will then be requested to pay the registration fees. Hoping to see you numerous in Les Houches next winter !

Download/Website: `http://www-n.oca.eu/crida/SchoolChronoVI/CSSVI.html`

Contact: `crida@oca.eu`

Habitable Worlds 2017: A System Science Workshop

Victoria Meadows
UW Astronomy Department; UW Astrobiology Program; NASA Astrobiology Institute

Laramie, Wyoming, USA, Nov 13-17, 2017

The Nexus for Exoplanet System Science (NExSS), a NASA research coordination network dedicated to the study of planetary habitability, is pleased to announce a five-day conference on ”Habitable Worlds 2017: A System Science Workshop” from Nov 13-17, 2017 in Laramie, WY. The field of exoplanets is currently at the cusp of a watershed moment in finding life on other worlds, propelled by the discoveries of habitable zone terrestrial planets in both ground and space-based surveys, and the potential for future telescopes to characterize the atmospheres of some of these rocky planets. Preparing for such a singular moment needs a diverse community, including Earth scientists, heliophysicists, planetary scientists, and astrophysicists.

Following the goals of NExSS to investigate the diversity of exoplanets and to learn how their history, geology, and climate interact to create the conditions for life, and corresponding bio-signature detection, the conference aims to address these questions:

1. What are the properties of habitable planets?
2. What would they look like?
3. How do you find them?
4. How do they form and what are their histories?

The conference will span five days, with plenary talks in the mornings, breakout groups for in-depth discussions in the evenings, and ample space and time for posters. Breakout groups will provide a brief summary of their discussions on the last day of the meeting. We welcome suggestions from the community the topics to be discussed in the breakout discussions.
For future details on the meeting, please sign up to our conference mailing list at the link below.
Any questions may be directed to the e-mail address below.

Download/Website: `https://nexss.info/community/workshops/habitable-worlds-2017`

Contact: `HabWorlds17@gmail.com`

The 21st International Microlensing Conference: Ushering in the New Age of Microlensing from Space

C. Henderson
California Institute of Technology, Pasadena, CA, USA

Pasadena, CA, January 31 - February 3, 2017

We happily invite the exoplanet community to the 21st International Microlensing Conference entitled "Ushering in the New Age of Microlensing from Space." The field of gravitational microlensing is burgeoning, in particular due to the success of several space-based missions. We will highlight breaking results from *K2's* Campaign 9 (*K2*C9), a combined ground- and space-based microlensing survey, as well as progress in *Spitzer's* program of obtaining "satellite parallaxes." Talks on ground-based surveys and advances in theory will also be featured prominently. Finally, we will have a number of talks on the revolutionary promise of the *WFIRST* mission for exoplanet science, which was recently approved to enter Phase A. Together these endeavors provide invaluable insight into topics such as the Galactic distribution of exoplanets, the abundance of free-floating planets, and the demographics of cold exoplanets.

The three-day conference will be preceded by a free half-day tutorial the afternoon of January 31 at Caltech. This tutorial will feature a series of microlensing talks introducing the mathematical formalism, observational methodology, and recent results of gravitational microlensing searches for exoplanets. Special emphasis will be given to the demographic questions addressed by space satellite programs, including *Spitzer*, *K2*C9, and *WFIRST*. This tutorial is recommended for those new to the field of microlensing and will help set the stage for synthesizing the content of the remainder of the conference. We thus encourage anyone interested in the microlensing technique to join us on the afternoon of January 31, 2017 for this free session, regardless of planned conference attendance.

Important Dates

- November 3, 2016: Travel Forecast Closing Date for NASA Attendees (NCTS Number 25666-17)
- December 1, 2016: Early Registration and Abstract Submission Deadline
- January 6, 2017: Hotel Reservation Deadline at the Pasadena Sheraton
- January 23, 2017: Late Registration Deadline
- January 31, 2017: 1/2 day Microlensing Tutorial at Caltech
- February 1-3, 2017: 21st International Conference on Microlensing at the Pasadena Sheraton

Download/Website: `http://nexsci.caltech.edu/conferences/2017/microlensing/`
Contact: `mlens2017@ipac.caltech.edu`

4 Jobs and positions

Assistant Professor of Physics (3 positions)(Vacancy Reference 1583723)

Don Pollacco
Department of Physics, University of Warwick, UK

Department of Physics, University of Warwick , 21st November 2016

The Department of Physics at the University of Warwick seeks to make up to three permanent academic appointments in the area of Exoplanets. Applicants will have a strong research track record and be ready to build your own research team with the support of colleagues at Warwick.

Warwick has leading positions in the WASP and NGTS ground based transit experiments, membership of the ESA S mission CHEOPS board, and the Science Coordination of ESAs PLATO mission (the PLATO Science office is being established at Warwick). It is expected that the successful candidates will take advantage of the opportunities presented by these experiments. One of these appointments could suit an applicant with a theoretical background. Suitable areas could include planetary atmospheres and orbital dynamics.

In addition to the above posts, we invite applications from outstanding scientists who either already hold an externally funded Research Fellowship or are seeking a top-class institution with which to apply for such a Fellowship in this research area.

Assistant Professor is a tenure track position leading to appointment as Associate Professor after successful completion of probation. Teaching and administration duties are reduced during the probationary period.

The University of Warwick maintains a global outlook and has affiliates around the globe. The Department of Physics will provide an exciting and highly supportive environment in which academics can develop their careers. We are fully committed to equality of opportunity and encourage application and enquiries from all suitably qualified candidates.

Candidates should submit their application via the online application system at the Warwick portal. Details are available from the website below.

Note: Closing date for applications is the 21st November 2016.
Informal enquiries can be addressed to Professor Pollacco on Tel: +44 24765 74329 or at the address below.

Download/Website: `http://www.jobs.ac.uk/job/AUI351/assistant-professor-plato-78318-086/`

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

5 As seen on astro-ph

The following list contains all the entries relating to exoplanets that we spotted on astro-ph during October 2016. If you see any that we missed, please let us know and we'll include them in the next issue.

astro-ph/1610.00600 : **Rossiter–McLaughlin models and their effect on estimates of stellar rotation, illustrated using six WASP systems** by *D.J.A. Brown, et al.*

astro-ph/1610.00714 : **How to design a planetary system for different scattering outcomes: giant impact sweet spot, maximising exocomets, scattered disks** by *M.C. Wyatt, et al.*

astro-ph/1610.01170 : **Born Dry in the Photo-Evaporation Desert: Kepler's Ultra-Short-Period Planets Formed Water-Poor** by *Eric D. Lopez*

astro-ph/1610.01173 : **Herschel Observations and Updated Spectral Energy Distributions of Five Sunlike Stars with Debris Disks** by *Sarah E. Dodson-Robinson et al.*

astro-ph/1610.01186 : **VLT FORS2 comparative transmission spectroscopy: Detection of Na in the atmosphere of WASP-39b from the ground** by *Nikolay Nikolov, et al.*

astro-ph/1610.01232 : **Giant planet formation at the pressure maxima of protoplanetary disks** by *O. M. Guilera, Zs. Sándor*

astro-ph/1610.01333 : **Ground-based Transit Observation of the Habitable-zone super-Earth K2-3d** by *Akihiko Fukui, et al.*

astro-ph/1610.01336 : **On Correlated-noise Analyses Applied To Exoplanet Light Curves** by *Patricio Cubillos, et al.*

astro-ph/1610.01379 : **Zero Age Planetary Orbit of Gas Giant Planets Revisited: Reinforcement of the Link with Stellar Metallicity** by *Rafael Pinotti, et al.*

astro-ph/1610.01389 : **Treatment of overlapping gaseous absorption with the correlated-k method in hot Jupiter and brown dwarf atmosphere models** by *David S. Amundsen, et al.*

astro-ph/1610.01597 : **The Fate of Exomoons in White Dwarf Planetary Systems** by *Matthew J. Payne, et al.*

astro-ph/1610.01606 : **Slowly-growing gap-opening planets trigger weaker vortices** by *Michael Hammer, Kaitlin M. Kratter, Min-Kai Lin*

astro-ph/1610.01610 : **Exoplanetary atmospheric sodium revealed by the orbital motion. Narrow-band transmission spectroscopy of HD 189733b with UVES** by *S. Khalafinejad, et al.*

astro-ph/1610.01643 : **A desert of gas giant planets beyond tens of au** by *Sergei Nayakshin*

astro-ph/1610.01791 : **Circumplanetary disks around young giant planets: a comparison between core-accretion and disk instability** by *J. Szulágyi, L. Mayer, T. Quinn*

astro-ph/1610.01841 : **A consistent retrieval analysis of 10 Hot Jupiters observed in transmission** by *Joanna K. Barstow, et al.*

astro-ph/1610.01877 : **Greenhouse effect from the point of view of radiative transfer** by *Szabolcs Barcza*

astro-ph/1610.01977 : **Long-Lived Dust Asymmetries at Dead Zone Edges in Protoplanetary Disks** by *Ryan Miranda, et al.*

astro-ph/1610.02039 : **UKIRT microlensing surveys as a pathfinder for WFIRST: The detection of five highly extinguished low-$|b|$ events** by *Y. Shvartzvald, et al.*

astro-ph/1610.02044 : **Can dead zones create structures like a transition disk?** by *Paola Pinilla, et al.*

astro-ph/1610.02049 : **An analytical formalism accounting for clouds and other "surfaces" for exoplanet transmission spectroscopy** by *Yan Bétrémieux, Mark R. Swain*

astro-ph/1610.02283 : **Transition to a Moist Greenhouse with CO2 and solar forcing** by *Max Popp, Hauke Schmidt, Jochem Marotzke*

astro-ph/1610.02848 : **Exploring Biases of Atmospheric Retrievals in Simulated JWST Transmission Spectra of Hot Jupiters** by *M. Rocchetto, et al.*

astro-ph/1610.03067 : **Measuring the Galactic Distribution of Transiting Planets with WFIRST** by *Benjamin*

T. Montet, Jennifer C. Yee, Matthew T. Penny

astro-ph/1610.03216 : **HELIOS-Retrieval: An Open-source, Nested Sampling Atmospheric Retrieval Code, Application to the HR 8799 Exoplanets and Inferred Constraints for Planet Formation** by *Baptiste Lavie, et al.*

astro-ph/1610.03325 : **High temperature condensate clouds in super-hot Jupiter atmospheres** by *Hannah R. Wakeford, et al.*

astro-ph/1610.03436 : **Tatooine's Future: The Eccentric Response of Kepler's Circumbinary Planets to Common-Envelope Evolution of their Host Stars** by *Veselin B. Kostov, et al.*

astro-ph/1610.03460 : **Formation and composition of planets around very low mass stars** by *Yann Alibert, Willy Benz*

astro-ph/1610.03504 : **The Broadband and Spectrally-Resolved H-band Eclipse of KELT-1b and the Role of Surface Gravity in Stratospheric Inversions in Hot Jupiters** by *Thomas G. Beatty, et al.*

astro-ph/1610.03550 : **A population of planetary systems characterized by short-period, Earth-sized planets** by *Jason H. Steffen, Jeffrey L. Coughlin*

astro-ph/1610.03893 : **Atmospheric Circulation of Hot Jupiters: Dayside-Nightside Temperature Differences. II. Comparison with Observations** by *Thaddeus D Komacek, Adam P. Showman, Xianyu Tan*

astro-ph/1610.04014 : **VLT/SPHERE robust astrometry of the HR8799 planets at milliarcsecond-level accuracy Orbital architecture analysis with PyAstrOFit** by *Olivier Wertz, et al.*

astro-ph/1610.04038 : **Multiple rings in the transition disk and companion candidates around RXJ1615.3-3255. High contrast imaging with VLT/SPHERE** by *J. de Boer, et al.*

astro-ph/1610.04047 : **How eclipse time variations, eclipse duration variations, and radial velocities can reveal S-type planets in close eclipsing binaries** by *M. Oshagh, R. Heller, S. Dreizler*

astro-ph/1610.04239 : **Mass Extinctions and a Dark Disk** by *Eric David Kramer, Michael Rowan*

astro-ph/1610.04446 : **Spectroscopic characterisation of microlensing events Towards a new interpretation of OGLE-2011-BLG-0417** by *A. Santerne, et al.*

astro-ph/1610.05269 : **Speckle Imaging Excludes Low-Mass Companions Orbiting the Exoplanet Host Star TRAPPIST-1** by *Steve B. Howell, et al.*

astro-ph/1610.05293 : **A New M Dwarf Debris Disk Candidate in a Young Moving Group Discovered with Disk Detective** by *Steven M. Silverberg, et al.*

astro-ph/1610.05303 : **Supernova enrichment of planetary systems in low-mass star clusters** by *Rhana B. Nicholson, Richard J. Parker*

astro-ph/1610.05307 : **Binary star influence on post-main-sequence multi-planet stability** by *Dimitri Veras, et al.*

astro-ph/1610.05359 : **A Machine Learns to Predict the Stability of Tightly Packed Planetary Systems** by *Daniel Tamayo, et al.*

astro-ph/1610.05403 : **Runaway gas accretion and gap opening versus type I migration** by *Aurlien Crida, Bertram Bitsch*

astro-ph/1610.05705 : **Assessing magnetic torques and energy fluxes in close-in star-planet systems** by *A Strugarek*

astro-ph/1610.05765 : **The Habitability of Planets Orbiting M-dwarf Stars** by *Aomawa L. Shields, Sarah Ballard, John A. Johnson*

astro-ph/1610.05842 : **Coevolution of Binaries and Gaseous Discs** by *David P. Fleming, Thomas R. Quinn*

astro-ph/1610.06318 : **Submillimeter polarization observation of the protoplanetary disk around HD 142527** by *Akimasa Kataoka, et al.*

astro-ph/1610.06463 : **Tracing water vapor and ice during dust growth** by *Sebastiaan Krijt, Fred J. Ciesla, Edwin A. Bergin*

astro-ph/1610.06609 : **BP Piscium: its flaring disk imaged with SPHERE/ZIMPOL** by *J. de Boer, et al.*

astro-ph/1610.06926 : **Explaining the variability of WD 1145+017 with simulations of asteroid tidal disruption** by *Dimitri Veras, et al.*

astro-ph/1610.07202 : **Challenges in Planet Formation** by *Alessandro Morbidelli, Sean N. Raymond*
astro-ph/1610.07249 : **Spitzer Observations Confirm and Rescue the Habitable-Zone Super-Earth K2-18b for Future Characterization** by *Bjrn Benneke, et al.*
astro-ph/1610.07602 : **The Joker: A custom Monte Carlo sampler for binary-star and exoplanet radial velocity data** by *Adrian M. Price-Whelan, et al.*
astro-ph/1610.07632 : **Forward and Inverse Modeling of the Emission and Transmission Spectrum of GJ 436b: Investigating Metal Enrichment, Tidal Heating, and Clouds** by *Caroline V. Morley, et al.*
astro-ph/1610.07811 : **The Role of Disc Self-Gravity in Circumbinary Planet Systems: I. Disc Structure and Evolution** by *Matthew M. Mutter, Arnaud Pierens, Richard P. Nelson*
astro-ph/1610.07906 : **The Mid-Infrared Polarization of the Herbig Ae Star WL 16: An Interstellar Origin?** by *Han Zhang, et al.*
astro-ph/1610.08016 : **Does a Differentiated, Carbonate-Rich, Rocky Object Pollute the White Dwarf SDSSJ104341.53+085558.2?** by *Carl Melis, P. Dufour*
astro-ph/1610.08248 : **The effect of radiative feedback on disc fragmentation** by *Anthony Mercer, Dimitris Stamatellos*
astro-ph/1610.08471 : **Limits to the presence of transiting circumbinary planets in CoRoT data** by *P. Klagyivik, et al.*
astro-ph/1610.08502 : **The Spiral Wave Instability Induced by a Giant Planet: I. Particle Stirring in the Inner Regions of Protoplanetary Disks** by *Jaehan Bae, Richard P. Nelson, Lee Hartmann*
astro-ph/1610.08571 : **EPIC 219388192 b - an inhabitant of the brown dwarf desert in the Ruprecht 147 open cluster** by *Grzegorz Nowak, et al.*
astro-ph/1610.08688 : **A simple model to describe intrinsic stellar noise for exoplanet detection around red giants** by *Thomas S. H. North, et al.*
astro-ph/1610.08698 : **The HADES RV Programme with HARPS-N@TNG II. Data treatment and simulations** by *M. Perger, et al.*
astro-ph/1610.08939 : **Three radial gaps in the disk of TW Hydrae imaged with SPHERE** by *Roy van Boekel, et al.*
astro-ph/1610.09008 : **Pressure-dependent water absorption cross sections for exoplanets and other atmospheres** by *Emma J. Barton, et al.*
astro-ph/1610.09067 : **The Solar Twin Planet Search. V. Close-in, low-mass planet candidates and evidence of planet accretion in the solar twin HIP 68468** by *Jorge Melendez, et al.*
astro-ph/1610.09134 : **Near-Infrared Imaging Polarimetry of Inner Region of GG Tau A Disk** by *Yi Yang, et al.*
astro-ph/1610.09375 : **Planetary Torque in 3D Isentropic Disks** by *Jeffrey Fung, et al.*
astro-ph/1610.09390 : **Predictions for the Period Dependence of the Transition Between Rocky Super-Earths and Gaseous Sub-Neptunes and Implications for $\eta_\oplus$** by *Eric D. Lopez, Ken Rice*
astro-ph/1610.09533 : **Absolute densities, masses, and radii of the WASP-47 system determined dynamically** by *J.M. Almenara, et al.*
astro-ph/1610.09643 : **Formation of dust-rich planetesimals from sublimated pebbles inside of the snow line** by *Shigeru Ida, Tristan Guillot*
astro-ph/1610.09667 : **On the radial velocity detection of additional planets in transiting, slowly rotating M-dwarf systems: the case of GJ 1132** by *Ryan Cloutier, et al.*
astro-ph/1610.09873 : **The mid-IR water and silicate relation in protoplanetary disks** by *S. Antonellini, et al.*
astro-ph/1610.10067 : **Vital Signs: Seismology of ocean worlds** by *Steven D. Vance, et al.*
astro-ph/1610.10089 : **Shadows and spirals in the protoplanetary disk HD 100453** by *M. Benisty, et al.*