ExoPlanet News
An Electronic Newsletter

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1 Editorial

Welcome to the 86th edition of Exoplanet News.

We have another very full issue this month, with the usual excellent array of abstracts, conference and meeting announcements, job opportunities, and miscellaneous other announcements of interest to the exoplanet community. 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

Efficient Geometric Probabilities of Multi-Transiting Exoplanetary Systems with CORBITS

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The Astrophysical Journal, in press (arXiv:1602.07014)

NASA's Kepler Space Telescope has successfully discovered thousands of exoplanet candidates using the transit method, including hundreds of stars with multiple transiting planets. In order to estimate the frequency of these valuable systems, it is essential to account for the unique geometric probabilities of detecting multiple transiting extrasolar planets around the same parent star. In order to improve on previous studies that used numerical methods, we have constructed an efficient, semi-analytical algorithm called CORBITS which, given a collection of conjectured exoplanets orbiting a star, computes the probability that any particular group of exoplanets can be observed to transit. The algorithm applies theorems of elementary differential geometry to compute the areas bounded by circular curves on the surface of a sphere (see Ragozzine & Holman 2010). The implemented algorithm is more accurate and orders of magnitude faster than previous algorithms, based on comparisons with Monte Carlo simulations. We use CORBITS to show that the present solar system would only show a maximum of 3 transiting planets, but that this varies over time due to dynamical evolution. We also used CORBITS to geometrically debias the period ratio and mutual Hill sphere distributions of Kepler's multi-transiting planet candidates, which results in shifting these distributions towards slightly larger values. In an Appendix, we present additional semi-analytical methods for determining the frequency of exoplanet mutual events, i.e., the geometric probability that two planets will transit each other (Planet-Planet Occultation, relevant to transiting circumbinary planets) and the probability that this transit occurs simultaneously as they transit their star. The CORBITS algorithms and several worked examples are publicly available at https://github.com/jbrakensiek/CORBITS .

Download/Website: `http://arxiv.org/abs/1602.07014`

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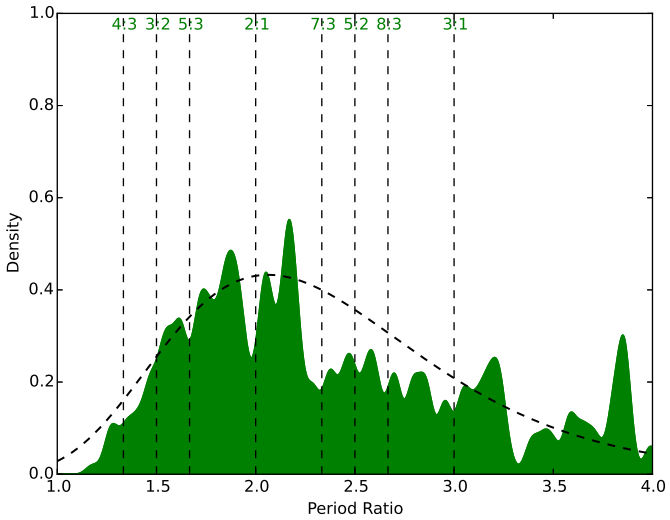

Figure 1: (Brakensiek & Ragozzine) The ability to efficiently calculate the probability of observing multiple transiting planets allows CORBITS to explore the properties of planetary systems that include correlations between planets, like the period ratio distribution. Here we display our estimate of the period ratio distribution after removing biases due to detection efficiency and multi-transiting geometric probability calculated with CORBITS. Accounting for these biases shifts the mode of the period ratio distribution to larger period ratios. See Brakensiek & Ragozzine 2016, in press, for more details.

The Rossiter-McLaughlin effect reloaded: Probing the 3D spin-orbit geometry, differential stellar rotation, and the spatially-resolved stellar spectrum of star-planet systems

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Astronomy & Astrophysics, in press (arXiv:1602.00322)

When a planet transits its host star, it blocks regions of the stellar surface from view; this causes a distortion of the spectral lines and a change in the line-of-sight (LOS) velocities, known as the Rossiter-McLaughlin (RM) effect. Since the LOS velocities depend, in part, on the stellar rotation, the RM waveform is sensitive to the star-planet alignment (which provides information on the system's dynamical history). We present a new RM modelling technique that directly measures the spatially-resolved stellar spectrum behind the planet. This is done by scaling the continuum flux of the (HARPS) spectra by the transit light curve, and then subtracting the in- from the out-of-transit spectra to isolate the starlight behind the planet. This technique does not assume any shape for the intrinsic local profiles. In it, we also allow for differential stellar rotation and centre-to-limb variations in the convective blueshift. We apply this technique to HD 189733 and compare to 3D magnetohydrodynamic (MHD) simulations. We reject rigid body rotation with high confidence (>99% probability), which allows us to determine the occulted stellar latitudes and measure the stellar inclination. In turn, we determine both the sky-projected ($\lambda \approx -0.4 \pm 0.2^{\circ}$) and *true 3D obliquity* ($\psi \approx 7^{+12}_{-4}{}^{\circ}$). We also find good agreement with the MHD simulations, with no significant centre-to-limb variations detectable in the local profiles. Hence, this technique provides a new powerful tool that can probe stellar photospheres, differential rotation, determine 3D obliquities, and remove sky-projection biases in planet migration theories. This technique can be implemented with existing instrumentation, but will become even more powerful with the next generation of high-precision radial velocity spectrographs.

Download/Website: `http://arxiv.org/abs/1602.00322`

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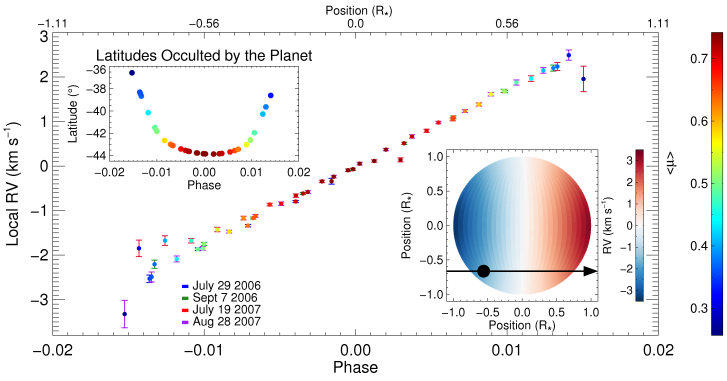

Figure 2: (Cegla et al.) Net velocitiy shifts of the in-transit residual CCF profiles (i.e. CCFs of the regions occulated by the planet) as a function phase (bottom axis) and stellar disc position defined in units of stellar radii (top axis), with an inset illustrating the planet positions across the star (bottom right) and another inset displaying the stellar latitudes occulated by the planet (top left); note the July 19 dataset was excluded from analysis due to potential stellar activity contamination and is not shown in the latitude inset. The data are colour-coded by the disc position in units of the brightness-weighted $\langle\mu\rangle$ (where $\mu = \cos\theta$) behind the planet, while the colour of the error bar indicates the observation date.

Modelling the Rossiter-McLaughlin Effect: Impact of the Convective Centre-to-Limb Variations in the Stellar Photosphere

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The Astrophysical Journal, in press (arXiv:1601.02054)

Observations of the Rossiter-McLaughlin (RM) effect provide information on star-planet alignments, which can inform planetary migration and evolution theories. Here, we go beyond the classical RM modelling and explore the impact of a convective blueshift that varies across the stellar disc and non-Gaussian stellar photospheric profiles. We simulated an aligned hot Jupiter with a 4 d orbit about a Sun-like star and injected centre-to-limb velocity (and profile shape) variations based on radiative 3D magnetohydrodynamic simulations of solar surface convection. The residuals between our modelling and classical RM modelling were dependent on the intrinsic profile width and $v \sin i$; the amplitude of the residuals increased with increasing $v \sin i$, and with decreasing intrinsic profile width. For slowly rotating stars the centre-to-limb convective variation dominated the residuals (with amplitudes of 10s of cm s^{-1} to $\sim$1 m s^{-1}); however, for faster rotating stars the dominant residual signature was due a non-Gaussian intrinsic profile (with amplitudes from 0.5 to 9 m s^{-1}). When the impact factor was 0, neglecting to account for the convective centre-to-limb variation led to an uncertainty in the obliquity of $\sim$10-20°, even though the true $v \sin i$ was known. Additionally, neglecting to properly model an asymmetric intrinsic profile had a greater impact for more rapidly rotating stars (e.g. $v \sin i$ = 6 km s^{-1}), and caused systematic errors on the order of $\sim$20° in the measured obliquities. Hence, neglecting the impact of stellar surface convection may bias star-planet alignment measurements and consequently also theories on planetary migration and evolution.

Download/Website: `http://arxiv.org/abs/1601.02054`

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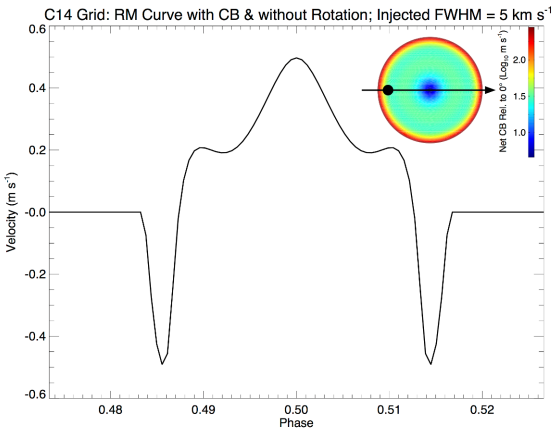

Figure 3: (Cegla et al.) The RM waveform due to centre-to-limb variations in net convective blueshift (CB): radial velocities from a model transit of a 4 day hot Jupiter about a non-rotating Sun-like star (with local intrinsic line profiles represented by Gaussians with a FWHM = 5 km s^{-1}). Inset: schematic of the planet transit across the stellar disc, colour-coded by the log of net convective velocities relative to disc centre.

State of the Field: Extreme Precision Radial Velocities

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Workshop summary proceedings, in press (arXiv:1602.07939)

The Second Workshop on Extreme Precision Radial Velocities defined circa 2015 the state of the art Doppler precision and identified the critical path challenges for reaching 10 cm/s measurement precision. The presentations and discussion of key issues for instrumentation and data analysis and the workshop recommendations for achieving this precision are summarized here.
Beginning with the HARPS spectrograph, technological advances for precision radial velocity measurements have focused on building extremely stable instruments. To reach still higher precision, future spectrometers will need to produce even higher fidelity spectra. This should be possible with improved environmental control, greater stability in the illumination of the spectrometer optics, better detectors, more precise wavelength calibration, and broader bandwidth spectra. Key data analysis challenges for the precision radial velocity community include distinguishing center of mass Keplerian motion from photospheric velocities, and the proper treatment of telluric contamination. Success here is coupled to the instrument design, but also requires the implementation of robust statistical and modeling techniques. Center of mass velocities produce Doppler shifts that affect every line identically, while photospheric velocities produce line profile asymmetries with wavelength and temporal dependencies that are different from Keplerian signals.
Exoplanets are an important subfield of astronomy and there has been an impressive rate of discovery over the past two decades. Higher precision radial velocity measurements are required to serve as a discovery technique for potentially habitable worlds and to characterize detections from transit missions. The future of exoplanet science has very different trajectories depending on the precision that can ultimately be achieved with Doppler measurements.

Download/Website: `http://arxiv.org/abs/1602.07939`

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Low-rank plus sparse decomposition for exoplanet detection in direct-imaging ADI sequences. The LLSG algorithm

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Astronomy & Astrophysics, in press (arXiv:1602.08381)

Context. Data processing constitutes a critical component of high-contrast exoplanet imaging. Its role is almost as important as the choice of a coronagraph or a wavefront control system, and it is intertwined with the chosen observing strategy. Among the data processing techniques for angular differential imaging (ADI), the most recent is the family of principal component analysis (PCA) based algorithms. It is a widely used statistical tool developed during the first half of the past century. PCA serves, in this case, as a subspace projection technique for constructing a reference point spread function (PSF) that can be subtracted from the science data for boosting the detectability of potential companions present in the data. Unfortunately, when building this reference PSF from the science data itself, PCA comes with certain limitations such as the sensitivity of the lower dimensional orthogonal subspace to non-Gaussian noise. *Aims.* Inspired by recent advances in machine learning algorithms such as robust PCA, we aim to propose a localized subspace projection technique that surpasses current PCA-based post-processing algorithms in terms of the detectability of companions at near real-time speed, a quality that will be useful for future direct imaging surveys.
Methods. We used randomized low-rank approximation methods recently proposed in the machine learning literature, coupled with entry-wise thresholding to decompose an ADI image sequence locally into low-rank, sparse, and Gaussian noise components (LLSG). This local three-term decomposition separates the starlight and the associated speckle noise from the planetary signal, which mostly remains in the sparse term. We tested the performance of our new algorithm on a long ADI sequence obtained on β Pictoris with VLT/NACO.
Results. Compared to a standard PCA approach, LLSG decomposition reaches a higher signal-to-noise ratio and has an overall better performance in the receiver operating characteristic space. This three-term decomposition brings a detectability boost compared to the full-frame standard PCA approach, especially in the small inner working angle region where complex speckle noise prevents PCA from discerning true companions from noise.

Download/Website: `http://arxiv.org/abs/1602.08381/`

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The Search for Extraterrestrial Intelligence in Earth's Solar Transit Zone

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Astrobiology, in press

Over the past few years, astronomers have detected thousands of planets and candidate planets by observing their periodic transits in front of their host stars. A related method, called transit spectroscopy, might soon allow studies of the chemical imprints of life in extrasolar planetary atmospheres. Here, we address the reciprocal question, namely, from where is Earth detectable by extrasolar observers using similar methods. We explore Earth's transit zone (ETZ), the projection of a band around Earth's ecliptic onto the celestial plane, where observers can detect Earth transits across the Sun. The ETZ is between 0.520° and 0.537° wide due to the non-circular Earth orbit. The restricted ETZ (rETZ), where Earth transits the Sun less than 0.5 solar radii from its center, is about 0.262° wide. We first compile a target list of 45 K and 37 G dwarf stars inside the rETZ and within 1 kiloparsec (about 3260 lightyears) using the Hipparcos catalog. We then greatly enlarge the number of potential targets by constructing an analytic galactic disk model and find that about 10^5 K and G dwarf stars should reside within the rETZ. The ongoing GAIA space mission can potentially discover all G dwarfs among them (several 10^4) within the next five years. Many more potentially habitable planets orbit dim, unknown M stars in the ETZ and other stars that traversed the ETZ thousands of years ago. If any of these planets host intelligent observers, they could have identified Earth as a habitable, or even as a living, world long ago, and we could be receiving their broadcasts today. The K2 mission, the Allen Telescope Array, the upcoming Square Kilometer Array, or the Green Bank Telescope might detect such deliberate extraterrestrial messages. The ETZ is also an ideal region to be monitored by the Breakthrough Listen Initiatives, an upcoming survey that will constitute the most comprehensive search for extraterrestrial intelligence so far.

Download/Website: `http://online.liebertpub.com/doi/full/10.1089/ast.2015.1358`

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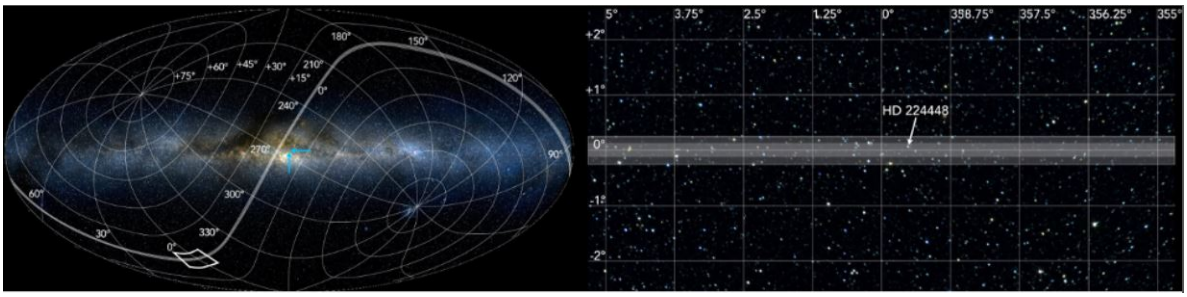

Figure 4: (Heller & Pudritz) Projection of the Earth's transit zone (ETZ) onto the celestial plane. *Left*: All-sky view in a galactic reference frame with ecliptic coordinates, based on optical, infrared (2MASS), and radio (Planck) data. The ETZ is indicated as a gray band curved along the ecliptic. The dashed rectangle around $(0^\circ, 0^\circ)$ indicates the zoom shown in right panel. Two red arrows label the origin of the galactic coordinate frame. *Right*: Zoom into the region around $(0^\circ, 0^\circ)$, now in an ecliptic reference frame. The wide, light shaded region has a width of 0.528°, while the inner shaded region highlights the restricted ETZ with a width of 0.262°, where Earth transits the Sun with an impact parameter $b \leq 0.5$. The position of one rETZ G dwarf is indicated with an arrow.

The SOPHIE search for northern extrasolar planets IX. Populating the brown dwarf desert

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Astronomy & Astrophysics, in press arXiv:1602.02749

Radial velocity planet search surveys of nearby solar-type stars have shown a strong scarcity of brown dwarf companions within ~ 5 AU. There is presently no comprehensive explanation for this lack of brown dwarf companions; therefore, increasing the sample of such objects is crucial to understand their formation and evolution. Based on precise radial velocities obtained using the SOPHIE spectrograph at Observatoire de Haute-Provence we characterise the orbital parameters of 15 companions to solar-type stars and constrain their true mass using astrometric data from the Hipparcos space mission. The nine companions not shown to be stellar in nature have minimum masses ranging from $\sim$13 to 70 $\mathrm{M_{Jup}}$, and are well distributed across the planet/brown dwarf mass regime, making them an important contribution to the known population of massive companions around solar-type stars. We characterise six companions as stellar in nature with masses ranging from a minimum mass of $76 \pm 4\,\mathrm{M_{Jup}}$ to a mass of $0.35 \pm 0.03\,\mathrm{M_{\odot}}$. The orbital parameters of two previously known substellar candidates are improved.

Download/Website: `http://arxiv.org/abs/1602.02749`

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The SOPHIE search for northern extrasolar planets. X. Detection and characterization of giant planets by the dozen

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Astronomy & Astrophysics, in press (arXiv:1602.04622)

We present new radial velocity measurements of eight stars that were secured with the spectrograph SOPHIE at the 193 cm telescope of the Haute-Provence Observatory. The measurements allow detecting and characterizing new giant extrasolar planets. The host stars are dwarfs of spectral types between F5 and K0 and magnitudes of between 6.7 and 9.6; the planets have minimum masses $M_{\mathrm{p}} \sin i$ of between 0.4 to 3.8 $\mathrm{M_{Jup}}$ and orbital periods of several days to several months. The data allow only single planets to be discovered around the first six stars (HD 143105, HIP 109600, HD 35759, HIP 109384, HD 220842, and HD 12484), but one of them shows the signature

of an additional substellar companion in the system. The seventh star, HIP 65407, allows the discovery of two giant planets that orbit just outside the 12:5 resonance in weak mutual interaction. The last star, HD 141399, was already known to host a four-planet system; our additional data and analyses allow new constraints to be set on it. We present Keplerian orbits of all systems, together with dynamical analyses of the two multi-planet systems. HD 143105 is one of the brightest stars known to host a hot Jupiter, which could allow numerous follow-up studies to be conducted even though this is not a transiting system. The giant planets HIP 109600b, HIP 109384b, and HD 141399c are located in the habitable zone of their host star.

Download/Website: `http://arxiv.org/abs/1602.04622`

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Long-term radial-velocity variations of the Sun as a star: The HARPS view

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Astronomy and Astrophysics, published (2016, A&A, 587, A103)

Context. Stellar radial velocities play a fundamental role in the discovery of extrasolar planets and the measurement of their physical parameters as well as in the study of stellar physical properties.
Aims. We investigate the impact of the solar activity on the radial velocity of the Sun using the HARPS spectrograph to obtain measurements that can be directly compared with those acquired in the extrasolar planet search programmes.
Methods. We used the Moon, the Galilean satellites, and several asteroids as reflectors to measure the radial velocity of the Sun as a star and correlated this velocity with disc-integrated chromospheric and magnetic indexes of solar activity that are similar to stellar activity indexes. We discuss in detail the systematic effects that affect our measurements and the methods to account for them.
Results. We find that the radial velocity of the Sun as a star is positively correlated with the level of its chromospheric activity at ~ 95 percent significance level. The amplitude of the long-term variation measured in the $2006 - 2014$ period is 4.98 ± 1.44 m/s, which is in good agreement with model predictions. The standard deviation of the residuals obtained by subtracting a linear best fit is 2.82 m/s and is due to the rotation of the reflecting bodies and the intrinsic variability of the Sun on timescales shorter than the activity cycle. A correlation with a lower significance is detected between the radial velocity and the mean absolute value of the line-of-sight photospheric magnetic field flux density.
Conclusions. Our results confirm similar correlations found in other late-type main-sequence stars and provide support to the predictions of radial velocity variations induced by stellar activity based on current models.

Download/Website: `http://www.aanda.org/articles/aa/abs/2016/03/aa27379-15/aa27379-15.html` or `http://arxiv.org/abs/1601.05646`

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The K2-ESPRINT Project II: Spectroscopic follow-up of three exoplanet systems from Campaign 1 of K2

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The Astrophysical Journal, in press (arXiv:1602.01851)

We report on Doppler observations of three transiting planet candidates that were detected during Campaign 1 of the K2 mission. The Doppler observations were conducted with FIES, HARPS-N and HARPS. We measure the mass of K2-27b (EPIC 201546283b), and provide constraints and upper limits for EPIC 201295312b and EPIC 201577035b. K2-27b is a warm Neptune orbiting its host star in 6.77 days and has a radius of $4.45^{+0.33}_{-0.33}$ $\mathrm{R}_\oplus$ and a mass of $29.1^{+7.5}_{-7.4}$ $\mathrm{M}_\oplus$, which leads to a mean density of $1.80^{+0.70}_{-0.55}$ $\mathrm{g\,cm^{-3}}$. EPIC 201295312b is smaller than Neptune with an orbital period of 5.66 days, radius $2.75^{+0.24}_{-0.22}$ $\mathrm{R}_\oplus$ and we constrain the mass to be below 12 $\mathrm{M}_\oplus$ at 95% confidence. We also find a long-term trend indicative of another body in the system. EPIC 201577035b, previously confirmed as the planet K2-10b, is smaller than Neptune orbiting its host star in 19.3 days, with radius $3.84^{+0.35}_{-0.34}$ $\mathrm{R}_\oplus$. We determine its mass to be 27^{+17}_{-16} $\mathrm{M}_\oplus$, with a 95% confidence uppler limit at 57 $\mathrm{M}_\oplus$, and mean density $2.6^{+2.1}_{-1.6}$ $\mathrm{g\,cm^{-3}}$. These measurements join the relatively small collection of planets smaller than Neptune with measurements or constraints of the mean density. Our code for performing K2 photometry and detecting planetary transits is now publicly available.

Download/Website: `http://adsabs.harvard.edu/abs/2016arXiv160201851V`
`https://github.com/vincentvaneylen/k2photometry`

Contact: `vincent@phys.au.dk`

3 Conference announcements

2016 Sagan Summer Workshop: Is There a Planet in My Data? Statistical Approaches to Finding and Characterizing 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

Registration and the application for financial assistance are now available for the 2016 Sagan Summer Workshop. There is no registration fee for this workshop, however attendance is limited so we suggest that you register early.

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

- 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`

New Directions in Planet Formation

Anders Johansen, Katrin Ros, Michiel Lambrechts
Lund Observatory, Lund University, Sweden

Lorentz Center, Leiden, Netherlands, 11–15 July 2016

In the past two decades over 2,000 exoplanets have been discovered with properties and orbital architectures very different from the solar system. Yet the theoretical foundations of planet formation theory still rely on a framework conceived for the solar system. This workshop will focus on new developments in dust coagulation, planetesimal formation, planetary growth and planetary migration. The goal of the workshop is to critically assess the viability of various theories on planet formation and establish new research directions.
The number of participants is limited to 55 and junior researchers in particular are encouraged to apply. We have around 30 free places in the workshop and 10 slots available for contributed talks (poster presentations are always possible). There is no registration fee.
Organisers: Ravit Helled (Tel Aviv University), Anders Johansen (Lund University) and Chris Ormel (University of Amsterdam)
Invited review speakers: Alessandro Morbidelli, Tristan Guillot, Shigeru Ida, Roman Rafikov, Willy Kley, Satoshi Okuzumi and Hal Levison.
Invited junior researchers: Joanna Drazkowska, Sebastiaan Krijt, Michiel Lambrechts, Katherine Kretke, Allona Vazan, Judith Szulagyi, Masahiro Ogihara and Beibei Liu.
Deadline for application: 31 March

Download/Website: `https://www.lorentzcenter.nl/lc/web/2016/799/info.php3?wsid=799&venue=Oort`

Contact: `helled@post.tau.ac.il, anders@astro.lu.se, c.w.ormel@uva.nl`

4^{th} CHEOPS Science Workshop – 2^{nd} announcement

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

Geneva, Switzerland, 21 - 23 June 2016

We are pleased to announce the opening of the registration for the fourth CHEOPS Science Workshop. Registration deadline is on 14th April. Participants are encouraged to propose contributed talks on all scientific aspects relevant to the mission. Details may be found below and at the workshop website.
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 will have a nominal lifetime of 3.5 years, with launch-readiness targeted for end 2017. 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. Participants are invited to propose contributed talks on all scientific aspects relevant to the mission, including synergies with other facilities. Ample time will be devoted to discussions.

Download/Website: `http://cheops.unige.ch/meetings/science-workshop-04/`

Contact: `vincent.bourrier@unige.ch`

Linking Exoplanet and Disk Compositions

Andrea Banzatti (chair), Nikole Lewis (co-chair)
Space Telescope Science Institute, 3700 San Martin Drive, Baltimore MD, USA

Baltimore MD, USA, September 12-14, 2016

This workshop will gather scientists working on the compositional characterization of planets and planet-forming regions in protoplanetary disks. Recent and upcoming advancements make it timely to have a round-table conversation among the several communities involved, to join forces in tackling our most compelling questions on the origins of exoplanet diversity. Do exoplanet compositions retain the imprint of large-scale disk processes? Do disks include compositional trends that imprint on planets? What do we learn in this context from observations of Solar System bodies? And what can we test with observations of disks and exoplanets in the near future? We intend to identify long-lasting and observable links between exoplanet and disk compositions, to help the community in shaping ongoing modeling efforts as well as the essential parameter space to cover with existing and upcoming observatories for exoplanet and disk characterization.

Abstract submission will begin on March 26, 2016 through the link provided below.

SOC:
Daniel Apai (Univ. of Arizona), Andrea Banzatti (STScI, chair) , Fred Ciesla (Univ. of Chicago), Jonathan Fortney (UCSC), Sarah Horst (JHU), Inga Kamp (Kapteyn Inst., Groningen), Nikole Lewis (STScI, co-chair), Amaya Moro-Martin (STScI), Karin Oberg (Harvard CfA), Klaus Pontoppidan (STScI), Olivia Venot (Katholieke Univ. Leuven), Marie Ygouf (STScI).

Confirmed invited Speakers:
Conel Alexander (Carnegie DTM), Uma Gorti (SETI, NASA Ames), Jonathan Lunine (Cornell Univ.), Christoph Mordasini (Univ. of Bern), Ilaria Pascucci (Univ. of Arizona), Sean Raymond (Univ. of Bordeaux), Leslie Rogers (Univ. of Chicago).

Download/Website: `http://www.cvent.com/d/ffqwn1`
Contact: `banzatti@stsci.edu`

Asteroseismology and Exoplanets: Listening to the Stars and Searching for New Worlds. IVth Azores International Advanced School in Space Sciences

Tiago Campante[1] *(Chair), Mário Monteiro*[2]*, Nuno Santos*[2]
[1] University of Birmingham, Birmingham, UK
[2] IA & Universidade do Porto, Porto, Portugal

Horta, Azores Islands, Portugal, 17–27 July 2016

This International Summer School will cover two scientific topics that share many synergies and resources: Asteroseismology and Exoplanetary Science. Therefore, the proposed program aims at building opportunities for cooperation and sharing of methods that will benefit both communities. The School will include both a teaching and a hands-on components, while bringing together a group of young and dynamic lecturers who have already established themselves as leaders in their respective fields of research. It is mainly aimed at PhD and MSc students (although postdocs are also encouraged to apply) in any field of Astrophysics. Students will also be given the opportunity to present their own research work by bringing a poster to the School.

The School will take place in the town of Horta, located in the island of Faial. Faial is one of the nine islands that make up the beautiful archipelago of the Azores, situated in the North Atlantic Ocean about 1360 km (850 mi) west of mainland Portugal. The Azores are served by frequent flights from Europe and the US/Canada.

There is an upper limit of 40 attendees to the School. Due to the large number of expected applications, a pre-registration process will be in place that requires applicants to submit a short CV (max. 2 pages) and a motivational letter (max. 1 page). Pre-registration should be done through the School's website and will close on **18 March 2016**. Information on the registration fee is available on the School's website.

Download/Website: `http://www.iastro.pt/faial2016`

Contact: `faial2016@iastro.pt`

EWASS 2016: Special Session 7: The effects of solar and stellar magnetic activity on planets

H. Korhonen[1]*, A. Vidotto*[2]

[1] DARK, Niels Bohr Institute, University of Copenhagen, Denmark
[2] Observatoire de l'Université de Genève, Versoix, Switzerland

Athens, July 5, 2016

The magnetic activity of cool stars in the form of flares, winds and coronal mass ejections have a direct impact on planets. This activity varies with the mass, age and rotation rate of the star and can be damaging for life, even in the case of a fairly inactive star like the Sun. During periods of intense solar activity, the solar wind is enhanced and geomagnetic storms produce auroras, disrupt radio transmissions, affect power grids, damage orbiting satellites, and can be hazardous to astronauts. By analogy, the magnetic activity of cool stars may be hazardous for the creation and development of life and is therefore of potential importance for habitability.
Special Session 7 *The effects of solar and stellar magnetic activity on planets* is dedicated to these issues. It will be organised on July 5 2016 during the EWASS 2016 meeting, which will be held in Athens, Greece (July 4–8, 2016). We aim to bring together observers/theoreticians whose diverse research interests are linked with solar and stellar activity and its effect on orbiting planets. Questions that will be addressed are:

1. How do stellar magnetic activity influence the exoplanets orbiting main-sequence stars?
2. Which lessons learned from our own solar system can be incorporate in exoplanetary research?
3. How can stellar activity affect habitability?

We have allocated significant time for contributed talks and we also welcome applications for posters. The deadline for abstract submission is March 15 and for the early bird registration is on April 30.

Download/Website: `http://eas.unige.ch/EWASS2016/session.jsp?id=SS7`

Contact: `heidi.korhonen@nbi.ku.dk`

4 Jobs and Positions

PhD position in Asteroseismology of Exoplanet-Host Stars with NASA's TESS mission

Dr. Tiago Campante
School of Physics and Astronomy, University of Birmingham, Edgbaston, Birmingham, B15 2TT, UK

University of Birmingham/IA-U.Porto, starting Summer/Autumn 2016

A call is ongoing for a PhD project on the "Detection and characterization of planets orbiting oscillating red-giant stars with NASA's TESS mission". An abstract of the proposed PhD project can be found below. This PhD project has been made available in the context of the PhD::SPACE Program, funded by the FCT PD Program Initiative (Portugal). The deadline for applications is the **31st of March 2016**. Details on the application procedure can be found at http://phd-space.iastro.pt/?page_id=835.

The successful candidate would be spending 1/3 of their time at the University of Birmingham (UK) under the supervision of Dr. Tiago Campante, while the remaining 2/3 would be spent at IA-U.Porto (Portugal) under the supervision of Dr. Margarida Cunha and Dr. Nuno Santos. Upon satisfactory completion, this project will lead to a PhD degree issued by the University of Porto.

Abstract: The Transiting Exoplanet Survey Satellite (TESS) is a NASA space mission with scheduled launch for late 2017 that will perform a wide-field survey for planets transiting bright nearby stars. Furthermore, TESS's excellent photometric precision, combined with its fine time sampling and long intervals of uninterrupted observations, will enable asteroseismology (i.e., the study of stars by the observation of their natural oscillations) of solar-type and red-giant stars. Asteroseismology is proving to be particularly significant for the study of red-giant stars while quickly maturing into a powerful tool whose impact is being felt more widely across different domains of astrophysics. A noticeable example is the synergy between asteroseismology and exoplanetary science. TESS hence offers the exciting prospect of conducting asteroseismology on a significant number of evolved exoplanet-host stars. The main goal of this project will be to use TESS photometry to systematically detect and characterize transiting planets orbiting oscillating red-giant stars. To that end, we propose an end-to-end PhD project that will provide the student with skills in (i) transit photometry analysis, (ii) asteroseismic data analysis and stellar modeling, and (iii) radial-velocity/spectroscopic techniques. The implications of this project are far-reaching. The proposed systematic search for transiting planets orbiting oscillating red-giant stars is expected to provide new insights into some of the outstanding problems in exoplanetary science, namely, (i) on the planet occurrence rate as a function of stellar mass/evolutionary state, (ii) on the correlation between stellar metallicity and planet occurrence around evolved stars or (iii) on the structural aspects of gas-giant planets.

Download/Website: `http://phd-space.iastro.pt/?page_id=835`

Contact: `campante@bison.ph.bham.ac.uk`

Job opening for a post-doctoral position 2 yr (+2 yr) at the Leuven University in the field of theoretical models for evolved stars

L. Decin
Institute of Astronomy – KU Leuven, Leuven, Belgium

Leuven, Belgium, between October 2016 and December 2016

Interdisciplinary project on the stellar winds around evolved stars at the Leuven University in Belgium funded by the ERC-CoG 2014 grant AEROSOL (PI. L. Decin).

The project

At the Leuven University (Belgium), we seek an excellent candidate for a post-doctoral research position, ready to play a key role in a new interdisciplinary project focusing on stellar winds around evolved (low-mass) stars. The candidate will interact closely with a team consisting of astrophysicists, chemists, and computational mathematicians, as the goal of the project is to boost our understanding of the physics and chemistry characterizing these stellar winds. The project builds upon novel data (including ALMA, Herschel, etc.), detailed theoretical wind models, and targeted laboratory experiments (see http://fys.kuleuven.be/ster/Projects/aerosol/aerosol).

Specifically, we now seek a post-doctoral researcher with expertise in theoretical and numerical modelling, if possible within an astrophysical context. The goal of the project is to develop a dynamical forward chemistry model for stellar winds coupling the effects of hydro- dynamics, thermodynamics, chemistry, and radiative transfer. Different numerical modules are already available. The post-doc will be part of a very active and highly performing team, which guarantees an environment in which the post-doc has access to ample support and which will train the post-doc towards his/her own career path.

Institute of Astronomy

The Institute of Astronomy (IoA) of the Leuven University is a young and active research group of some 50 scientists, engineers and administrative staff (http://fys.kuleuven.be/ster). The institute is involved in several international networks and research projects, involving telescopes at international observatories and space missions. The organisation of the Master in Astronomy & Astrophysics of the Faculty of Science at the Leuven University is in the hand of the IoA. The IoA has a long tradition in the observational and theoretical studies of the late stages of evolution of low and intermediate mass stars.

The position

At the Leuven University, the candidates will join the Institute of Astronomy (Prof. L. Decin). The interdisciplinary project is carried out in collaboration with dr. J. Yates (UCL, London; director DiRAC facilities), Prof. T. Millar (Belfast University) and Prof. J. Nuth (NASA, Greenbelt). The candidate will interact closely with the other team members at the IoA and within the departments of mathematics and chemistry. At the Leuven University, we have access to parallel computing facilities, to be exploited extensively in this project.

Contract

The postdoc candidate will be employed at the Institute of Astronomy. The initial contract runs over 2 years and could be prolonged with another 2 years after positive evaluation. The salary will be commensurate to the standard scale for post-doctoral researchers at the Leuven University. The preferred starting date is between 1 October 2016 and 1 December 2016, but will be adapted to the selected candidates availability. Candidates are thus requested to indicate their preferred starting date in the application.

Interested?

The successful post-doc candidate must have a PhD degree in astrophysics, (theoretical) physics or (applied) mathematics. The application must be sent as single pdf document including

- A Curriculum Vitae (including publication list).
- A statement of research interests and future plans (maximum 3 pages).
- A letter detailing your specific qualifications for the position and your career/educational goals (maximum 1 page).

- Two letters of recommendation from professors well acquainted with your academic achievements. The letters are to be submitted separately to the address mentioned below.

The application should be sent by email to Prof. L. Decin (Leen.Decin@ster.kuleuven.be) and dr. K. Clemer (Katrijn.Clemer@ster.kuleuven.be). DEADLINE for the application: 1 May 2016.
More information can be obtained by contacting
Prof. L. Decin
Institute for Astronomy
Department of Physics and Astronomy, KU Leuven Celestijnenlaan 200D, 3001 Heverlee, Belgium
++32-16-32 70 41

Download/Website: `http://fys.kuleuven.be/ster/staff/senior-staff/leen See also: http://fys.kuleuven.be/ster/`

Contact: `Leen.Decin@ster.kuleuven.be`

1) Postdoctoral Research Assistant on Exoplanet Observation and Analysis; 2) Postdoctoral Research Assistant in Ice Giant Observation and Analysis

Prof. Patrick G.J. Irwin
University of Oxford, UK

Atmospheric, Oceanic and Planetary Physics, University of Oxford, after 1st April 2016

1)Postdoctoral Research Assistant on Exoplanet Observation and Analysis 2)Postdoctoral Research Assistant in Ice Giant Observation and Analysis
Dear Colleagues,
We have two new PDRA positions available at the University of Oxford, to start as soon as possible after April 1st 2016. The projects are concerned with modelling and interpretation of: 1) exoplanetary transit spectra; and 2) Uranus and Neptune spectra. Both projects are will analyse visible, near-IR and mid-IR spectral observations using our radiative transfer and retrieval tool, Nemesis. The details of the projects can be found at:
https://www.recruit.ox.ac.uk/pls/hrisliverecruit/erq_jobspec_version_4.display_form?p_company=10&p_internal_external=E&p_display_in_irish=N&p_process_type=&p_applicant_no=&p_form_profile_detail=&p_display_apply_ind=Y&p_refresh_search=Y&p_recruitment_id=121776
https://www.recruit.ox.ac.uk/pls/hrisliverecruit/erq_jobspec_version_4.display_form?p_company=10&p_internal_external=E&p_display_in_irish=N&p_process_type=&p_applicant_no=&p_form_profile_detail=&p_display_apply_ind=Y&p_refresh_search=Y&p_recruitment_id=121777
The deadline for applications is 30th March 2016. I would be grateful if you could bring these projects to the attention of anyone you think might be interested.

Contact: `patrick.irwin@physics.ox.ac.uk`

5 Announcements

IRACSIM: Software for simulating Spitzer/IRAC exoplanet observations

J. Ingalls
Spitzer Science Center, California Institute of Technology, Mail Code 314-6, Pasadena, CA 91104, USA

http://dx.doi.org/10.5281/zenodo.46270, First public release

We announce the first public release of `IRACSIM`, a software for simulating realistic *Spitzer*/InfraRed Array Camera (IRAC) observations of point sources, including a fully functional exoplanet simulator. The program, written in IDL, uses a model of the *Spitzer*/IRAC system to create synthetic IRAC point source measurements, outputting FITS image (or image cube) files similar to those produced by the IRAC basic calibrated data (BCD) pipeline. The simulator model is built on three major components of *Spitzer*/IRAC behavior: (1) pointing, (2) imaging, and (3) Fowler sampling. The model is described in Appendix A of Ingalls et al. 2016, "Repeatability and Accuracy of Exoplanet Eclipse Depths Measured with Post-Cryogenic Spitzer", submitted to Astronomical Journal; `http://arxiv.org/abs/1601.05101`. The exoplanet wrapper for `IRACSIM` features realtime access to the Exoplanet.org database of planetary system parameters. Its main job is to create model exoplanet phase curves as input light curves to the IRAC simulator. It uses the thermal phase variations model of Cowan & Agol (2011), and the transit (and eclipse) shape model of Mandel & Agol (2002), allowing for the effects of nonlinear limb darkening in the transit. The output of the program is a facsimile of the output of a real Spitzer/IRAC observation: a set of BCD image files and uncertainty files, with realistic FITS headers containing standard time and astrometry information that is correct for the simulated observation. The code also adds history items, comments, and new keywords that are specific to the simulation.

Download/Website: `http://dx.doi.org/10.5281/zenodo.46270`

Contact: `ingalls@ipac.caltech.edu`

Fizeau exchange visitors program in optical interferometry – call for applications

European Interferometry Initiative
Opticon, FP7

www.european-interferometry.eu, application deadline: Mar. 15

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

The deadline for applications is March 15. Fellowships can be awarded for missions starting in May 2016.

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

Please distribute this message also to potentially interested colleagues outside of your community!

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

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

Contact: `fizeau@european-interferometry.eu`

2016B NASA Keck Call for General Observing Proposals

Dr. Dawn M. Gelino
NASA Exoplanet Science Institute

Proposals Due, March 17, 2016 at 4 pm PDT

NASA is soliciting proposals to use the Keck Telescopes for the 2016B observing semester (Aug. 1, 2016-Jan. 31, 2017). Complete call information is available on the website below and all proposals are due by **17 March 2016 at 4 pm PDT**.

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

NASA intends the use of the Keck telescopes to be highly strategic in support of on-going space missions and/or high priority, long-term science goals. Proposals are sought in the following discipline areas: (1) investigations in support of EXOPLANET EXPLORATION science goals and missions; (2) investigations of our own SOLAR SYSTEM; (3) investigations in support of COSMIC ORIGINS science goals and missions; and (4) investigations in support of PHYSICS OF THE COSMOS science goals and missions. Direct mission support proposals in any of these scientific areas are also encouraged.

Highlights for 2016B:

- The updated 2014 NASA Science Plan can be used for the strategic relevance section of your proposal. Please see the website below to download this document and for updated information on strategic grading of the proposals.
- Letters for general mission support proposals must be requested from NASA HQ by March 3, two weeks before submission deadline.
- Check the WMKO instrument page for the list of available instruments and for telescope observing limits.

Download/Website: `http://nexsci.caltech.edu/missions/KeckSolicitation/index.shtml`

Contact: `KeckCFP@ipac.caltech.edu`

Pale Red Dot (*late submission)

G. Anglada-Escudé[1], *P.J. Amado*[2], *Z.M. Berdiñas*[2], *A. Castro-Tirado*[2], *L.L. Christensen*[7], *G. Coleman*[1], *S. Dreizler*[3], *E. Gómez*[4], *S. Jeffers*[3], *J. Jenkins*[5], *H.R.A. Jones*[6], *M.J. López-González*[2], *C.J. Marvin*[3], *N. Morales*[2], *J. Morin*[8], *R. P. Nelson*[1], *A. Ofir*[9], *J.L. Ortíz*[2] *A. Reiners*[3], *C. Rodríguez-López*[2], *O. Sandu*[7], *R. Street*[4], *Y. Tsapras*[4], *M. Tuomi*[6], *E. Rodríguez*[2] *& M. Zechmeister*[3]

[1] School of Physics and Astronomy, Queen Mary University of London, UK
[2] Instituto de Astrofísica de Andalucía, Consejo Superior de Investigaciones Científicas, Spain
[3] Institute for Astrophysics, University of Göttingen, Germany
[4] Las Cumbres Observatory Global Telescope Network, lcogt.net
[5] Astronomy Department, Universidad de Chile, Chile
[6] Centre for Astrophysical Research, University of Hertfordshire, UK
[7] Outreach and media office, European Southern Observatory, Germany
[8] Laboratoire Univers et Particules de Montpellier, CNRS & Univ. de Montpellier, France
[9] Earth and Planetary Sciences, Weizmann Institute of Science, Israel

On-going campaign, Jan 18th–March 31st, 2016

What is PALE RED DOT? It is a research project from which an outreach project has been devised. The outreach project is aimed at showing to the public how scientists are working to address major scientific questions in practice namely, are there Earth-like planet around the nearest stars? – and in particular – does Proxima Centauri host a planetary system potentially capable of sustaining life? In addition to details of the observation campaign and analysis of the data, the project website is featuring original outreach articles from researchers and science writers about the excitement of the search for planets and life beyond the Solar System. Beyond direct dissemination of contents, 'Pale Red Dot' is also intended to be a repository of outreach material for exoplanet researchers and other science media authors. The project is a partnership between the scientists involved in the observations, their hosts institutions and the ESO outreach office.

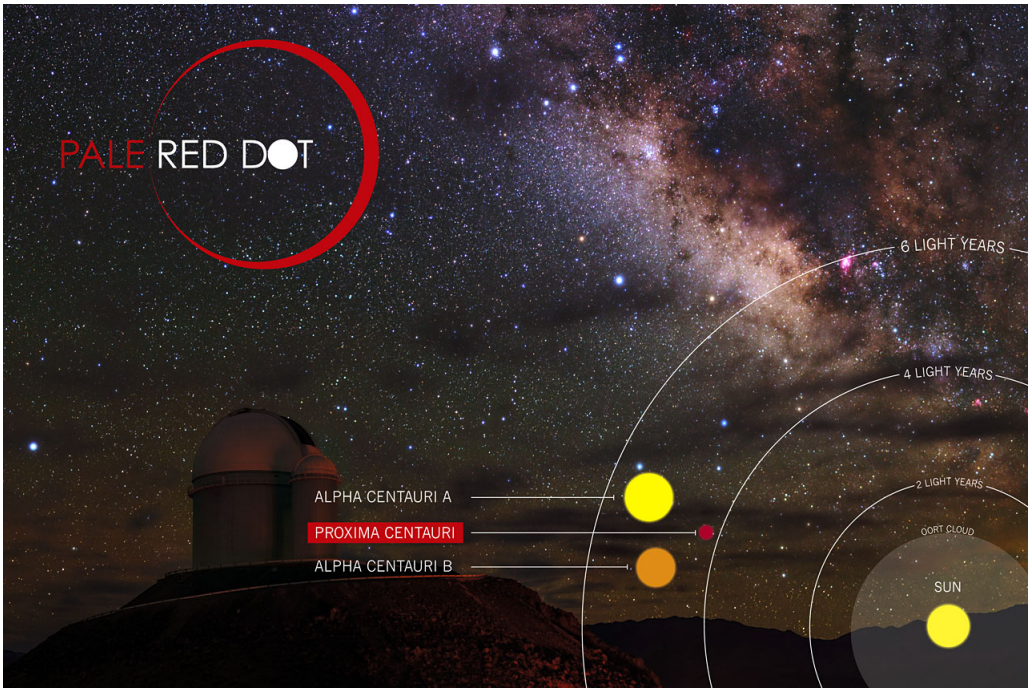
Why we call it PALE RED DOT? In 1990, Voyager 1, on its trek towards interstellar space, sent back a picture of the Inner Solar System on which the image of the Earth fell on a single pixel. This image of Earth was called Pale Blue Dot, and inspired the late Carl Sagan's essay "Pale Blue Dot : A vision of the human future in Space", which in turn has been a source of inspiration for a generation of exoplanet hunters. Given that Proxima Centauri -or just Proxima- is a red dwarf star, such a planet would show reddish tints. Even if successful, we will only obtain information about its orbital period and mass –even less than Voyager 1's pale blue pixel– at least for now!

What is special about the project? Proxima Centauri is the nearest star to the Sun. After years of data acquisition by many researchers and teams, a signal was been identified by our team which may indicate the presence of an Earth mass planet in a warm orbit. The Pale Red Dot campaign consists on monitoring Proxima for another 60 consecutive nights with HARPS/ESO and small telescope for simultaneous photometric follow-up, thus reducing the the risk of an activity-induced false-positive. By broadcasting the progress and results of the observations through all media channels available e.g. press, website, and social media, the Pale Red Dot project aims to show the time-scales of a scientific investigation, while promoting Science Technology Engineering and Mathematics (STEM) in the broader society, inform the public and –hopefully– inspire the new generation of scientists.

Help us to spread the word on Twitter @Pale_Red_Dot #palereddot, Facebook www.facebook.com/palereddot/ or by sharing palereddot.org with your colleages and students.

Download/Website: https://palereddot.org

Contact: g.anglada@qmul.ac.uk



Astronomical Review

Andrew Norton
The Open University

Taylor & Francis, Journal re-launched from 1st Jan 2016

The journal *Astronomical Review* is now re-launched, following its takeover by the publishers Taylor & Francis, with me (Andrew Norton) as Editor-in-Chief.

The focus is to be on authoritative and topical review articles, across the entire field of astronomy (Solar physics, Solar system, exoplanets, stars, high energy phenomena, galaxies & local Universe, cosmology & distant Universe, instrumentation, computational modelling and astronomical software). The journal will be entirely online and delivered through "gold" open access. To facilitate this, each accepted article carries an Article Publishing Charge of $ 750 / £469 / 625 Euro.

I know that many of us are (rightly) sceptical whenever a new journal is launched. However, I believe that there is a real need for a journal publishing high quality reviews in astronomy, which none of the current major journals do on a regular basis. These will be the sort of review articles that one would expect to see cited in the introductory paragraphs of original research papers, PhD theses, etc. With the backing of an international publisher like Taylor & Francis, I am confident this journal will therefore be of great use to the professional astronomical community.

If anyone would like to write and submit a review article for the journal, by all means speak to me first if you wish, alternatively the Editorial Manager website for submissions is already live at http://www.editorialmanager.com/tare

Download/Website: `http://www.tandfonline.com/loi/tare20`

Contact: `andrew.norton@open.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 February 2016. If you see any that we missed, please let us know and we'll include them in the next issue.

astro-ph/1602.00009 : **The GAPS programme with HARPS-N at TNG XI. Pr 0211 in M 44: the first multi-planet system in an open cluster** by *L. Malavolta, et al.*

astro-ph/1602.00322 : **The Rossiter-McLaughlin effect reloaded: Probing the 3D spin-orbit geometry, differential stellar rotation, and the spatially-resolved stellar spectrum of star-planet systems** by *H. M. Cegla, et al.*

astro-ph/1602.00506 : **The GTC exoplanet transit spectroscopy survey. IV.: No asymmetries in the transit of Corot-29b** by *E. Palle, et al.*

astro-ph/1602.00638 : **The K2-ESPRINT Project IV: A Hot Jupiter in a Prograde Orbit with a Possible Stellar Companion** by *Teruyuki Hirano, et al.*

astro-ph/1602.00658 : **Solubility of Rock in Steam Atmospheres of Planets** by *Bruce Fegley Jr, et al.*

astro-ph/1602.00690 : **Terrestrial planets across space and time** by *E. Zackrisson, et al.*

astro-ph/1602.00691 : **The Measurement, Treatment, and Impact of Spectral Covariance and Bayesian Priors in Integral-Field Spectroscopy of Exoplanets** by *Johnny P. Greco, Timothy D. Brandt*

astro-ph/1602.00740 : **Drifting Asteroid Fragments Around WD 1145+017** by *S. Rappaport, et al.*

astro-ph/1602.00751 : **Effect of Pressure Broadening on Molecular Absorption Cross Sections in Exoplanetary Atmospheres** by *Christina Hedges, Nikku Madhusudhan*

astro-ph/1602.00835 : **Evolved stars and the origin of abundance trends in planet hosts** by *J. Maldonado, E. Villaver*

astro-ph/1602.01219 : **The Matryoshka Disk: Keck/NIRC2 Discovery of a Solar System-Scale, Radially Segregated Residual Protoplanetary Disk Around HD 141569A** by *Thayne Currie, et al.*

astro-ph/1602.01724 : **Dust masses of disks around 8 Brown Dwarfs and Very Low-Mass Stars in Upper Sco OB1 and Ophiuchus** by *G. van der Plas, et al.*

astro-ph/1602.01740 : **Five transiting hot Jupiters discovered using WASP-South, Euler and TRAPPIST: WASP-119 b, WASP-124 b, WASP-126 b, WASP-129 b and WASP-133 b** by *P.F.L. Maxted et al.*

astro-ph/1602.01851 : **The K2-ESPRINT Project II: Spectroscopic follow-up of three exoplanet systems from Campaign 1 of K2** by *Vincent Van Eylen, et al.*

astro-ph/1602.02513 : **Transiting planets as a precision clock to constrain the time variation of the gravitational constant** by *Kento Masuda, Yasushi Suto*

astro-ph/1602.02519 : **The OGLE-III planet detection efficiency from six years of microlensing observations (2003 to 2008)** by *Y. Tsapras, et al.*

astro-ph/1602.02749 : **The SOPHIE search for northern extrasolar planets IX. Populating the brown dwarf desert** by *P. A. Wilson, et al.*

astro-ph/1602.02758 : **In hot water: effects of temperature-dependent interiors on the radii of water-rich super-Earths** by *Scott W. Thomas, Nikku Madhusudhan*

astro-ph/1602.02759 : **Clouds in Super-Earth Atmospheres: Chemical Equilibrium Calculations** by *Rostom Mbarek, Eliza M.-R. Kempton*

astro-ph/1602.02781 : **Disk-fed giant planet formation** by *James E. Owen, Kristen Menou*

astro-ph/1602.02856 : **High-Cadence, High-Contrast Imaging for Exoplanet Mapping: Observations of the HR 8799 Planets with VLT/SPHERE Satellite Spot-Corrected Relative Photometry** by *Daniel Apai, et al.*

astro-ph/1602.02877 : **Applying Titius-Bode's Law on Exoplanetry Systems** by *M. B. Altaie, Zahraa Yousef, A. I. Al-Sharif*

astro-ph/1602.03022 : **The First Brown Dwarf/Planetary-Mass Object in the 32 Orionis Group** by *Adam J. Burgasser et al.*

astro-ph/1602.03037 : **Effect of turbulence on collisions of dust particles with planetesimals in protoplanetary**

disks by *H. Homann, et al.*

astro-ph/1602.03088 : **A transition in the composition of clouds in hot Jupiters** by *Vivien Parmentier, et al.*

astro-ph/1602.03204 : **Identifying False Alarms in the Kepler Planet Candidate Catalog** by *F. Mullally, et al.*

astro-ph/1602.03895 : **Dynamical Constraints on the Core Mass of Hot Jupiter HAT-P-13b** by *P. Buhler, et al.*

astro-ph/1602.04362 : **Inferring asymmetric limb cloudiness on exoplanets from transit light curves** by *P. von Paris, et al.*

astro-ph/1602.04428 : **Difficulty in Formation of Counter-orbiting Hot Jupiters from Near-coplanar Hierarchical Triple Systems: A Sub-stellar Perturber** by *Yuxin Xue, Yasushi Suto*

astro-ph/1602.04622 : **The SOPHIE search for northern extrasolar planets. X. Detection and characterization of giant planets by the dozen** by *G. Hebrard, et al.*

astro-ph/1602.04683 : **The orbit of Beta Pic b as a transiting planet** by *A. Lecavelier des Etangs, A. Vidal-Madjar*

astro-ph/1602.04751 : **Disruption of Planetary Orbits Through Evection Resonance with an External Companion: Circumbinary Planets and Multiplanet Systems** by *Wenrui Xu, Dong Lai*

astro-ph/1602.04755 : **A numerical investigation of coorbital stability and libration in three dimensions** by *Maria Helena M. Morais, Fathi Namouni*

astro-ph/1602.04814 : **How Spirals and Gaps Driven by Companions in Protoplanetary Disks Appear in Scattered Light at Arbitrary Viewing Angles** by *Ruobing Dong, Jeffrey Fung, Eugene Chiang*

astro-ph/1602.04827 : **Direct detection of precursors of gas giants formed by gravitational instability with the Atacama Large Millimetre/sub-millimetre Array** by *Lucio Mayer, et al.*

astro-ph/1602.05176 : **The inner edge of the habitable zone for synchronously rotating planets around low-mass stars using general circulation models** by *Ravi kumar Kopparapu, et al.*

astro-ph/1602.05200 : **A 12-Year Activity Cycle for HD 219134** by *Marshall C. Johnson, et al.*

astro-ph/1602.05584 : **Identifying Planetary Biosignature Impostors: Spectral Features of CO and O4 Resulting from Abiotic O2/O3 Production** by *Edward W. Schwieterman, et al.*

astro-ph/1602.05674 : **On the Detection of Non-Transiting Hot Jupiters in Multiple-Planet Systems** by *Sarah Millholland, Songhu Wang, Gregory Laughlin*

astro-ph/1602.06305 : **The Need for Laboratory Work to Aid in The Understanding of Exoplanetary Atmospheres** by *Jonathan J. Fortney, et al.*

astro-ph/1602.06713 : **Daughter Fragmentation is Unlikely To Occur in Self-Gravitating Circumstellar Discs** by *Duncan Forgan*

astro-ph/1602.06733 : **The atmospheric circulation of a nine-hot Jupiter sample: Probing circulation and chemistry over a wide phase space** by *Tiffany Kataria, et al.*

astro-ph/1602.07014 : **Efficient Geometric Probabilities of Multi-Transiting Exoplanetary Systems from CORBITS** by *Joshua Brakensiek, Darin Ragozzine*

astro-ph/1602.07843 : **The dearth of short-period Neptunian exoplanets - a desert in the period-mass/radius planes** by *Tsevi Mazeh, Tomer Holczer, Simchon Faigler*

astro-ph/1602.07848 : **Transiting Planet Candidates Beyond the Snow Line Detected by Visual Inspection of 7557 Kepler Objects of Interest** by *Sho Uehara, et al.*

astro-ph/1602.07939 : **State of the Field: Extreme Precision Radial Velocities** by *Debra Fischer, et al.*

astro-ph/1602.08277 : **Telling twins apart: Exo-Earths and Venuses with transit spectroscopy** by *Joanna K. Barstow, et al.*

astro-ph/1602.08381 : **Low-rank plus sparse decomposition for exoplanet detection in direct-imaging ADI sequences. The LLSG algorithm** by *C. A. Gomez Gonzalez, et al.*

astro-ph/1602.08389 : **Transiting Exoplanet Studies and Community Targets for JWST's Early Release Science Program** by *Kevin B. Stevenson, et al.*

astro-ph/1602.08390 : **The evolution of self-gravitating accretion discs** by *Ken Rice*

astro-ph/1602.09055 : **Departure from the constant-period ephemeris for the transiting exoplanet WASP-12 b** by *G. Maciejewski, et al.*