ExoPlanet News
An Electronic Newsletter

No. 83, November 3rd, 2015

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

Contents

1 Editorial

Welcome to the 83rd edition of Exoplanet News. As well as the usual selection of great abstracts, this month sees a wide range of enticing conference announcements and job adverts – please keep these coming and continue to send me anything that will be of interest to the exoplanet research 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

Dust Evolution Can Produce Scattered Light Gaps in Protoplanetary Disks

T. Birnstiel[1], *S. M. Andrews*[1], *P. Pinilla*[2], *M. Kama*[2]

[1] Harvard-Smithsonian Center for Astrophysics, 60 Garden Street, Cambridge, MA 02138, USA
[2] Leiden Observatory, P.O. Box 9513, 2300 RA, Leiden, The Netherlands

Astrophysical Journal Letters, vol 813, L14 (arXiv:1510.05660)

Recent imaging of protoplanetary disks with high resolution and contrast have revealed a striking variety of substructure. Of particular interest are cases where near-infrared scattered light images show evidence for low-intensity annular "gaps." The origins of such structures are still uncertain, but the interaction of the gas disk with planets is a common interpretation. We study the impact that the evolution of the solid material can have on the observable properties of disks in a simple scenario without any gravitational or hydrodynamical disturbances to the gas disk structure. Even with a smooth and continuous gas density profile, we find that the scattered light emission produced by small dust grains can exhibit ring-like depressions similar to those presented in recent observations. The physical mechanisms responsible for these features rely on the inefficient fragmentation of dust particles. The occurrence and position of the proposed "gap" features depend most strongly on the dust-to-gas ratio, the fragmentation threshold velocity, the strength of the turbulence, and the age of the disk, and should be generic (at some radius) for typically adopted disk parameters. The same physical processes can affect the thermal emission at optically thin wavelengths ($\sim$1 mm), although the behavior can be more complex; unlike for disk–planet interactions, a "gap" should not be present at these longer wavelengths.

Download/Website: `http://arxiv.org/abs/1510.05660`

Contact: `birnstiel@mpia.de`

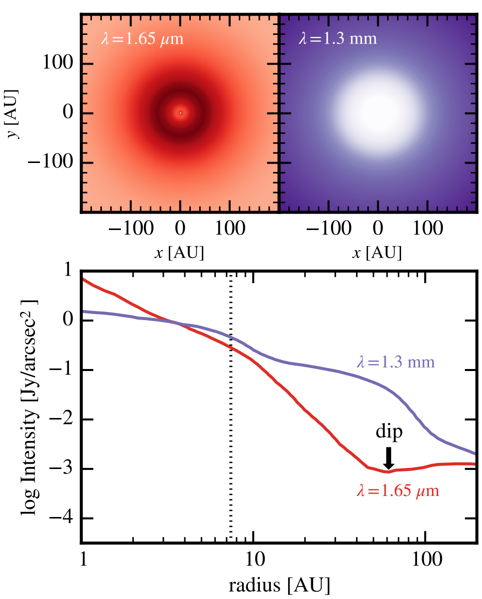

Figure 1: (Birnstiel et al.) Figure caption: Observational signatures of particle growth in a disk without planets or pressure inhomogeneities. (*top*) Synthetic images at 1.65 μm (left) and 1.3 mm (right), both with a logarithmic stretch to the color-scale. The scattered light image at 1.65 μm has been scaled by r^2. (*bottom*) The corresponding azimuthally averaged radial intensity profiles.

A bimodal correlation between host star chromospheric emission and the surface gravity of hot-Jupiters

L. Fossati[1,4], *S. Ingrassia*[2], *A. F. Lanza*[3]

[1] Space Research Institute, Austrian Academy of Sciences, Schmiedlstrasse 6, A-8042 Graz, Austria
[2] Department of Economics and Business - University of Catania, Corso Italia, 55, I-95100 Catania, Italy
[3] INAF-Osservatorio Astrofisico di Catania, Via S. Sofia, 78, I-95123 Catania, Italy
[4] Argelander-Institut für Astronomie der Universität Bonn, Auf dem Hügel 71, 53121, Bonn, Germany

Astrophysical Journal Letters, published (2015, ApJ, 812, L35)

The chromospheric activity index $\log R'_{\rm HK}$ of stars hosting transiting hot Jupiters appears to be correlated with the planets' surface gravity. One of the possible explanations is based on the presence of condensations of planetary evaporated material located in a circumstellar cloud that absorbs the Ca2 H&K and Mg2 h&k resonance line emission flux, used to measure chromospheric activity. A larger column density in the condensations, or equivalently a stronger absorption in the chromospheric lines, is obtained when the evaporation rate of the planet is larger, which occurs for a lower gravity of the planet. We analyze here a sample of stars hosting transiting hot Jupiters tuned in order to minimize systematic effects (e.g., interstellar medium absorption). Using a mixture model, we find that the data are best fit by a two-linear-regression model. We interpret this result in terms of the Vaughan–Preston gap. We use a Monte Carlo approach to best take into account the uncertainties, finding that the two intercepts fit the observed peaks of the distribution of $\log R'_{\rm HK}$ for main-sequence solar-like stars. We also find that the intercepts are correlated with the slopes, as predicted by the model based on the condensations of planetary evaporated material. Our findings bring further support to this model, although we cannot firmly exclude different explanations. A precise determination of the slopes of the two linear components would allow one to estimate the average effective stellar flux powering planetary evaporation, which can then be used for theoretical population and evolution studies of close-in planets.

Contact: `luca.fossati@oeaw.ac.at`

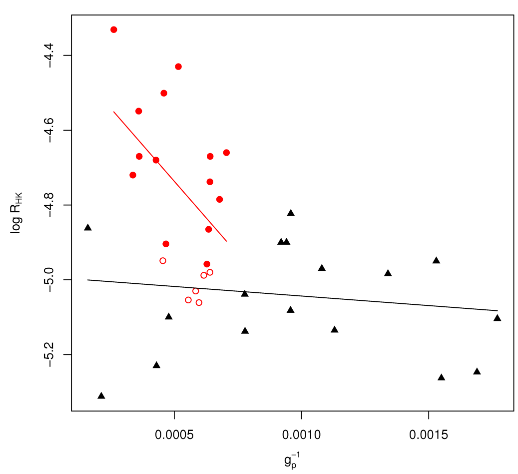

Figure 2: (Fossati, Ingrassia & Lanza) Chromospheric emission index $\log R'_{\rm HK}$ vs. the inverse of the planet gravity $g_{\rm p}^{-1}$ (in cm^{-1} s^2) with the two best-fit regression lines of our mixture model in black and red. The data points assigned to each of the two regressions are plotted with the same color coding of the corresponding regression line. The open circles indicate points belonging to the high-activity component with an a posteriori probability between 0.5 and 0.65, hence points which may also belong to the low-activity component.

KELT-10b: The First Transiting Exoplanet from the KELT-South Survey – A Hot Sub-Jupiter Transiting a V=10.7 Early G-Star

R. B. Kuhn[1], J. E. Rodriguez[2], K. A. Collins[2,3], M. B. Lund[2], R. J. Siverd[4], K. D. Colón[5,6,7], J. Pepper[5], K. G. Stassun[2,8], P. A. Cargile[9], D. J. James[10], K. Penev[11], G. Zhou[12], D. Bayliss[13,14], T. G. Tan[15], I. A. Curtis[16], S. Udry[13], D. Segransan[13], D. Mawet[17,18], J. Soutter[19], R. Hart[19], B. Carter[19], B. S. Gaudi[20], G. Myers[21,22], T. G. Beatty[23,24], J. D. Eastman[9], D. E. Reichart[25], J. B. Haislip[25], J. Kielkopf[3], A. Bieryla[9], D. W. Latham[9], E. L. N. Jensen[26], T. E. Oberst[27], D. J. Stevens[20]

[1] South African Astronomical Observatory, PO Box 9, Observatory 7935, South Africa
[2] Department of Physics and Astronomy, Vanderbilt University, 6301 Stevenson Center, Nashville, TN 37235, USA
[3] Department of Physics and Astronomy, University of Louisville, Louisville, KY 40292, USA
[4] Las Cumbres Observatory Global Telescope Network, 6740 Cortona Drive, Suite 102, Santa Barbara, CA 93117, USA
[5] Department of Physics, Lehigh University, Bethlehem, PA 18015, USA
[6] NASA Ames Research Center, M/S 244-30, Moffett Field, CA 94035, USA
[7] Bay Area Environmental Research Institute, 625 2nd St. Ste 209 Petaluma, CA 94952, USA
[8] Department of Physics, Fisk University, 1000 17th Avenue North, Nashville, TN 37208, USA
[9] Harvard-Smithsonian Center for Astrophysics, 60 Garden St, Cambridge, MA 02138, USA
[10] Cerro Tololo Inter-American Observatory, Colina El Pino, S/N, La Serena, Chile
[11] Department of Astrophysical Sciences, Princeton University, Princeton, NJ 08544, USA
[12] Research School of Astronomy and Astrophysics, Australian National University, Canberra, ACT 2611, Australia
[13] Observatoire Astronomique de l'Université de Genève, Chemin des Maillettes 51, 1290 Sauverny, Switzerland
[14] The Australian National University, Canberra, Australia
[15] Perth Exoplanet Survey Telescope, Perth, Australia
[16] Adelaide, Australia
[17] Department of Astronomy, California Institute of Technology, Mail Code 249-17, 1200 E. California Blvd, Pasadena, CA 91125, USA
[18] European Southern Observatory, Alonso de Cordova 3107, Vitacura, Santiago, Chile
[19] Computational Engineering and Science Research Centre, University of Southern Queensland, Toowoomba, QLD 4350, Australia
[20] Department of Astronomy, The Ohio State University, 140 West 18th Avenue, Columbus, OH 43210, USA
[21] 5 Inverness Way, Hillsborough, CA 94010, USA
[22] AAVSO, 49 Bay State Rd., Cambridge, MA 02138, USA
[23] Department of Astronomy & Astrophysics, The Pennsylvania State University, 525 Davey Lab, University Park, PA 16802, USA
[24] Center for Exoplanets and Habitable Worlds, The Pennsylvania State University, 525 Davey Lab, University Park, PA 16802, USA
[25] Department of Physics and Astronomy, University of North Carolina at Chapel Hill, Chapel Hill, NC 27599-3255, USA
[26] Department of Physics and Astronomy, Swarthmore College, Swarthmore, PA 19081, USA
[27] Department of Physics, Westminster College, New Wilmington, PA 16172, USA

Monthly Notices of the Royal Astronomical Society, in press (arXiv:1509.02323)

We report the discovery of KELT-10b, the first transiting exoplanet discovered using the KELT-South telescope. KELT-10b is a highly inflated sub-Jupiter mass planet transiting a relatively bright $V = 10.7$ star (TYC 8378-64-1), with T_{eff} = 5948 ± 74 K, $\log g = 4.319^{+0.020}_{-0.030}$ and [Fe/H] = $0.09^{+0.11}_{-0.10}$, an inferred mass M_* = $1.112^{+0.055}_{-0.061}$ $M_\odot$ and radius R_* = $1.209^{+0.047}_{-0.035}$ $R_\odot$. The planet has a radius R_p = $1.399^{+0.069}_{-0.049}$ R_J and mass M_p = $0.679^{+0.039}_{-0.038}$ M_J. The planet has an eccentricity consistent with zero and a semi-major axis a = $0.05250^{+0.00086}_{-0.00097}$ AU. The best fitting linear ephemeris is T_0 = 2457066.72045±0.00027 BJD_{TDB} and P = 4.1662739±0.0000063 days. This planet joins a group of highly inflated transiting exoplanets with a radius much larger and a mass much less than those of Jupiter. The planet, which boasts deep transits of 1.4%, has a relatively high equilibrium temperature of T_{eq} = 1377^{+28}_{-23} K, assuming zero albedo and perfect heat redistribution. KELT-10b receives an estimated insolation of $0.817^{+0.068}_{-0.054} \times 10^9$ erg s^{-1} cm^{-2}, which places it far above the insolation threshold above which hot Jupiters exhibit increasing amounts of radius inflation. Evolutionary analysis of the host star suggests that KELT-10b is unlikely to survive beyond the subgiant phase, due to a concomitant in-spiral of the planet over the next $\sim$1 Gyr. The planet transits a relatively bright star which is accessible to large telescopes and exhibits the third largest transit depth of all transiting exoplanets with V $<$ 11 in the southern hemisphere, making it a promising candidate for future atmospheric characterization studies.

Download/Website: `http://arxiv.org/abs/1509.02323`

Contact: `rudi@saao.ac.za`

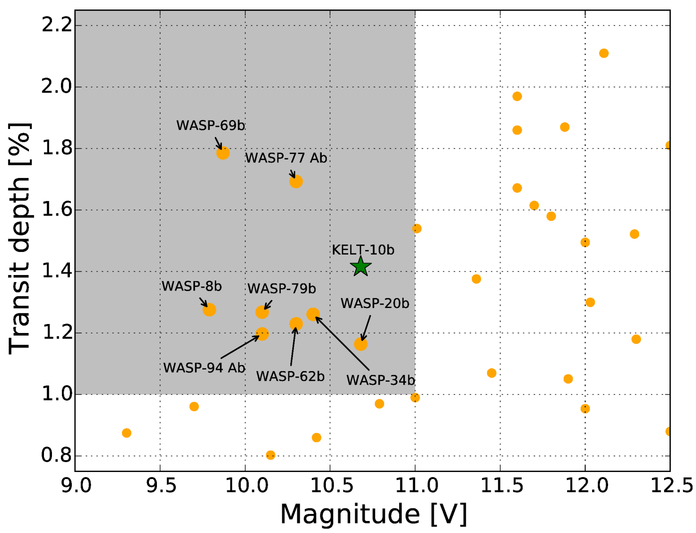

Figure 3: (Kuhn et al.) Transit depth as a function of the host star apparent V magnitude for southern transiting systems with relatively bright (V < 12.5) host stars and relatively deep ($\delta > 0.75\%$) transit depths. KELT-10b is shown as the green star. Systems in the top left (the grey shaded area) tend to be the most amenable to detailed spectroscopic and photometric studies. Other bright transiting exoplanet systems that fall into this category are also labelled (data obtained from the NASA Exoplanet Archive, retrieved on 2015 August 28). (A colour version of this figure is available in the online journal.)

How do giant planetary cores shape the dust disk? HL Tauri system

G. Picogna and W. Kley
Institut für Astronomie und Astrophysik, Universität Tübingen, Auf der Morgenstelle 10, Tübingen, Germany

Astronomy & Astrophysics, in press (arXiv:1510.01498)

We have been observing, thanks to ALMA, the dust distribution in the region of active planet formation around young stars. This is a powerful tool that can be used to connect observations with theoretical models and improve our understanding of the processes at play.
We want to test how a multiplanetary system shapes its birth disk and to study the influence of the planetary masses and particle sizes on the final dust distribution. Moreover, we apply our model to the HL Tau system in order to obtain some insights on the physical parameters of the planets that are able to create the observed features.
We follow the evolution of a population of dust particles, treated as Lagrangian particles, in two-dimensional locally isothermal disks where two equal-mass planets are present. The planets are kept in fixed orbits and they do not accrete mass.
The outer planet plays a major role in removing the dust particles in the co-orbital region of the inner planet and in forming a particle ring which have a steeper density gradient close to the gap edge respect to the single-planet scenario, promoting the development of vortices. The ring and gap width depend strongly on the planetary mass and particle stopping times, and for the more massive cases on the ring clumps in few stable points that are able to collect a high mass fraction. The features observed in the HL Tau system can be explained through the presence of several massive cores that shape the dust disk where the inner planet(s) have a mass of the order of $0.07\,M_{\rm Jup}$ and the outer one(s) of the order of $0.35\,M_{\rm Jup}$. These values can be significantly lower if the disk mass turns out to be less than previously estimated. By decreasing the disk mass by a factor of 10, we obtain similar gap widths for planets with a mass of $10\,M_\oplus$ and $20\,M_\oplus$ for the inner and outer planets, respectively. Although the particle gaps are prominent, the expected gaseous gaps are barely visible.

Download/Website: `http://www.aanda.org/articles/aa/pdf/forth/aa26921-15.pdf`

Contact: `giovanni.picogna@uni-tuebingen.de`

An Increase in the Mass of Planetary Systems around Lower-Mass Stars

Gijs D. Mulders[1,2], *Ilaria Pascucci*[1,2], *Daniel Apai*[1,2,3]
[1] Lunar and Planetary Laboratory, The University of Arizona, Tucson, AZ, USA
[2] Earths in Other Solar Systems Team, NASA Nexus for Exoplanet System Science
[3] Department of Astronomy, The University of Arizona, Tucson, AZ, USA

The Astrophysical Journal, in press (arXiv:1510.02481)

Trends in the planet population with host star mass provide an avenue to constrain planet formation theories. We derive the planet radius distribution function for Kepler stars of different spectral types, sampling a range in host star masses. We find that M dwarf stars have 3.5 times more small planets $(1.0 - 2.8\ R_\oplus)$ than main-sequence FGK stars, but two times fewer Neptune-sized and larger $(> 2.8R_\oplus)$ planets. We find no systematic trend in the planet size distribution between spectral types F, G, and K to explain the increasing occurrence rates. Taking into account the mass-radius relationship and heavy-element mass of observed exoplanets, and assuming those are independent of spectral type, we derive the inventory of the heavy-element mass locked up in exoplanets at short orbits. The overall higher planet occurrence rates around M stars are not consistent with the redistribution of the same mass into more, smaller planets. At the orbital periods and planet radii where Kepler observations are complete for all spectral types, the average heavy-element mass locked up in exoplanets increases roughly inversely with stellar mass from $4\ M_\oplus$ in F stars to $5\ M_\oplus$ in G and K stars to $7\ M_\oplus$ in M stars. This trend stands in stark contrast with observed protoplanetary disk masses that decrease towards lower mass stars, and provides a challenge for current planet formation models. Neither models of in situ formation nor migration of fully-formed planets are consistent with these results. Instead, these results are indicative of large-scale inward migration of planetary building blocks — either through type-I migration or radial drift of dust grains — that is more efficient for lower mass stars, but does not result in significantly larger or smaller planets.

Download/Website: `http://arxiv.org/abs/1510.02481`

Contact: `mulders@lpl.arizona.edu`

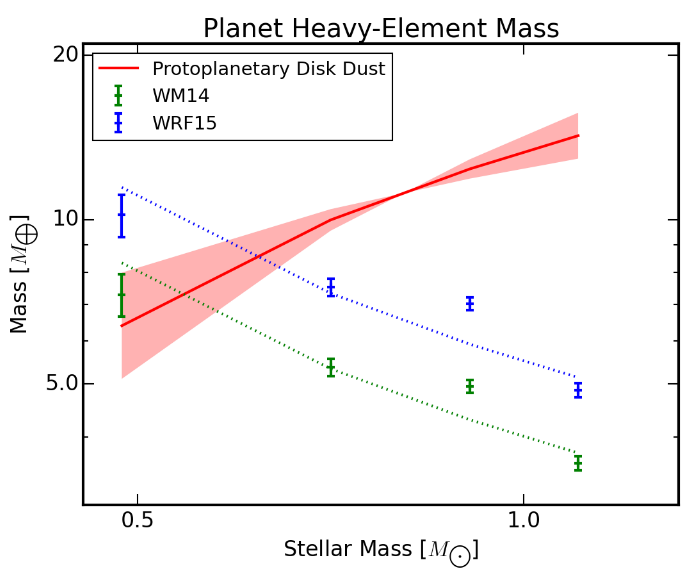

Figure 4: (Mulders et al.) Average heavy-element mass locked up in planetary systems observed by Kepler as function of stellar mass. For comparison, the observed dust disk masses from Andrews et al. 2013 are also displayed, showing the opposite trend with stellar mass. Different planet mass-radius relations yield the same trend with stellar mass (green and blue lines). See paper for more details.

Variability and dust filtration in the transition disk J160421.7-213028 observed in optical scattered light

P. Pinilla[1], *J. de Boer*[1], *M. Benisty* [2], *A. Juhász* [3], *M. de Juan Ovelar*[4], *C. Dominik*[5], *H. Avenhaus*[6], *T. Birnstiel*[7], *J. H. Girard*[8], *N. Huelamo*[9], *A. Isella*[10], *and J. Milli*[8]

[1] Leiden Observatory, Leiden University, P.O. Box 9513, 2300RA Leiden, The Netherlands
[2] Univ. Grenoble Alpes, IPAG, F-38000 Grenoble, France CNRS, IPAG, F-38000 Grenoble, France
[3] Institute of Astronomy, Madingley Road, Cambridge CB3 OHA, United Kingdom
[4] Astrophysics Research Institute, Liverpool John Moores University,146 Brownlow Hill, Liverpool L3 5RF, UK
[5] Astronomical Institute Anton Pannekoek, University of Amsterdam, PO Box 94249, 1090 GE Amsterdam, The Netherlands
[6] Departamento de Astronomía, Universidad de Chile, Casilla 36-D, Santiago, Chile
[7] Harvard-Smithsonian Center for Astrophysics, 60 Garden Street, Cambridge, MA 02138, USA
[8] European Southern Observatory (ESO), Alonso de Córdova 3107, Vitacura, Casilla 19001, Santiago, Chile
[9] Centro de Astrobiología (INTA-CSIC); ESAC Campus, PO Box 78, 28691 Villanueva de la Canada, Spain
[10] Department of Physics & Astronomy, Rice University, 6100 Main Street, Houston, TX 77005, USA

Astronomy & Astrophysics Letters, in press (arXiv:1510.00412)

Context. Protoplanetary disks around young stars are the birth-sites of planets. Spectral energy distributions and direct images of a subset of disks known as transition disks reveal dust-depleted inner cavities. Some of these disks show asymmetric structures in thermal submillimetre emission and optical scattered light. These structures can be the result of planet(s) or companions embedded in the disk.
Aims. We aim to detect and analyse the scattered light of the transition disk J160421.7-213028, identify disk structures, and compare the results with previous observations of this disk at other wavelengths.
Methods. We obtained and analysed new polarised intensity observations of the transition disk J160421.7-213028 with VLT/SPHERE using the visible light instrument ZIMPOL at R'-band (0.626 μm). We probed the disk gap down to a radius of confidence of 0.1” ($\sim$15 AU at 145 pc). We interpret the results in the context of dust evolution when planets interact with the parental disk.
Results. We observe a gap from 0.1 to 0.3” ($\sim$15 to 40 AU) and a bright annulus as previously detected by HiCIAO H-band observations at 1.65μm. The radial width of the annulus is around 40 AU, and its centre is at $\sim$61 AU from the central star. The peak of the reflected light at 0.626 μm is located 20 AU inward of the cavity detected in the submillimetre. In addition, we detect a dip at a position angle of $\sim 46.2 \pm 5.4°$. A dip was also detected with HiCIAO, but located at $\sim 85°$. If the dip observed with HiCIAO is the same, this suggests an average dip rotation of $\sim 12°$/year, which is inconsistent with the local Keplerian angular velocity of $\sim$0.8°/yr at $\sim$61 AU.
Conclusions. The spatial discrepancy in the radial emission in J160421.7-213028 at different wavelengths is consistent with dust filtration at the outer edge of a gap carved by a massive planet. The dip rotation can be interpreted as fast variability of the inner disk and/or the presence of a warp or circumplanetary material of a planet at ~ 9.6 AU.

Download/Website: `http://arxiv.org/pdf/1510.00412v2.pdf`

Contact: `pinilla@strw.leidenuniv.nl`

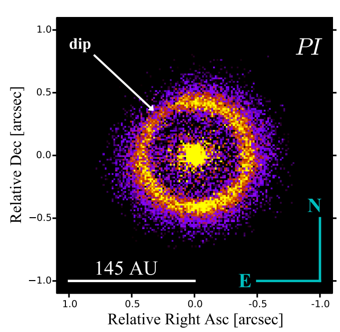

Figure 5: (Pinilla et al.) Polarised intensity (PI) image at 0.626 μm obtained with VLT/SPHERE/ZIMPOL of the transition disk J160421.7-213028.

The VLT/NaCo large program to probe the occurrence of exoplanets and brown dwarfs at wide orbits. III. The frequency of brown dwarfs and giant planets as companions to solar-type stars.

M. Reggiani[1,2], M. R. Meyer [1], G. Chauvin [3], A. Vigan[4], S. P. Quanz [1], B. Biller [5], M. Bonavita [5,6], S. Desidera[6], P. Delorme [3], J. Hagelberg [7,17], A.-L. Maire [6], A. Boccaletti [8], J.-L. Beuzit [3], E. Buenzli[1], J. Carson[10], E. Covino[11], M. Feldt[9], J. Girard [12], R. Gratton [6], T. Henning[9], M. Kasper [13], A.-M. Lagrange [3], D. Mesa[6], S. Messina [14], G. Montagnier [4], C. Mordasini[15], D. Mouillet [3], J. E. Schlieder [16], D. Segransan [17], C. Thalmann [1], A. Zurlo [18,19]

[1] Institute for Astronomy (IfA), ETH, Zurich
[2] Département d'Astrophysique, Géophysique et Océanographie, Université de Liège, 17 Allée du Six Août, 4000 Liège, Belgium
[3] UJF-Grenoble1/CNRS-INSU, Institut de Planétologie et dAstrophysique de Grenoble UMR 5274, 38041 Grenoble, France
[3] Aix-Marseille Université, CNRS, LAM (Laboratoire dAstrophysique de Marseille) UMR 7326, 13388 Marseille, France
[5] Institute for Astronomy, University of Edinburgh, Blackford Hill, Edinburgh EH9 3HJ, UK
[6] INAF Osservatorio Astronomico di Padova, Vicolo dell Osservatorio 5, 35122 Padova, Italy
[7] Institute for Astronomy, University of Hawaii, 2680 Woodlawn Drive, Honolulu, HI 96822 USA
[8] LESIA, Observatoire de Paris Meudon, 5 Pl. J. Janssen, 92195 Meudon, France Italy
[9] Max-Planck Institute for Astronomy, Königstuhl 17, 69117 Heidelberg, Germany
[10] Department of Physics and Astronomy, College of Charleston, Charleston, SC 29424 , USA
[11] INAF Osservatorio Astronomico di Capodimonte via Moiarello 16, 80131 Napoli, Italy
[12] European Southern Observatory, Casilla 19001, Santiago 19, Chile
[13] European Southern Observatory, Karl Schwarzschild St, 2, 85748 Garching, Germany
[14] INAF Catania Astrophysical Observatory, via S. So a 78, 95123 Catania, Italy
[15] Physikalisches Institut, University of Bern, Sidlerstrasse 5, CH-3012 Bern, Switzerland
[16] NASA Ames Research Center, Moffett Field, CA, USA
[17] Geneva Observatory, University of Geneva, Chemin des Mailettes 51, 1290 Versoix, Switzerland
[18] Núcleo de Astronomía, Facultad de Ingeniería, Universidad Diego Portales, Av. Ejercito 441, Santiago, Chile
[19] Millennium Nucleus "Protoplanetary Disk", Departamento de Astronomía, Universidad de Chile, Casilla 36-D, Santiago, Chile

Astronomy & Astrophysics, in press (arXiv:1510.08453)

In recent years there have been many attempts to characterize the occurrence and distribution of stellar, brown dwarf (BD) and planetary-mass companions to solar-type stars, with the aim of constraining formation mechanisms. From radial velocity observations a dearth of companions with masses between 10-40 $M_{Jupiter}$ has been noticed at close separations, suggesting the possibility of a distinct formation mechanism for objects above and below this range. We present a model for the substellar companion mass function (CMF). It consists of the superposition of the planet and BD companion mass distributions, assuming that we can extrapolate the radial velocity measured companion mass function for planets to larger separations and the stellar companion mass-ratio distribution over all separations into the BD mass regime. By using both the results of the VLT/NaCo large program (NaCo-LP, P.I. J. L. Beuzit) and the complementary archive datasets that probe the occurrence of planets and BDs on wide orbits around solar-type stars, we place some constraints on the planet and BD distributions. We developed a Monte Carlo simulation tool to predict the outcome of a given survey, depending on the shape of the orbital parameter distributions (mass, semi-major axis, eccentricity and inclination). Comparing the predictions with the results of the observations, we calculate how likely different models are and which can be ruled out. Current observations are consistent with the proposed model for the CMF, as long as a sufficiently small outer truncation radius ($<$100 AU) is introduced for the planet separation distribution. Some regions of parameter space can be excluded by the observations. We conclude that the results of the direct imaging surveys searching for substellar companions around Sun-like stars are consistent with a combined substellar mass spectrum of planets and BDs. This mass distribution has a minimum between 10 and 50 $M_{Jupiter}$, in agreement with radial velocity measurements. In this picture the dearth of objects in this mass range would naturally arise from the shape of the mass distribution, without the introduction of any distinct formation mechanism for BDs. Such a model for the CMF allows to determine what is the probability for a substellar companion as a function of mass to have formed in a disk or from protostellar core fragmentation, as such mechanisms overlap in this mass range.

Download/Website: `http://arxiv.org/pdf/1510.08453.pdf`

Contact: `mreggiani@ulg.ac.be`

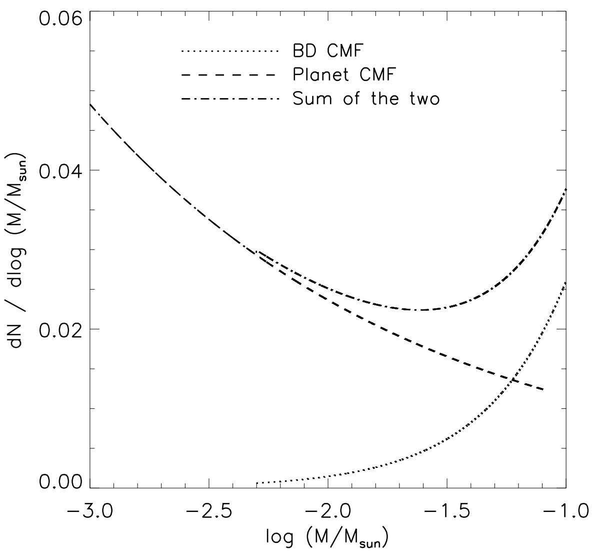

Figure 6: (Reggiani et al.) Figure: Substellar companion mass function. It consists of the superposition of the planet and BD companion mass distributions, assuming that we can extrapolate the radial velocity measured companion mass function for planets to larger separations and the stellar companion mass-ratio distribution over all separations into the BD mass regime.

Generation of highly inclined protoplanetary discs through single stellar flybys

M. Xiang-Gruess
Max-Planck Institut für Radioastronomie, Auf dem Hügel 69, D-53121 Bonn, Germany

Monthly Notices of the Royal Astronomical Society, in press (arXiv: 1510.07458)

We study the three-dimensional evolution of a viscous protoplanetary disc which is perturbed by a passing star on a parabolic orbit. The aim is to test whether a single stellar flyby is capable to excite significant disc inclinations which would favour the formation of so-called misaligned planets. We use smoothed particle hydrodynamics to study inclination, disc mass and angular momentum changes of the disc for passing stars with different masses. We explore different orbital configurations for the perturber's orbit to find the parameter spaces which allow significant disc inclination generation. Prograde inclined parabolic orbits are most destructive leading to significant disc mass and angular momentum loss. In the remaining disc, the final disc inclination is only below 20°. This is due to the removal of disc particles which have experienced the strongest perturbing effects. Retrograde inclined parabolic orbits are less destructive and can generate disc inclinations up to 60°. The final disc orientation is determined by the precession of the disc angular momentum vector about the perturber's orbital angular momentum vector and by disc orbital inclination changes.
We propose a sequence of stellar flybys for the generation of misalignment angles above 60°. The results taken together show that stellar flybys are promising and realistic for the explanation of misaligned Hot Jupiters with misalignment angles up to 60°.

Download/Website: `http://arxiv.org/abs/1510.07458`

Contact: `mxianggruess@mpifr-bonn.mpg.de`

The migration of gas giant planets in gravitationally unstable discs

D. Stamatellos
Jeremiah Horrocks Institute for Mathematics, Physics & Astronomy, University of Central Lancashire, Preston, PR1 2HE, UK

Astrophysical Journal Letters, published (2015ApJ...810L..11S)

Planets form in the discs of gas and dust that surround young stars. It is not known whether gas giant planets on wide orbits form the same way as Jupiter or by fragmentation of gravitationally unstable discs. Here we show that a giant planet, which has formed in the outer regions of a protostellar disc, initially migrates fast towards the central star (migration timescale $\sim 10^4$ yr) while accreting gas from the disc. However, in contrast with previous studies, we find that the planet eventually opens up a gap in the disc and the migration is essentially halted. At the same time, accretion-powered radiative feedback from the planet, significantly limits its mass growth, keeping it within the planetary mass regime (i.e. below the deuterium burning limit) at least for the initial stages of disc evolution. Giant planets may therefore be able to survive on wide orbits despite their initial fast inward migration, shaping the environment in which terrestrial planets that may harbour life form.

Download/Website: `http://arxiv.org/abs/1508.01196`

Contact: `dstamatellos@uclan.ac.uk`

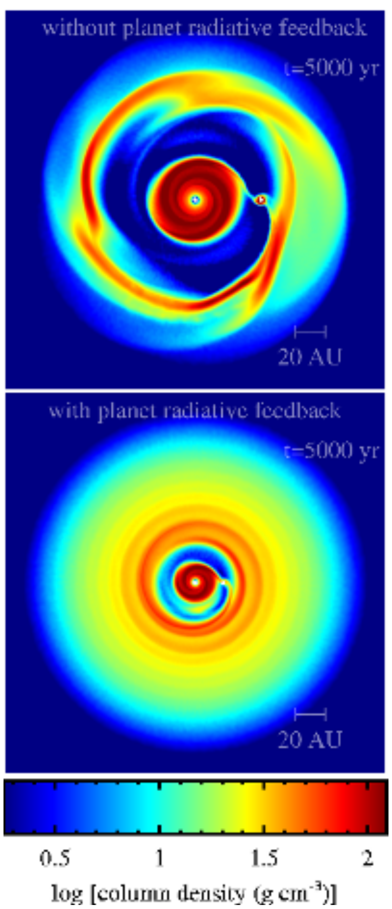

Figure 7: (Stamatellos) Column density plots showing gap opening induced by a Jupiter-mass protoplanet in an 0.1-M$_\odot$ disc, in two simulations: without (top) and with (bottom) radiative feedback from the protoplanet. The star (in the centre) and the protoplanet are depicted by thick white dots. The protoplanet in the first simulation opens up a deep, wide gap and grows to become a brown dwarf, migrating initially inwards and subsequently outwards. In the simulation with radiative feedback the gap is shallow and narrow. The protoplanet migrates inwards but its mass growth is suppressed, so that it becomes a wide-orbit planet.

The molecular composition of the planet-forming regions of protoplanetary disks across the luminosity regime

Catherine Walsh[1], *Hideko Nomura*[2], *Ewine F. van Dishoeck*[1,3]

[1] Leiden Observatory, Leiden University, P. O. Box 9513, 2300 RA Leiden, The Netherlands
[2] Department of Earth and Planetary Sciences, Tokyo Institute of Technology, 2-12-1 Ookayama, Meguro-ku, Tokyo 152-8551, Japan
[3] Max-Planck-Institut für extraterretrische Physik, Giessenbachstrasse 1, 85748 Garching, Germany

Astronomy & Astrophysics, published, 2015A&A...582A..88W

Context: Near- to mid-infrared observations of molecular emission from protoplanetary disks show that the inner regions are rich in small organic volatiles (e.g., C_2H_2 and HCN). Trends in the data suggest that disks around cooler stars ($T_{\rm eff} \approx 3000$ K) are potentially (i) more carbon-rich; and (ii) more molecule-rich than their hotter counterparts ($T_{\rm eff} \gtrsim 4000$ K). Aims: To explore the chemical composition of the planet-forming region ($<$ 10AU) of protoplanetary disks around stars over a range of spectral types (from M dwarf to Herbig Ae) and compare with the observed trends. *Methods*: Self-consistent models of the physical structure of a protoplanetary disk around stars of different spectral types are coupled with a comprehensive gas-grain chemical network to map the molecular abundances in the planet-forming zone. The effects of (i) N_2 self shielding; (ii) X-ray-induced chemistry; and (iii) initial abundances, are investigated. The chemical composition in the 'observable' atmosphere is compared with that in the disk midplane where the bulk of the planet-building reservoir resides. *Results*: M dwarf disk atmospheres are relatively more molecule rich than those for T Tauri or Herbig Ae disks. The weak far-UV flux helps retain this complexity which is enhanced by X-ray-induced ion-molecule chemistry. N_2 self shielding has only a small effect in the disk molecular layer and does not explain the higher C_2H_2/HCN ratios observed towards cooler stars. The models underproduce the OH/H_2O column density ratios constrained in Herbig Ae disks, despite reproducing (within an order of magnitude) the absolute value for OH: the inclusion of self shielding for H_2O photodissociation only increases this discrepancy. One possible explanation is the adopted disk structure. Alternatively, the 'hot' H_2O ($T \gtrsim 300$ K) chemistry may be more complex than assumed. The results for the atmosphere are independent of the assumed initial abundances; however, the composition of the disk midplane is sensitive to the initial main elemental reservoirs. The models show that the gas in the inner disk is generally more carbon rich than the midplane ices. This effect is most significant for disks around cooler stars. Furthermore, the atmospheric C/O ratio appears larger than it actually is when calculated using observable tracers only. This is because gas-phase O_2 is predicted to be a significant reservoir of atmospheric oxygen. *Conclusions*: The models suggest that the gas in the inner regions of disks around cooler stars is more carbon rich; however, calculations of the molecular emission are necessary to definitively confirm whether the chemical trends reproduce the observed trends.

Download/Website: `http://cdsads.u-strasbg.fr/abs/2015A%26A...582A..88W`

Contact: `cwalsh@strw.leidenuniv.nl`

3 Conference announcements

Water in the Universe – from clouds to oceans

G. Pilbratt
ESTEC/SRE-S,Keplerlaan 1, NL-2201 AZ Noordwijk, The Netherlands

ESA/ESTEC, Noordwijk, The Netherlands, 12-15 April 2016

Important date: Abstract submission deadline 11 December 2015

The conference will cover all astrophysical aspects of water, including the water trail, from the formation of water in molecular clouds to water on planetary bodies, including in our own solar system; water as a probe of physics and and chemistry; and water in nearby to water in extra-galactic and high redshift sources.

Topics are meant to be wide in scope, and include the following broad science areas:

- Formation and destruction of water and its chemistry: theory, laboratory work, and models
- Water excitation and its relation to other ISM tracers
- Water in star formation
- Water in disks and planet formation
- Water in the solar system and exo-solar systems
- Extra-galactic and high-redshift water

The objective of the meeting is to bring together astronomers interested in all astrophysical aspects of water, and aims to facilitate cross-fertilization between researchers with different observational, experimental, and theoretical backgrounds.

Science Organising Committee:

Yuri Aikawa, Ted Bergin, Cecilia Ceccarelli, Ewine van Dishoeck, Yu Gao, Paul Hartogh, Darek Lis, Göran Pilbratt, and Axel Weiss.

Confirmed invited speakers:

Dominique Bockelée-Morvan, Paola Caselli, Ilse Cleeves, Alex Faure, Eduardo González-Alfonso, Michiel Hogerheijde, Sergio Ioppolo, Agata Karska, Lars Kristensen, Bertrand LeFloch, Gary Melnick, David Neufeld, Giovanna Tinetti, Geronimo Villanueva, and Paul van der Werf.

Welcome!

Download/Website: `http://www.congrexprojects.com/2016-events/16A06/`

Contact: `esa.conference.bureau@esa.int`

The Astrophysics of Planetary Habitability

Manuel Güdel
University of Vienna, Department of Astrophysics, Türkenschanzstrasse 17, A-1180 Vienna, Austria

University of Vienna, Austria, 8 February – 12 February 2016

2nd Announcement for the international conference on "The Astrophysics of Planetary Habitability" to be held in Vienna from 8 February - 12 February, 2016. Abstract submission and full registration are open and can be completed via our website: http://habitability.univie.ac.at. The deadline for abstract submission will be **November 18th, 2015**.

The SOC will select contributions by **10 December, 2015**, and **early registration** can be completed until **17 December 2015**. The conference will include invited talks and there will be plenty of opportunities for contributed talks and poster presentations.

With a continuously increasing number of discovered exoplanets, research is shifting from pure detection to characterization of planets. The rapidly improving quality of observing tools and the success of space-based observations of exoplanets are driving detection and characterization toward ever smaller planets; several rocky planets have already been detected in or near habitable zones around their host stars. Exoplanetary studies are increasingly confronted with questions on habitable conditions. These conditions are determined by various astrophysical factors such as stellar high-energy radiation, particle winds, magnetic fields, accreting small bodies, planetary collisions, and planetary system dynamics.
This conference addresses astrophysical factors and processes that are pivotal for the formation, sustainability, and evolution of habitable conditions on planets from the era of planet formation in disks to the end of the main sequence life of the host star.

Confirmed invited speakers are: Yann Alibert (Univ. Bern, CHE), Christian Koeberl (NHM Vienna, AUT), Ravi Kopparapu (NASA GSFC, USA), Theresa Lüftinger (Univ. Vienna, AUT), Victoria Meadows (Univ. Washington USA), Heike Rauer (DLR Berlin, DEU), Paul Tackley (ETH Zurich, CHE), Caroline Terquem (IAP Paris, Oxford, FRA, GBR), Feng Tian (Tsinghua Univ. Beijing, CHN), Stephane Udry (Univ. Geneva, CHE).

A social program will be offered, including a visit to a monastery, a reception at the Vienna University Observatory, a visit to the Natural History Museum (meteorite collection), and a conference dinner at the town hall. For further details please visit our website mentioned below.

Download/Website: `http://habitability.univie.ac.at`

Contact: `habitability@univie.ac.at`

2016 Sagan Summer Workshop: Looking for Planets in Astronomical Data

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

Pasadena, CA, July 18-22, 2016

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

Important Dates

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

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

UK Exoplanet Community Meeting (UKEXOM 2016)

Conference Chair: Isabelle Baraffe

University of Exeter, March 30 - April 1st

Exeter is organising the next UK Exoplanet Community Meeting in 2016. This is the third of such events. The first meeting took place in Cambridge in 2014 and the second in Warwick in 2015. The main goal of these meetings is to gather and consolidate the UK community working in the field of exoplanets.
Registration will open on December 1st and will close on February 15. The conference will be organised according to several major themes illustrating the strength of our community. In addition to speakers representing UK institutions, each theme will have one international key speaker. Further information will be provided in due time.

Organisation Board: Isabelle Baraffe, Sasha Hinkley, Nathan Mayne, David Sing (Exeter)
Christiane Helling (St Andrews), Don Pollaco (Warwick), Didier Queloz (Cambridge)

Download/Website: `Information will soon be available at http://ukexom16.co.uk`
Contact: `i.baraffe@exeter.ac.uk`

4 Announcements

Astronomical Review

Andrew Norton
The Open University

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

The journal *Astronomical Review* is shortly to be 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`

Europlanet2020 RI – Providing Access to leading research facilities

N.J. Mason
The Open University, Walton Hall, Milton Keynes MK7 6AA, UK

The Open University, Current

The Europlanet 2020 Research Infrastructure (Europlanet RI) is a major (10 million Euro) programme funded under Horizon 2020 to foster transnational collaborations that will enable Europe to be at the forefront of planetary science. A central part of the programme is to allow researchers (including Postgraduate students) employed within the EU, academic or industrial, access to a comprehensive set of state of the art laboratory facilities and field sites tailored to the needs of planetary research community Access for researchers based outside the EU is also possible but there are some limitations. Access is arranged three Trans- national Access (TA) programmes (see overleaf).
There will be 4 calls for visits to Europlanet facilities 2016 – 2019. The first will close on 30th November 2015 Noon CET. Frequently asked questions are answered on the Web page but for enquiries contact the Europlanet Central office Europlanet-Office@open.ac.uk
Transnational Access provides researchers with travel and subsistence when visiting the Facility. For Laboratory facilities a typical visit is expected to last a week. For field sites expeditions are expected to last between 2 and 4 weeks. Applications are submitted via www.esf.org/europlanetcall

Download/Website: `http://www.europlanet-2020-ri.eu/`

Contact: `Europlanet-Office@open.ac.uk`

5 Jobs and Positions

PhD Position

N. J. Rattenbury
The University of Auckland, Auckland, New Zealand

Auckland, New Zealand, January 2016

Fully-funded PhD Position. This project will involve investigating the opportunities for discovering exoplanets with the Large Synoptic Survey Telescope (LSST; http://www.lsst.org/), with a particular emphasis on gravitational microlensing. The PhD candidate will be expected to generate predicted discovery rates for exoplanets in gravitational microlensing events discovered by the LSST, for a range of possible target fields and LSST cadence selections.
The candidate will have excellent programming and data analysis skills, and must be willing to travel abroad to work with LSST collaborators in the United States.
The ideal candidate will be a confident and experienced programmer, with extensive experience in handling and modelling astronomical data. Experience in fitting theoretical models to data using evolutionary or genetic algorithms would be an advantage. Experience in parallel computing and/or GPU programming and/or intelligent systems is not essential, but would be an advantage. A good understanding of inverse problem theory and statistics would also be an advantage.

Download/Website: `https://www.physics.auckland.ac.nz/en/about/our-research/funded-phd-projects-available.html`

Contact: `n.rattenbury@auckland.ac.nz`

Post-doc positions in Brazil

Othon Winter
Sao Paulo State University – UNESP in Guaratinguetá & National Institute for Space Research – INPE in Sao Joé dos Campos

Brazil, Current

The Group of Orbital Dynamics & Planetology invites applications for post-doc positions. There are 4 positions that will be funded by FAPESP (Fundacao de Amparo à Pesquisa do Estado de Sao Paulo). The candidates must have experience on Planetary Dynamics and/or Spacecraft Dynamics. The projects to be developed are the following:

- Spin-orbit coupling in solar system dynamics;
- Problems in orbital dynamics involving small bodies under gravitational close approaches;
- Dynamics of narrow planetary rings and small satellites;
- Attitude and orbit analysis for a mission to a triple asteroid system.

The projects will be developed in one of the following institutions: I) Sao Paulo State University – UNESP in Guaratinguetá; II) National Institute for Space Research – INPE in Sao José dos Campos.
Applicants should send a statement of research interest and a curriculum vitae with a list of publications to: Prof. Othon Winter (email: ocwinter@gmail.com)

Contact: `ocwinter@gmail.com`

VIDA Postdoctoral Research Fellowships

Keivan G. Stassun
Vanderbilt University, Department of Physics & Astronomy, Nashville, TN USA

Vanderbilt University, Start date: Anytime in 2016

The Vanderbilt Initiative in Data-Intensive Astrophysics (VIDA) announces the 2016 VIDA Postdoctoral Research Fellowship. Successful VIDA fellows will be expected to conduct original research in observational, theoretical, or computational astrophysics and will have the freedom to work on any of the broad VIDA research efforts. Candidates with an interest in simulations of data and/or theory, experience with multi wavelength observations, developing novel approaches to data visualization and multi-sensory perception, and/or using large surveys to study exoplanet astronomy, are especially encouraged to apply. VIDA fellows will be appointed to renewable one-year terms, for up to three years. The VIDA fellowship comes with a competitive salary, benefits, and research budget.

VIDA operates within the department of Physics and Astronomy at Vanderbilt University. VIDA research is focused on the emerging area of astro-informatics, which deals with the challenges in analyzing massive datasets, often employs simulation-based methods, and lives at the interface between astronomy, computer science, statistics, and information science. Vanderbilt is an institutional member of the Sloan Digital Sky Survey IV (SDSS IV) and Transiting Exoplanet Survey Satellite (TESS) collaborations, and also houses state-of-the-art computational facilities, such as the Advanced Computing Center for Research and Education (ACCRE). VIDA faculty regularly use national supercomputing facilities, such as Titan, Stampede, and Pleiades. VIDA also engages in significant efforts to increase diversity in science through the Fisk-Vanderbilt Bridge Program and VIDA fellows will have the opportunity to participate.

Candidates must have a Ph.D. in astronomy, physics, or equivalent, by the date of appointment. Applicants should send a curriculum vitae, a list of publications, and a short description of research interests and skills, and arrange for three letters of recommendation to be sent to: Professor Keivan Stassun, Department of Physics and Astronomy, P.O. Box 351807-B, Vanderbilt University, Nashville, TN 37235-1807, or electronically to keivan.stassun@vanderbilt.edu.

Review of applications will begin in December and continue until the position is filled. Vanderbilt University is an equal employment opportunity/affirmative action employer. Women and minority candidates are encouraged to apply.

Download/Website: `http://as.vanderbilt.edu/astronomy/vida`

Contact: `keivan.stassun@vanderbilt.edu`

Postdoctoral Fellowships

Kelly Lepo
McGill Space Institute, McGill University, Montreal, Canada.

Montreal, Canada, 1st December 2015

We invite applications for multiple Postdoctoral Fellowships to be held in the McGill Space Institute at McGill University (http://msi.mcgill.ca/).
The McGill Space Institute is a newly formed interdisciplinary center that brings together researchers engaged in space-related research at McGill. Currently there are 17 active faculty members affiliated with the center, from the Physics, Earth and Planetary Sciences, Atmospheric and Oceanic Sciences, and Natural Resource Sciences departments at McGill.
The successful applicant will have a strong research record in theoretical, observational, or experimental work in astronomy, astrophysics, cosmology, planetary science, atmospheric science or astrobiology. Applicants should submit a curriculum vitae, list of publications, statement of research plans (not to exceed 2 pages) which demonstrates how the proposed research program complements current MSI activities, and contact details of 3 referees.
This position offers a competitive salary and will be for two years, with a possible renewal for a third year, dependent on supervisor approval and the availability of funds. Preference is given to applicants within 3 years of the PhD. All application materials including letters of recommendation must be received by the deadline of December 1, 2015.

Download/Website: `https://academicjobsonline.org/ajo/jobs/6521`

Contact: `kelly.lepo@mcgill.ca`

iREx Postdoctoral Fellowship

Kelly Lepo
McGill Space Institute, McGill University, Montreal, Canada.

Montreal, Canada, 1st December 2015

We invite applications for an iREx Postdoctoral Fellowship to be held at McGill University. This fellowship is made possible in part by a generous gift from the Trottier Family Foundation to the Institute for Research on Exoplanets (iREx).
The Institute for Research on Exoplanets includes 7 faculty members and 4 postdoctoral researchers at the University of Montreal and McGill University. The group is comprised of instrument builders, observers, and theorists. Our research encompasses the formation, detection and characterization of exoplanets. Further information on these research areas can be found at http://www.exoplanetes.umontreal.ca/?lang=en.
McGill professors Cowan and Cumming are also part of the McGill Space Institute (MSI). This new research centre brings together different areas of space-related research, including planetary sciences and astrobiology.
The successful applicant will have a strong research record in exoplanet research. Applicants should submit a curriculum vitae, list of publications, statement of research interests not to exceed 2 pages, and contact details of 3 referees.
Preference is given to applicants within 3 years of the PhD. All application materials including letters of recommendation must be received by the deadline of December 1st, 2015.

Download/Website: `https://academicjobsonline.org/ajo/jobs/6532`

Contact: `kelly.lepo@mcgill.ca`

ALMA Postdoctoral Fellow

ALMA science operations group
Joint ALMA Observatory, Vitacura, Santiago, Chile

Santiago Central Office, Chile, with frequent visits to the Operations Support Facility (OSF) near San Pedro de Atacama, Chile, before October 2016

ALMA Postdoctoral Fellows will be appointed for a period of three years and will spend 50% of their time dedicated to their personal scientific research.
Position Details:
Fellows will be based in the Santiago Central Office in Chile, with eventual shifts to the ALMA Operations Support Facility (OSF) near San Pedro de Atacama for real-time interaction with the telescope. The goal of these fellowships is to offer young scientists the opportunity to enhance their research programs through involvement in science activities and interactions with experienced staff at the world's foremost observatory for sub-mm astronomy.
At present, there are over 40 scientists with a wide range of research interests working at ALMA in Santiago, and the JAO also hosts regular visits from scientists from the ALMA Regional Centers (ARCs) in Europe, North America and East Asia. The ALMA office is located adjacent to ESOs Santiago office, and the offices of AUI/NRAO and NAOJ are located nearby. In addition, fellows have the opportunity to collaborate with the rapidly growing Chilean astronomical community as well as with astronomers from other international observatories located in Chile.
The ALMA Postdoctoral Fellows will be provided with resources for science trips and will be encouraged to visit one or more of the ARCs for science collaborations. The JAO runs a visitor program through which science collaborators can be invited to work in Santiago. ALMA Postdoctoral Fellows will actively participate in and contribute to the science activities of the JAO. The research area of the successful candidate should take advantage of or be relevant to the use of ALMA
Deadline 1 December 2015.
Duties and Responsibilities:
The ALMA Postdoctoral fellows are expected to support ALMA science operations and will work in the JAO Department of Science Operations (DSO). They will perform their duties as part of the large team of international scientists working at the JAO and in the ARCs.
Successful candidates will act as Astronomers on Duty at the OSF. A fraction of the technical duties can be spent on data processing, participation in the ALMA review process as technical experts, software testing, and development and testing of new capabilities of the array, among other technical activities necessary for the successful operations of the facility.

Download/Website: `www.almaobservatory.org`

Contact: `fgiles@nrao.edu`

Post-doctoral Research Positions

Prof. Michael R. Meyer
University of Michigan, Ann Arbor, Michigan, U.S.A.

Ann Arbor, Michigan, U.S.A., Fall 2016

The Department of Astronomy at the University of Michigan welcomes applications for one (or more) post-doctoral research positions in exoplanet science. Applications are especially welcome in the areas of exoplanet population statistics, high contrast imaging and infrared instrumentation, spectral characterization, and planet formation (theory and observation). Successful applicants will have access to departmental facilities such as the Magellan Telescopes, the MDM Observatories, high performance computing clusters, and other facilities (please see *http://www.lsa.umich.edu/astro/*). Members of the research team will have a chance to collaborate on on-going projects (such as preparing for planned observations with the James Webb Space Telescope), initiate new ones, conduct their own independent research, and work with students (if appropriate). Interdisciplinary collaborations with faculty in the Departments of Astronomy, Physics, Earth Sciences, as well as Climate and Space Sciences, are encouraged (and supported) through the MIRA initiative. The University of Michigan is recognized as a top academic employer and Ann Arbor, Michigan is routinely recognized for its high quality of life. Please send a cover letter, CV, description of research accomplishments and plans (suggested length 8 pages total), list of publications, and arrange for three letters of recommendation to be sent directly to Professor Michael R. Meyer at *mrmeyer@umich.edu* by 4 January 2016 for full consideration. The University is a equal opportunity/affirmative action employer and women and minorities are encouraged to apply.

Download/Website: `http://www.lsa.umich.edu/astro/`

Contact: `mrmeyer@umich.edu`

6 As seen on astro-ph

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

astro-ph/1510.00015: **KELT-4Ab: An inflated Hot Jupiter transiting the bright (V $\sim$ 10) component of a hierarchical triple** by *Jason D. Eastman, et al.*

astro-ph/1510.00067 : **Re-inflated Warm Jupiters Around Red Giants** by *Eric D. Lopez, Jonathan J. Fortney*

astro-ph/1510.00686 : **Scaling laws to quantify tidal dissipation in star-planet systems** by *Pierre Auclair-Desrotour, Stéphane Mathis, Christophe Le Poncin-Lafitte*

astro-ph/1510.00841 : **Polar stellar-spots and grazing planetary transits: possible explanation for the low number of discovered grazing planets** by *M. Oshagh, et al.*

astro-ph/1510.00858 : **The Structure and Evolution of Protoplanetary Disks: an infrared and submillimeter view** by *Lucas A. Cieza*

astro-ph/1510.01047 : **Photo-dynamical mass determination of the multi-planetary system K2-19** by *S. C. C. Barros, et al.*

astro-ph/1510.01060 : **Characterization of the K2-19 Multiple-Transiting Planetary System via High-Dispersion Spectroscopy, AO Imaging, and Transit Timing Variations** by *Norio Narita, et al.*

astro-ph/1510.01372 : **CoRoT pictures transiting exoplanets** by *Claire Moutou, Magali Deleuil*

astro-ph/1510.01393 : **MOA-2010-BLG-353Lb A Possible Saturn Revealed** by *N. J. Rattenbury, et al.*

astro-ph/1510.01498 : **How do giant planetary cores shape the dust disk? HL Tau system** by *Giovanni Picogna, Wilhelm Kley*

astro-ph/1510.01630 : **Tidal Downsizing Model. IV. Destructive feedback in planets** by *Sergei Nayakshin*

astro-ph/1510.01706 : **3D modeling of GJ1214b's atmosphere: formation of inhomogeneous high clouds and observational implications** by *Benjamin Charnay, et al.*
astro-ph/1510.01746 : **A New Analysis of the Exoplanet Hosting System HD 6434** by *Natalie R. Hinkel, et al.*
astro-ph/1510.01778 : **Planet heating prevents inward migration of planetary cores** by *Pablo Benítez-Llambay, et al.*
astro-ph/1510.01964 : **Influence of Stellar Multiplicity On Planet Formation. IV. Adaptive Optics Imaging of Kepler Stars With Multiple Transiting Planet Candidates** by *Ji Wang, et al.*
astro-ph/1510.02090 : **Stealing the Gas: Giant Impacts and the Large Diversity in Exoplanet Densities** by *Niraj K. Inamdar, Hilke E. Schlichting*
astro-ph/1510.02094 : **Growing the gas-giant planets by the gradual accumulation of pebbles** by *Harold F. Levison, Katherine A. Kretke, Martin J. Duncan*
astro-ph/1510.02095 : **Growing the terrestrial planets from the gradual accumulation of sub-meter sized objects** by *Harold F. Levison, et al.*
astro-ph/1510.02111 : **An Exo-Jupiter Candidate in the Eclipsing Binary FL Lyr** by *V. S. Kozyreva, et al.*
astro-ph/1510.02212 : **Discovery of a Two-Armed Spiral Structure in the Gapped Disk in HD 100453** by *Kevin Wagner, et al.*
astro-ph/1510.02476 : **Numerical and Analytical Modelling of Transit Time Variations** by *Sam Hadden, Yoram Lithwick*
astro-ph/1510.02481 : **An Increase in the Mass of Planetary Systems around Lower-Mass Stars** by *Gijs D. Mulders, Ilaria Pascucci, Daniel Apai*
astro-ph/1510.02724 : **Red noise versus planetary interpretations in the microlensing event OGLE-2013-BLG-446** by *E. Bachelet, et al.*
astro-ph/1510.02738 : **ExoData: A python package to handle large exoplanet catalogue data** by *Ryan Varley*
astro-ph/1510.02747 : **Direct imaging of an asymmetric debris disk in the HD 106906 planetary system** by *Paul G. Kalas, et al.*
astro-ph/1510.02776 : **The Laplace resonance in the Kepler-60 system** by *Krzysztof Gozdziewski, et al.*
astro-ph/1510.03093 : **Inner disk clearing around the Herbig Ae star HD 139614: Evidence for a planet-induced gap ?** by *A. Matter, et al.*
astro-ph/1510.03276 : **How do starspots influence the transit timing variations of exoplanets? Simulations of individual and consecutive transits** by *P. Ioannidis, K.F. Huber, J.H.M.M. Schmitt*
astro-ph/1510.03430 : **The Transit Transmission Spectrum of a Cold Gas Giant Planet** by *Paul A. Dalba, et al.*
astro-ph/1510.03484 : **The Potential of Planets Orbiting Red Dwarf Stars to Support Oxygenic Photosynthesis and Complex Life** by *Joseph Gale, Amri Wandel*
astro-ph/1510.03527 : **Stratospheric Temperatures and Water Loss from Moist Greenhouse Atmospheres of Earth-like Planets** by *James F. Kasting, Howard Chen, Ravi Kumar Kopparapu*
astro-ph/1510.03790 : **TraMoS IV: Discarding the Quick Orbital Decay Hypothesis for OGLE-TR-113b** by *S. Hoyer, et al.*
astro-ph/1510.03811 : **Doppler Monitoring of the WASP-47 Multiplanet System** by *Fei Dai, et al.*
astro-ph/1510.03832 : **A Possible Dynamical History for the Fomalhaut System** by *Virginie Faramaz*
astro-ph/1510.03902 : **Prevalence of Earth-size Planets Orbiting Sun-like Stars** by *Erik Ardeshir Petigura*
astro-ph/1510.03997 : **Demonstrating High-precision, Multi-band Transit Photometry with MuSCAT: A Case for HAT-P-14b** by *Akihiko Fukui, et al.*
astro-ph/1510.04251 : **Aeolus: A Markov–Chain Monte Carlo code for mapping ultracool atmospheres. An application on Jupiter and brown dwarf HST light curves** by *Theodora Karalidi, et al.*
astro-ph/1510.04257 : **Constrained Evolution of a Radially Magnetized Protoplanetary Disk: Implications for Planetary Migration** by *Matthew Russo, Christopher Thompson*
astro-ph/1510.04258 : **Radially Magnetized Protoplanetary Disk: Vertical Profile** by *Matthew Russo, Christopher Thompson*

astro-ph/1510.04276 : **The In Situ Formation of Giant Planets at Short Orbital Periods** by *A. C. Boley, A. P. Granados Contreras, B. Gladman*
astro-ph/1510.04297 : **The frequency of snowline-region planets from four-years of OGLE-MOA-Wise second-generation microlensing** by *Y. Shvartzvald, et al.*
astro-ph/1510.04331 : **The Geneva Reduction and Analysis Pipeline for High-contrast Imaging of planetary Companions** by *J. Hagelberg, et al.*
astro-ph/1510.04343 : **The Pan-Pacific Planet Search III: Five companions orbiting giant stars** by *R.A. Wittenmyer, et al.*
astro-ph/1510.04542 : **A Simple Method for Calculating a Planet's Mean Annual Insolation by Latitude** by *Alice Nadeau, Richard McGehee*
astro-ph/1510.04564 : **A possible correlation between planetary radius and orbital period for small planets** by *Ravit Helled, Michael Lozovsky, Shay Zucker*
astro-ph/1510.04606 : **The G Search for Extraterrestrial Civilizations with Large Energy Supplies. IV. The Signatures and Information Content of Transiting Megastructures** by *Jason T. Wright, et al.*
astro-ph/1510.04750 : **Sensitivity bias in the mass-radius distribution from Transit Timing Variations and Radial Velocity measurements** by *Jason H. Steffen*
astro-ph/1510.04917 : **Microlensing planet detection via geosynchronous and low Earth orbit satellites** by *F. Mogavero, J. P. Beaulieu*
astro-ph/1510.04988 : **The GTC exoplanet transit spectroscopy survey II: An overly-large Rayleigh-like feature for exoplanet TrES-3b** by *Hannu Parviainen, et al.*
astro-ph/1510.05345 : **Conic-Helical Orbits of Planets around Binary Stars do not Exist** by *Greg Egan*
astro-ph/1510.05598 : **Ghost in the time series: no planet for Alpha Cen B** by *Vinesh Rajpaul, Suzanne Aigrain, Stephen J. Roberts*
astro-ph/1510.05639 : **Melting the core of giant planets: impact on tidal dissipation** by *S. Mathis*
astro-ph/1510.05660 : **Dust Evolution Can Produce Scattered Light Gaps in Protoplanetary Disks** by *Tilman Birnstiel, et al.*
astro-ph/1510.05666 : **The Catalog of Earth-Like Exoplanet Survey TArgets (CELESTA): A Database of Habitable Zones around Nearby Stars** by *Colin Orion Chandler, Iain McDonald, Stephen R. Kane*
astro-ph/1510.05758 : **HATS-17b: A Transiting Compact Warm Jupiter in a 16.3 Days Circular Orbit** by *R. Brahm, et al.*
astro-ph/1510.06010 : **Suppression of type I migration by disk winds** by *Masahiro Ogihara, Alessandro Morbidelli, Tristan Guillot*
astro-ph/1510.06247 : **On the convective overstability in protoplanetary discs** by *Henrik Latter*
astro-ph/1510.06331 : **K-Stacker, a new way of detecting and characterizing exoplanets with high contrast imaging instruments** by *H. Le Coroller, et al.*
astro-ph/1510.06347 : **Besancon Galactic model analysis of MOA-II microlensing: evidence for a mass deficit in the inner bulge** by *Supachai Awiphan, Eamonn Kerins, Annie Robin*
astro-ph/1510.06387 : **A disintegrating minor planet transiting a white dwarf** by *Andrew Vanderburg, et al.*
astro-ph/1510.06434 : **Multiwavelength Transit Observations of the Candidate Disintegrating Planetesimals Orbiting WD 1145+017** by *Bryce Croll, et al.*
astro-ph/1510.06446 : **The HARPS search for southern extra-solar planets. XXXVII. Bayesian re-analysis of three systems. New super-Earths, unconfirmed signals, and magnetic cycles** by *R. F. Díaz, et al.*
astro-ph/1510.06523 : **On the relativistic Lagrange-Laplace secular dynamics for extrasolar systems** by *M. Sansottera, L. Grassi, A. Giorgilli*
astro-ph/1510.06703 : **An Overview of Inside-Out Planet Formation** by *Jonathan C. Tan, et al.*
astro-ph/1510.06885 : **A population-based Habitable Zone perspective** by *Andras Zsom*
astro-ph/1510.07052 : **A Chemical Kinetics Network for Lightning and Life in Planetary Atmospheres** by *Paul B Rimmer, Christiane Helling*
astro-ph/1510.07458 : **Generation of highly inclined protoplanetary discs through single stellar flybys** by

Meng Xiang-Gruess

astro-ph/1510.07582 : **Scaling the Earth: A Sensitivity Analysis of Terrestrial Exoplanetary Interior Models** by *Cayman T. Unterborn, Evan E. Dismukes, Wendy R. Panero*

astro-ph/1510.07625 : **Variability in a Young, L/T Transition Planetary-Mass Object** by *Beth A. Biller, et al.*

astro-ph/1510.07689 : **Hydrogen-Water Mixtures in Giant Planet Interiors Studied with Ab Initio Simulations** by *Francois Soubiran, Burkhard Militzer*

astro-ph/1510.08062 : **Friends of Hot Jupiters III: An Infrared Spectroscopic Search for Low-Mass Stellar Companions** by *Danielle Piskorz, et al.*

astro-ph/1510.08448 : **The Fragility of the Terrestrial Planets During a Giant Planet Instability** by *Nathan A. Kaib, John E. Chambers*

astro-ph/1510.08453 : **The VLT/NaCo large program to probe the occurrence of exoplanets and brown dwarfs at wide orbits. III. The frequency of brown dwarfs and giant planets as companions to solar-type stars** by *M. Reggiani, et al.*

astro-ph/1510.08521 : **Caustic Structures and Detectability of Circumbinary Planets in Microlensing** by *Jacob K. Luhn, Matthew T. Penny, B. Scott Gaudi*

astro-ph/1510.08575 : **A high obliquity orbit for the hot-Jupiter HATS-14b transiting a 5400K star** by *G. Zhou, et al.*

astro-ph/1510.08837 : **A New Empirical Constraint on the Prevalence of Technological Species in the Universe** by *Adam Frank, W.T. Sullivan III*

astro-ph/1510.08839 : **HAT-P-57b: A Short-Period Giant Planet Transiting A Bright Rapidly Rotating A8V Star Confirmed Via Doppler Tomography** by *J. D. Hartman et al.*

astro-ph/1510.08855 : **Breeding Super-Earths and Birthing Super-Puffs in Transitional Disks** by *Eve J. Lee, Eugene Chiang*

astro-ph/1510.08890 : **Resolved Millimeter-Wavelength Observations of Debris Disks around Solar-Type Stars** by *Amy Steele, et al.*

astro-ph/1510.08918 : **Formation and Stellar Spin-Orbit Misalignment of Hot Jupiters from Lidov-Kozai Oscillations in Stellar Binaries** by *Kassandra R. Anderson, Natalia I. Storch, Dong Lai*

astro-ph/1510.08933 : **Period Ratio Distribution of Near-Resonant Planets Indicate Planetesimal Scattering** by *Sourav Chatterjee, Seth O. Krantzler, Eric B. Ford*

astro-ph/1510.09149 : **EPIC 204129699b, a grazing transiting hot Jupiter on an 1.26-day orbit around a bright solar like star** by *S. Grziwa, et al.*