ExoPlanet News
An Electronic Newsletter

No. 26, February 1st, 2010

Editors: Andrew J. Norton
Glenn J. White
Dept. of Physics & Astronomy, The Open University, Milton Keynes MK7 6AA, UK
exoplanet@open.ac.uk, http://exoplanet.open.ac.uk/

Contents

1 Editorial

Welcome to the twenty-sixth edition of ExoPlanet News, an electronic newsletter reporting the latest developments and research outputs in the field of exoplanets.
This edition is somewhat larger than usual as it is our first for two months. We hope you enjoy catching up with recent developments in the field. 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.
Please send anything relevant to exoplanet@open.ac.uk, and it will appear in the next edition which we plan to send out at the beginning of March 2010. As for this issue, if you wish to include ONE .eps figure per abstract, please do so.

Best wishes
Andrew Norton & Glenn White
The Open University

2 Abstracts of refereed papers

Stability of the directly imaged multiplanet system HR 8799: resonance and masses

D. C. Fabrycky[1,2], *R. A. Murray-Clay*[1,3]
[1] Harvard-Smithsonian Center for Astrophysics
[2] Michelson Fellow
[3] ITC Fellow

Astrophysical Journal, in press (arxiv:0812.0011)

A new era of directly imaged extrasolar planets has produced a three-planet system, where the masses of the planets have been estimated by untested cooling models. We point out that the nominal circular, face-on orbits of the planets lead to a dynamical instability in $\sim 10^5$ yr, a factor of at least 100 shorter than the estimated age of the star. Reduced planetary masses produce stability only for unreasonably small planets ($\lesssim 2\ M_{\rm Jup}$). Relaxing the face-on assumption, but still requiring circular orbits while fitting the observed positions, makes the instability time even shorter. A promising solution is that the inner two planets have a 2:1 commensurability between their periods, and they avoid close encounters with each other through this resonance. That the inner resonance has lasted until now, in spite of the perturbations of the outer planet, leads to a limit $\lesssim 10\ M_{\rm Jup}$ on the masses unless the outer two planets are *also* engaged in a 2:1 mean-motion resonance. In a double resonance, which is consistent with the current data, the system could survive until now even if the planets have masses of $\sim 20\ M_{\rm Jup}$. Apsidal alignment can further enhance the stability of a mean-motion resonant system. A completely different dynamical configuration, with large eccentricities and large mutual inclinations among the planets, is possible but finely tuned.

Download/Website: `http://arxiv.org/abs/0812.0011`

Contact: `daniel.fabrycky@gmail.com`

EUCLID : Dark Universe Probe and Microlensing planet Hunter

J.P. Beaulieu[1,2,3], *D.P. Bennett*[4,3], *V Batista*[1,3], *A Cassan*[1,3], *D. Kubas*[1,3], *P. Fouqué*[5,3], *E. Kerrins*[6], *S. Mao*[6], *J. Miralda-Escudé*[7], *J. Wambsganss*[8], *B.S. Gaudi*[9], *A. Gould*[9,3] *and S. Dong*[10]

[1] Institut d'Astrophysique de Paris, 75014 Paris, France
[2] Department of Physics and Astronomy, University College London, London WC1E 6BT, UK
[3] HOLMES collaboration
[4] University of Notre Dame, Department of Physics, Notre Dame IN 46556, USA
[5] Observatoire Midi-Pyrénées, UMR 5572, 31400 Toulouse, France
[6] Jordrell Bank Center for Astrophysics, Univ of Manchester, Manchester, UK
[7] ICREA/ICC-IEEC, Univ of Barcelona, Barcelona, Spain
[8] Astronomisches Rechen-Institut, Zentrum fur Astronomie, 69120 Heidelberg, Germany
[9] Department of Astronomy, Ohio State University, Columbus OH 43210, USA
[10] Institute for advance studies, School of Natural Sciences, Princeton NJ 08540, USA

Barcelona, Pathways towards habitable planets, September 2009

There is a remarkable synergy between requirements for Dark Energy probes by cosmic shear measurements and planet hunting by microlensing. Employing weak and strong gravitational lensing to trace and detect the distribution of matter on cosmic and Galactic scales, but as well as to the very small scales of exoplanets is a unique meeting point from cosmology to exoplanets. It will use gravity as the tool to explore the full range of masses not accessible by any other means. EUCLID is a 1.2m telescope with optical and IR wide field imagers and slitless spectroscopy, proposed to ESA Cosmic Vision to probe for Dark Energy, Baryonic acoustic oscillation, galaxy evolution, and an exoplanet hunt via microlensing. A 3 months microlensing program will already efficiently probe for planets down to the mass of Mars at the snow line, for free floating terrestrial or gaseous planets and habitable super Earth. A 12+ months survey would give a census on habitable Earth planets around solar like stars. This is the perfect complement to the statistics that will be provided by the KEPLER satellite, and these missions combined will provide a full census of extrasolar planets from hot, warm, habitable, frozen to free floating.

Download/Website: `http://arxiv.org/abs/1001.3349`

Contact: `beaulieu@iap.fr`

Debris discs and comet populations around Sun-like stars: the Solar System in context

J. S. Greaves[1], *M. C. Wyatt*[2]

[1] Physics and Astronomy, University of St Andrews, North Haugh, Fife KY16 9SS
[2] Institute of Astronomy, University of Cambridge, CB3 OHA

Monthly Notices of the Royal Astronomical Society, accepted (arXiv:1001.5177)

Numerous nearby FGK dwarfs possess discs of debris generated by collisions among comets. Here we fit the levels of dusty excess observed by Spitzer at 70 μm and show that they form a rather smooth distribution. Taking into account the transition of the dust removal process from collisional to Poynting-Robertson drag, all the stars may be empirically fitted by a single population with many low-excess members. Within this ensemble, the Kuiper Belt is inferred to be such a low-dust example, among the last 10 % of stars, with a small cometary population. Analogue systems hosting gas giant planets and a modest comet belt should occur for only a few per cent of Sun-like stars, and so terrestrial planets with a comparable cometary impact rate to the Earth may be uncommon. The nearest such analogue system presently known is HD 154345 at 18 pc, but accounting for survey completeness, a closer example should lie at around 10 pc.

Contact: `jsg5@st-andrews.ac.uk`

Energetic Neutral Atoms Around HD 209458b: Estimations of Magnetospheric Properties

A. Ekenbäck[1], *M. Holmström*[1], *P. Wurz*[2], *J-M. Grießmeier*[3], *H. Lammer*[4], *F. Selsis*[5], *T. Penz*[6]

[1] Swedish Institute of Space Physics, PO Box 812, SE-98128 Kiruna, Sweden
[2] Physikalisches Institut, University of Bern, Sidlerstr. 5, CH-3012 Bern, Switzerland
[3] Netherlands Institute for Radio Astronomy, Oude Hoogeveensedijk 4, NL-7991 PD Dwingeloo, The Netherlands
[4] Space Research Institute, Austrian Academy of Sciences, Schmiedlstr. 6, A-8042 Graz, Austria
[5] Laboratoire d'Astrophysique de Bordeaux, Université Bordeaux 1, BP 89, F-33270, Floirac, France
[6] INAF – Osservatorio Astronomico di Palermo, Piazza del Parlamento 1, I-90134 Palermo, Italy

Astrophysical Journal, published (2010ApJ...709..670E)

HD 209458b is an exoplanet found to transit the disk of its parent star. Observations have shown a broad absorption signature about the Ly stellar line during transit, suggesting the presence of a thick cloud of atomic hydrogen around the "hot Jupiter" HD 209458b. This work expands on an earlier work studying the production of energetic neutral atoms (ENAs) as a result of the interaction between the stellar wind and the exosphere. We present an improved flow model of HD 209458b and use stellar wind values similar to those in our solar system. We find that the ENA production is high enough to explain the observations, and we show thatusing expected values for the stellar wind and exospherethe spatial and velocity distributions of ENAs would give absorption in good agreement with the observations. We also study how the production of ENAs depends on the exospheric parameters and establish an upper limit for the obstacle standoff distance at approximately 4-10 planetary radii. Finally, we compare the results obtained for the obstacle standoff distance with existing exomagnetospheric models and show how the magnetic moment of HD 209458b can be estimated from ENA observations.

Download/Website: `http://dx.doi.org/10.1088/0004-637X/709/2/670`

Contact: `andreas@irf.se`

Searching for Life on Habitable Planets and Moons

Ashwini Kumar Lal

Ministry of Statistics & Programme Implementation, New Delhi, India

Journal of Cosmology, in press (arXiv:0912.1040)

Earth is the only known inhabited planet in the universe to date. However, advancements in the fields of astrobiology and observational astronomy, and the discovery of large varieties of extremophiles with extraordinary capablities to thrive in harshest environments on Earth, have led to speculation that life may be thriving on many of the extraterrestrial bodies in the universe. Coupled with the growing number of exoplanets detected over the past decade, the search for the possibility of life on other planets and satellites within the solar system and beyond has become a passion as well as a challenge for scientists in a variety of fields. This paper examines such possibility of finding life, in the light of findings of the numerous space probes and theoretical research undertaken in this field over the past few decades.

Download/Website: `http://arxiv.org/abs/0912.1040`

Contact: `akl1951@yahoo.co.in`

The outcome of protoplanetary dust growth: pebbles, boulders, or planetesimals? I. Mapping the zoo of laboratory collision experiments

C. Güttler [1], J. Blum[1], A. Zsom[2], C.W. Ormel[2], C.P. Dullemond[2]

[1] Inst. für Geophysik und extraterrestrische Physik, Technische Universität Braunschweig, Mendelssohnstr. 3, 38106 Braunschweig, Germany
[2] Max-Planck-Institute für Astronomie, Königstuhl 17, D-69117 Heidelberg, Germany

Astronomy & Astrophysics, accepted for publication (arXiv:0910.4251)

The growth processes from protoplanetary dust to planetesimals are not fully understood. Laboratory experiments and theoretical models have shown that collisions among the dust aggregates can lead to sticking, bouncing, and fragmentation. However, no systematic study on the collisional outcome of protoplanetary dust has been performed so far so that a physical model of the dust evolution in protoplanetary disks is still missing. We intend to map the parameter space for the collisional interaction of arbitrarily porous dust aggregates. This parameter space encompasses the dust-aggregate masses, their porosities and the collision velocity. With such a complete mapping of the collisional outcomes of protoplanetary dust aggregates, it will be possible to follow the collisional evolution of dust in a protoplanetary disk environment. We use literature data, perform own laboratory experiments, and apply simple physical models to get a complete picture of the collisional interaction of protoplanetary dust aggregates. In our study, we found four different types of sticking, two types of bouncing, and three types of fragmentation as possible outcomes in collisions among protoplanetary dust aggregates. We distinguish between eight combinations of porosity and mass ratio. For each of these cases, we present a complete collision model for dust-aggregate masses between 10^{-12} and 10^{2} g and collision velocities in the range 10^{-4} to 10^{4} cm/s for arbitrary porosities. This model comprises the collisional outcome, the mass(es) of the resulting aggregate(s) and their porosities. We present the first complete collision model for protoplanetary dust. This collision model can be used for the determination of the dust-growth rate in protoplanetary disks.

Download/Website: `http://arxiv.org/abs/0910.4251`

Contact: `c.guettler@tu-bs.de`

The outcome of protoplanetary dust growth: pebbles, boulders, or planetesimals? II. Introducing the bouncing barrier

A. Zsom[1], C.W. Ormel[1], C. Güttler [2], J. Blum[2], C.P. Dullemond[1]

[1] Max-Planck-Institute für Astronomie, Königstuhl 17, D-69117 Heidelberg, Germany
[2] Inst. für Geophysik und extraterrestrische Physik, Technische Universität Braunschweig, Mendelssohnstr. 3, 38106 Braunschweig, Germany

Astronomy & Astrophysics, accepted for publication (arXiv:1001.0488)

The sticking of micron sized dust particles due to surface forces in circumstellar disks is the first stage in the production of asteroids and planets. The key ingredients that drive this process are the relative velocity between the dust particles in this environment and the complex physics of dust aggregate collisions. Here we present the results of a collision model, which is based on laboratory experiments of these aggregates. We investigate the maximum aggregate size and mass that can be reached by coagulation in protoplanetary disks. We model the growth of dust aggregates at 1 AU at the midplane at three different gas densities. We find that the evolution of the dust does not follow the previously assumed growth-fragmentation cycles. Catastrophic fragmentation hardly occurs in the three disk models. Furthermore we see long lived, quasi-steady states in the distribution function of the aggregates due to bouncing. We explore how the mass and the porosity change upon varying the turbulence parameter and by varying the critical mass ratio of dust particles. Particles reach Stokes numbers of roughly 10^{-4} during the simulations. The particle growth is stopped by bouncing rather than fragmentation in these models. The final Stokes number of the aggregates is rather insensitive to the variations of the gas density and the strength of turbulence. The maximum mass of the particles is limited to approximately 1 gram (chondrule-sized particles). Planetesimal formation can proceed via the turbulent concentration of these aerodynamically size-sorted chondrule-sized particles.

Download/Website: http://arxiv.org/abs/1001.0488

Contact: zsom@mpia.de

A time-dependent radiative model for the atmosphere of the eccentric exoplanets

N. Iro, L. D. Deming

NASA/Goddard Space Flight Center, Planetary Systems Laboratory, Code 693, Greenbelt, MD 20771

Astrophysical Journal, in press (arXiv:1001.1171v1)

We present a time-dependent radiative model for the atmosphere of extrasolar planets that takes into account the eccentricity of their orbit. In addition to the modulation of stellar irradiation by the varying planet-star distance, the pseudo-synchronous rotation of the planets may play a significant role. We include both of these time-dependent effects when modeling the planetary thermal structure. We investigate the thermal structure, and spectral characteristics for time-dependent stellar heating for two highly eccentric planets. Finally, we discuss observational aspects for those planets suitable for *Spitzer* measurements, and investigate the role of the rotation rate.

Download/Website: http://arxiv.org/abs/1001.1171v1

Contact: nicolas.iro@nasa.gov

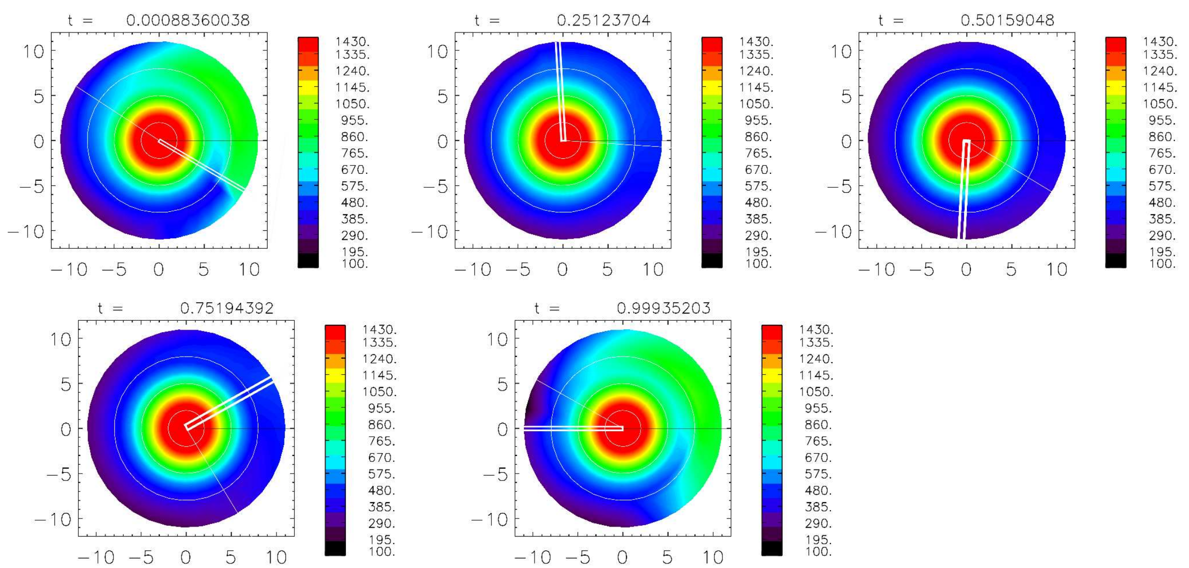

Figure 1: (Iro & Deming) Thermal structure of the planet HD17156b atmosphere for selected times during the orbit ($t/P_{\rm orb}$ = 0; 0.25; 0.5; 0.75 and 1). The axis represent the pressure in logarithmic scale. Are indiated by white circle form the center outward the 10^3, 1 and 10^{-3} bar levels. The substellar point direction is indicated by the black line, fixed at a single location to facilitate comparision between frames. The white line indicates the direction of the Earth. The time is shown as fractions of one orbit. The area contained in the rectangle is the parcel of atmosphere (in pseudo-synchronous rotation) whose temperature evolution is plotted in another Figure.

Spatially resolved spectroscopy of the exoplanet HR 8799 c

M. Janson[1], *C. Bergfors*[2], *M. Goto*[2], *W. Brandner*[2], *D. Lafreniere*[3]

[1] Department of Astronomy, University of Toronto, 50 St George Street, Toronto, M5S 3H8 Canada
[2] Max Planck Institute for Astronomy, Königstuhl 17, Heidelberg, D-69117, Germany
[3] Department of Physics, University of Montreal, C.P. 6128, Succursale-Centreville, Montreal, H3C 3J7

Astrophysical Journal Letters, published (arXiv:1001.2017)

HR 8799 is a multi-planet system detected in direct imaging, with three companions known so far. Here, we present spatially resolved VLT/NACO 3.88–4.10 μm spectroscopy of the middle planet, HR 8799 c, which has an estimated mass of $\sim$10 $M_{\rm Jup}$, temperature of $\sim$1100 K and projected separation of 38 AU. The spectrum shows some differences in the continuum from existing theoretical models, particularly longwards of 4μm, implying that detailed cloud structure or non-equilibrium conditions may play an important role in the physics of young exoplanetary atmospheres.

Download/Website: `http://arxiv.org/abs/1001.2017`

Contact: `janson@astro.utoronto.ca`

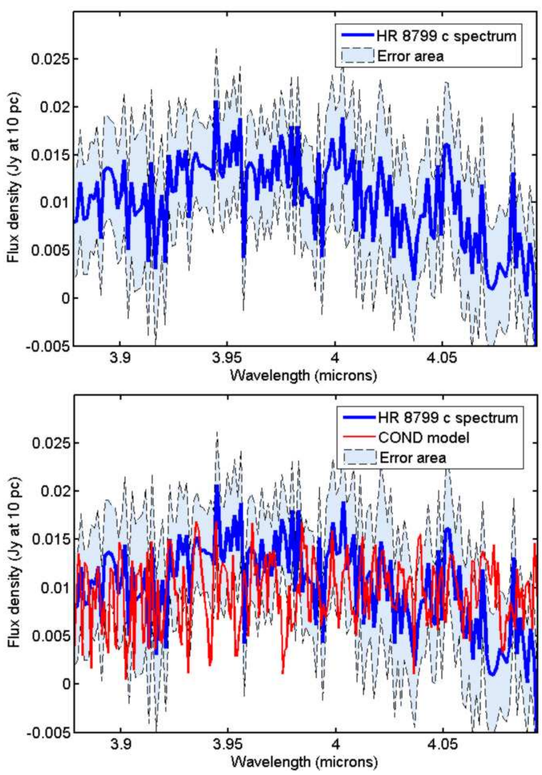

Figure 2: (Janson et al.) Figure: Spectrum of HR 8799 c. The dashed lines and light blue area denote the errors. Lower: Same figure but with a COND model spectrum overplotted as a thinner red line.

Hot Jupiters and the evolution of stellar angular momentum

A. F. Lanza
INAF-Osservatorio Astrofisico di Catania, Via S. Sofia, 78 – 95123 Catania, Italy

Astronomy & Astrophysics, in press (arXiv:0912.4585)

Giant planets orbiting main-sequence stars closer than 0.1 AU are called hot Jupiters. They interact with their stars affecting their angular momentum. Recent observations provide suggestive evidence of excess angular momentum in stars with hot Jupiters in comparison to stars with distant and less massive planets. This has been attributed to tidal interaction, but needs to be investigated in more detail considering also other possible explanations because in several cases the tidal synchronization time scales are much longer than the ages of the stars. We select stars harbouring transiting hot Jupiters to study their rotation and find that those with an effective temperature $T_{\rm eff} > 6000$ K and a rotation period $P_{\rm rot} < 10$ days are synchronized with the orbital motion of their planets or have a rotation period approximately twice that of the planetary orbital period. Stars with $T_{\rm eff} < 6000$ K or $P_{\rm rot} > 10$ days show a general trend toward synchronization with increasing effective temperature or decreasing orbital period. We propose a model for the angular momentum evolution of stars with hot Jupiters to interpret these observations. It is based on the hypothesis that a close-in giant planet affects the coronal field of its host star leading to a topology with predominantly closed field lines. An analytic linear force-free model is adopted to compute the radial extension of the corona and its angular momentum loss rate. The corona is more tightly confined in F-type stars and in G- and K-type stars with a rotation period shorter than ~ 10 days. The angular momentum loss is produced by coronal eruptions similar to solar coronal mass ejections. The model predicts that F-type stars with hot Jupiters, $T_{\rm eff} > 6000$ K and an initial rotation period < 10 days suffer no or very little angular momentum loss during their main-sequence lifetime. This can explain their rotation as a remnant of their pre-main-sequence evolution. On the other hand, F-type stars with $P_{\rm rot} > 10$ days, and G- and K-type stars experience a significant angular momentum loss during their main-sequence lifetime, but at a generally slower pace than similar stars without close-in massive planets. Considering a spread in their ages, this can explain the observed rotation period distribution of planet-harbouring stars. Our model can be tested observationally and has relevant consequences for the relationship between stellar rotation and close-in giant planets as well as for the application of gyrochronology to estimate the age of planet-hosting stars.

Download/Website: `http://arxiv.org/abs/0912.4585`

Contact: `nuccio.lanza@oact.inaf.it`

Day-side z'–band emission and eccentricity of WASP-12b.

M. López-Morales[2,4], J. L. Coughlin[3,5], D. K. Sing[6], A. Burrows[7], D. Apai[8], J. C. Rogers[4,9] & D. S. Spiegel[7]
[2] Hubble Fellow
[3] NSF Graduate Research Fellow
[4] Carnegie Institution of Washington, Department of Terrestrial Magnetism, 5241 Broad Branch Rd. NW, Washington D.C., 20015, USA
[5] Department of Astronomy, New Mexico State University, Las Cruces, NM 88003, USA
[6] Astrophysics group, School of Physics, University of Exeter, Stocker Road, Exeter, Ex4 4QL, United Kingdom
[7] Princeton University, Department of Astrophysical Sciences, Peyton Hall, Princeton, NJ, 08544, USA
[8] Space Telescope Science Institute, 3700 San Martin Drive, Baltimore, MD 21218, USA
[9] Johns Hopkins University, Department of Physics and Astronomy, 366 Bloomberg Center, 3400 N. Charles Street, Baltimore, MD 21218, USA

The Astrophysical Journal Letters. , Accepted. 2009arXiv0912.2359L

We report the detection of the eclipse of the very-hot Jupiter WASP-12b via z'-band time-series photometry obtained with the 3.5-meter ARC telescope at Apache Point Observatory. We measure a decrease in flux of 0.082±0.015% during the passage of the planet behind the star. That planetary flux is equally well reproduced by atmospheric models with and without extra absorbers, and a black-body model with $T_{z'} \sim 2660K$, $A_B < 0.3$, and $P_n \sim 0.5$.

The eclipse is centered at phase ϕ = 0.5100 ± 0.0022, consistent with an orbital eccentricity of $|ecos\omega|$ = 0.0156 ± 0.0035. Assuming the eccentricity is caused by other planets in the system and atmospheric opacities corresponding to solar metallicity abundance, the large radius of WASP-12b can be explained by tidal heating if $Q'_p < 3.82 \times 10^7$.

Download/Website: `http://adsabs.harvard.edu/abs/2009arXiv0912.2359L`

Contact: `mercedes@dtm.ciw.edu`

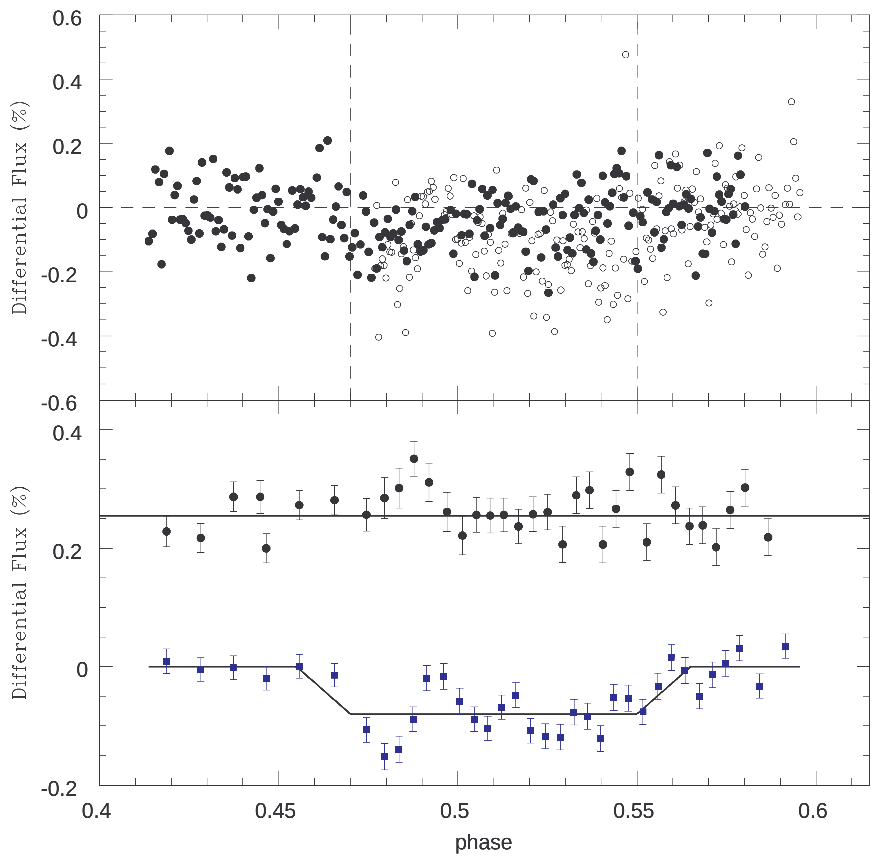

Figure 3: (López-Morales et al.) *Top*: De-trended differential light curves. Open and filled dots show, respectively, the Feb 19 and Oct 18 UT 2009 data. *Bottom*: Combined light curves binned by a factor of 12. Blue squares correspond to WASP-12 and black dots to the differential light curve of the two comparison stars. The best fit models are shown as solid lines. We attribute the flux jumps between phases 0.475 and 0.5 to unremoved systematics. Notice that, although the systematics appear in both curves around approximately the same phases, the trends in each curve are not correlated.

Multi-band transit observations of the TrES-2b exoplanet

D. Mislis [1], *S. Schröter* [1], *J.H.M.M. Schmitt* [1], *O. Cordes* [2], *& K. Reif* [2]

[1] Hamburger Sternwarte, Gojenbergsweg 112, D-21029 Hamburg
[2] Argelander-Institut für Astronomie, Auf dem Hügel 71, D-53121 Bonn

Astronomy & Astrophysics, published (arXiv:0912.4428v2)

We present a new data set of transit observations of the TrES-2b exoplanet taken in spring 2009, using the 1.2m Oskar-Lühning telescope (OLT) of Hamburg Observatory and the 2.2m telescope at Calar Alto Observatory using BUSCA (Bonn University Simultaneous CAmera). Both the new OLT data, taken with the same instrumental setup as our data taken in 2008, as well as the simultaneously recorded multicolor BUSCA data confirm the low inclination values reported previously, and in fact suggest that the TrES-2b exoplanet has already passed the first inclination threshold $(i_{min,1} = 83.417°)$ and is not eclipsing the full stellar surface any longer. Using the multi-band BUSCA data we demonstrate that the multicolor light curves can be consistently fitted with a given set of limb darkening coefficients without the need to adjust these coefficients, and further, we can demonstrate that wavelength dependent stellar radius changes must be small as expected from theory. Our new observations provide further evidence for a change of the orbit inclination of the transiting extrasolar planet TrES-2b reported previously. We examine in detail possible causes for this inclination change and argue that the observed change should be interpreted as nodal regression. While the assumption of an oblate host star requires an unreasonably large second harmonic coefficient, the existence of a third body in the form of an additional planet would provide a very natural explanation for the observed secular orbit change. Given the lack of clearly observed short-term variations of transit timing and our observed secular nodal regression rate, we predict a period between approximately 50 and 100 days for a putative perturbing planet of Jovian mass. Such an object should be detectable with present-day radial velocity (RV) techniques, but would escape detection through transit timing variations.

Download/Website: `http://arxiv.org/abs/0912.4428`

Contact: `mdimitri@hs.uni-hamburg.de`

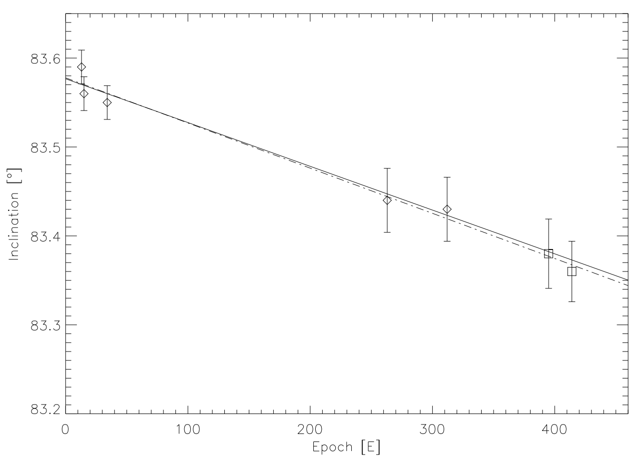

Figure 4: (Mislis et al.) Epoch versus inclination together with a linear fit to the currently available data; the diamond points are those taken in 2006 by Holman et. al. 2007, and those taken in 2008 and reported in Mislis & Schmitt 2009. The square points are derived from our new observations taken in April and May 2009. The solid lines showing two linear fits, from the first paper (dashed line) and the fit from the present paper (solid line).

The Validity of the Super-Particle Approximation during Planetesimal Formation

Hanno Rein, Geoffroy Lesur & Zoe M. Leinhardt
University of Cambridge, Department of Applied Mathematics and Theoretical Physics, Centre for Mathematical Sciences, Wilberforce Road, Cambridge CB3 0WA, UK

Astronomy & Astrophysics, in press (arxiv:1001.0109)

The formation mechanism of planetesimals in protoplanetary discs is hotly debated. Currently, the favoured model involves the accumulation of meter-sized objects within a turbulent disc, followed by a phase of gravitational instability. At best, one can simulate a few million particles numerically as opposed to the several trillion meter-sized particles expected in a real protoplanetary disc. Therefore, single particles are often used as super-particles to represent a distribution of many smaller particles. It is assumed that small-scale phenomena do not play a role and particle collisions are not modelled. The super-particle approximation is not always valid when applied to planetesimal formation because the system can be marginally collisional (of order one collision per particle per orbit). The super-particle approximation can only be valid in a collisionless or strongly collisional system, although, in many recent numerical simulations this is not the case.
In this work, we present new results from numerical simulations of planetesimal formation via gravitational instability. A scaled system is studied that does not require the use of super-particles. This system is simplified for computational practicality and proper identification of important processes: 1) the evolution of particles is studied in a local shearing box; 2) the particle-particle interactions such as gravity, physical collisions, and gas drag are solved directly assuming a constant background shear flow without any feedback from the particles. We find that the scaled particles can be used to model the initial phases of clumping if the properties of the scaled particles are chosen such that all important timescales in the system are equivalent to what is expected in a real protoplanetary disc. Constraints are given for the number of particles needed in order to achieve numerical convergence.
We compare this new method to the standard super-particle approach. We find that the super-particle approach produces unreliable results that depend on artifacts such as the gravitational softening in both the requirement for gravitational collapse and the resulting clump statistics. Our results show that short-range interactions (collisions) have to be modelled properly.

Download/Website: `http://arxiv.org/abs/1001.0109`
Contact: `hr260@cam.ac.uk`

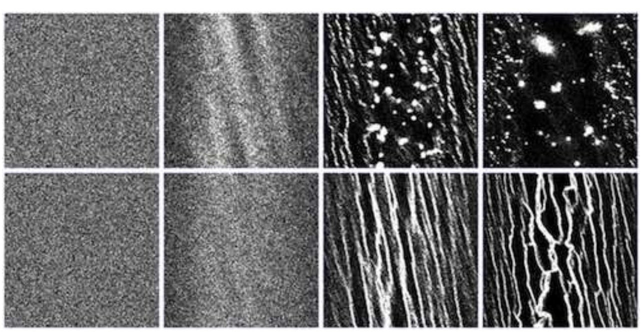

Figure 5: (Rein et al.) Snapshots of the super-particle distributione taken at (from left to right) $t = 0, 30, 37, 40\ \Omega^{-1}$. Both simulations use 160 000 particles but with different smoothing lengths. The simulation on the bottom uses a ten times larger smoothing length than the one on the top. With a large smoothing length, the outcome looks very different, the system is more stable, more stripy structure can be seen and clumps form later, if at all. The simulations are not converged.

Ks-Band Detection of Thermal Emission and Color Constraints to CoRoT-1b: A Low-Albedo Planet with Inefficient Atmospheric Energy Redistribution and a Temperature Inversion.

J. C. Rogers[1], *D. Apai*[2], *M. López-Morales*[3], *D. K. Sing*[4], *A. Burrows*[5]

[1] Department of Physics and Astronomy, Johns Hopkins University, 366 Bloomberg Center, 3400 N. Charles Street, Baltimore, MD 21218, USA.
[2] Space Telescope Science Institute, 3700 San Martin Drive, Baltimore, MD 21218, USA.
[3] Department of Terrestrial Magnetism, Carnegie Institution of Washington, 5241 Broad Branch Rd. NW, Washington, DC 20015, USA.
[4] UPMC Univ Paris 06, CNRS, Institut d'Astrophysique de Paris, 98bis boulevard Arago, F-75014 Paris, France.
[5] Department of Astrophysical Sciences, Princeton University, Peyton Hall, Princeton, NJ 08544, USA.

The Astrophysical Journal, Published. 2009ApJ...707.1707R

We report the detection in Ks-band of the secondary eclipse of the hot Jupiter CoRoT-1b from time series photometry with the ARC 3.5 m telescope at Apache Point Observatory. The eclipse shows a depth of 0.336 ± 0.042% and is centered at phase $0.5022^{+0.0023}_{-0.0027}$, consistent with a zero eccentricity orbit ($ecos\omega = 0.0035^{+0.0036}_{-0.0042}$). We perform the first optical to near-infrared multi-band photometric analysis of an exoplanet's atmosphere and constrain the reflected and thermal emissions by combining our result with the recent 0.6, 0.71, and 2.09 μm secondary eclipse detections by Snellen et al., Gillon et al., and Alonso et al. Comparing the multi-wavelength detections to state-of-the-art radiative-convective chemical-equilibrium atmosphere models, we find the near-infrared fluxes difficult to reproduce. The closest blackbody-based and physical models provide the following atmosphere parameters: a temperature $T = 2460^{+80}_{-160}$ K; a very low Bond albedo $A_B = 0.000^{+0.081}-0.000$ and an energy redistribution parameter $P_{n<} = 0.1$, indicating a small but non-zero amount of heat transfer from the day to nightside. The best physical model suggests a thermal inversion layer with an extra optical absorber of opacity $\kappa_e = 0.05cm^2g^-1$, placed near the 0.1 bar atmospheric pressure level. This inversion layer is located 10 times deeper in the atmosphere than the absorbers used in models to fit mid-infrared Spitzer detections of other irradiated hot Jupiters.

Download/Website: `http://adsabs.harvard.edu/abs/2009ApJ...707.1707R`

Contact: `rogers@pha.jhu.edu`

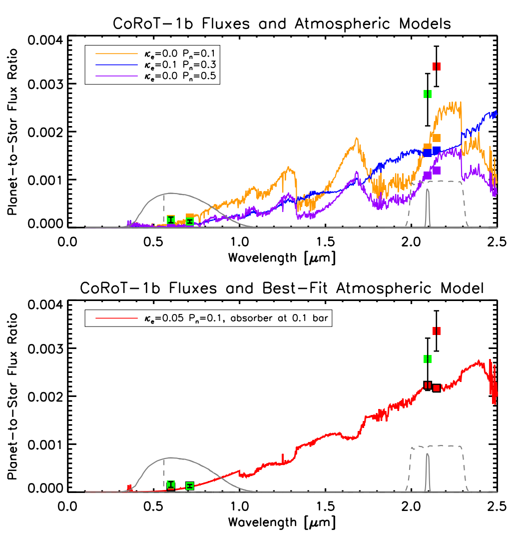

Figure 6: (Rogers et al.) *Top Panel*: The measured planet-to-star flux ratios compared to the band–averaged ratios from atmospheric models that incorporate extra optical absorbers placed near the 0.01 bar level. Three models shown here in orange, blue, and purple, have absorber opacities κ_e= 0.0, 0.1, and 0.0 cm^2 g^{-1}, and redistribution parameters P_n = 0.1, 0.3, and 0.5, respectively. *Bottom Panel*: The measured flux ratios compared to the predicted ratios from the best–fit atmospheric model, with κ=0.05 cm^2 g^{-1} and P_n = 0.1, and the absorber placed near the 0.1 bar level, deeper in the atmosphere than for the other models.

The Debris Disk of Vega: A Steady-State Collisional Cascade, Naturally

Sebastian Müller, Torsten Löhne, Alexander V. Krivov
Astrophysical Institute and University Observatory, Friedrich Schiller University Jena, Germany

Astrophysical Journal, published (2010ApJ...708.1728M)

The archetypical debris disk around Vega has been observed intensively over the past 25 years. It has been argued that the resulting photometric data and images may be in contradiction with a standard, steady-state collisional scenario of the disk evolution. In particular, the emission in the mid-infrared (mid-IR) appears to be in excess of what is expected from a “Kuiper belt” at ~ 100 AU, which is evident in the submillimeter images and inferred from the majority of photometric points. Here we re-address the question of whether or not the Vega disk observations are compatible with a continuous dust production through a collisional cascade. Instead of seeking a size and spatial distribution of dust that provide the best fit to observations, our approach involves physical modeling of the debris disk “from the sources”. We assume that dust is maintained by a belt of parent planetesimals, and employ our collisional and radiative transfer codes to consistently model the size and radial distribution of the disk material and then thermal emission of dust. In doing so, we vary a broad set of parameters, including the stellar properties, the exact location, extension, and dynamical excitation of the planetesimal belt, chemical composition of solids, and the collisional prescription. We are able to reproduce the spectral energy distribution in the entire wavelength range from the near-IR to millimeter, as well as the mid-IR and submillimeter radial brightness profiles of the Vega disk. Thus, our results suggest that the Vega disk observations are not in contradiction with a steady-state collisional dust production, and we put important constraints on the disk parameters and physical processes that sustain it. The total disk mass in $\lesssim 100$ km-sized bodies is estimated to be ~ 10 Earth masses. Provided that collisional cascade has been operating over much of the Vega age of ~ 350 Myr, the disk must have lost a few Earth masses of solids during that time. We also demonstrate that using an intermediate luminosity of the star between the pole and the equator, as derived from its fast rotation, is required to reproduce the debris disk observations. Finally, we show that including cratering collisions into the model is mandatory.

Download/Website: `http://adsabs.harvard.edu/abs/2010ApJ...708.1728M`

Contact: `sebastian@astro.uni-jena.de`

A Cold Neptune-Mass Planet OGLE-2007-BLG-368Lb: Cold Neptunes Are Common

T. Sumi[1,2], D.P. Bennett[1,3,4], I.A. Bond[1,5], A. Udalski[6,7], V. Batista[3,8,9], M. Dominik[3,10,11], P. Fouqué[3,12], D. Kubas[3,8,9,13], A. Gould[14,15], B. Macintosh[16], K. Cook[16], S. Dong[14,17], L. Skuljan[1,5], A. Cassan[3,8,9,18], et al. (89 additional authors) (The MOA, PLANET, OGLE and μFUN Collaborations)

[1] Microlensing Observations in Astrophysics (MOA)
[2] Solar-Terrestrial Environment Laboratory, Nagoya University, Nagoya, 464-8601, Japan
[3] Probing Lensing Anomalies NETwork (PLANET)
[4] Department of Physics, University of Notre Dame, Notre Dame, IN 46556, USA
[5] Institute of Information and Mathematical Sciences, Massey University, Private Bag 102-904, North Shore Mail Centre, Auckland, NZ
[6] Optical Gravitational Lens Experiment (OGLE)
[7] Warsaw University Observatory, Al. Ujazdowskie 4, 00-478 Warszawa, Poland
[8] HOLMES Collaboration
[9] Institut d’Astrophysique de Paris, UMR7095 CNRS, Université Pierre & Marie Curie, 98 bis boulevard Arago, 75014 Paris, France
[10] SUPA, Physics & Astronomy, North Haugh, St Andrews, KY16 9SS, UK; md35,kdh1@st-andrews.ac.uk
[11] Royal Society University Research Fellow
[12] Laboratoire d’Astrophysique (CNRS), Univ. Paul Sabatier - Toulouse 3, 14, avenue Edouard Belin, F-31400 Toulouse, France
[13] European Southern Observatory, Casilla 19001, Vitacura 19, Santiago, Chile
[14] Microlensing Follow Up Network (μFUN)
[15] Department of Astronomy, Ohio State University, 140 W. 18th Ave., Columbus, OH 43210, USA
[16] Lawrence Livermore National Laboratory, IGPP, P.O. Box 808, Livermore, CA 94551, USA
[17] Institute for Advanced Study, Princeton, NJ 08540, USA, e-mail: `dong@ias.edu`
[18] Astronomisches Rechen-Institut, Zentrum für Astronomie, Heidelberg University, Mönchhofstr. 12–14, 69120 Heidelberg, Germany

Astrophysical Journal, in press (arXiv:0912.1171v3)

We present the discovery of a Neptune-mass planet OGLE-2007-BLG-368Lb with a planet-star mass ratio of $q = [9.5 \pm 2.1] \times 10^{-5}$ via gravitational microlensing. The planetary deviation was detected in real-time thanks to the high cadence of the MOA survey, real-time light curve monitoring and intensive follow-up observations. A Bayesian analysis returns the stellar mass and distance at $M_l = 0.64^{+0.21}_{-0.26}\ M_\odot$ and $D_l = 5.9^{+0.9}_{-1.4}$ kpc, respectively, so the mass and separation of the planet are $M_p = 20^{+7}_{-8}\ M_\oplus$ and $a = 3.3^{+1.4}_{-0.8}$ AU, respectively. This discovery adds another cold Neptune-mass planet to the planetary sample discovered by microlensing, which now comprise four cold Neptune/Super-Earths, five gas giant planets, and another sub-Saturn mass planet whose nature is unclear. The discovery of these ten cold exoplanets by the microlensing method implies that the mass ratio function of cold exoplanets scales as $dN_{\rm pl}/d\log q \propto q^{-0.7\pm0.2}$ with a 95% confidence level upper limit of $n < -0.35$ (where $dN_{\rm pl}/d\log q \propto q^n$). As microlensing is most sensitive to planets beyond the snow-line, this implies that Neptune-mass planets are at least three times more common than Jupiters in this region at the 95% confidence level.

Download/Website: `http://arxiv.org/abs/0912.1171`

Contact: `sumi@stelab.nagoya-u.ac.jp`

Planetesimal accretion in binary systems: could planets form around α Centauri B?

Ji-Wei Xie[1,2], Ji-Lin Zhou[1], Jian Ge[2]
[1] Department of Astronomy, Nanjing University, Nanjing, Jiangsu, 210093, China
[2] Department of Astronomy, University of Florida, Gainesville, FL, 32611-2055, USA

Astrophysical Journal, published (Xie et al. 2010, ApJ, 708, 1566)

Stellar perturbations affect planet-formation in binary systems. Recent studies show that the planet-formation stage of mutual accretion of km-sized planetesimals is most sensitive to binary effects. In this paper, the condition for planetesimal accretion is investigated around α CenB, which is believed to be an ideal candidate for detection of an Earth-like planet in or near its habitable zone(0.5-0.9 AU). A simplified scaling method is developed to estimate the accretion timescale of the planetesimals embedded in a protoplanetary disk. Twenty-four cases with different binary inclinations(i_B=0, 0.1^o 1.0^o, and 10^o), gas densities(0.3,1,and 3 times of the Minimum Mass of Solar Nebula, MMSN hereafter), and with and without gas depletion, are simulated. We find: (1) re-phasing of planetesimals orbits is independent of gas depletion in α CenB, and it is significantly reached at $1-2$ AU, leading to accretion-favorable conditions after the first $\sim 10^5$ yrs, (2)the planetesimal collision timescale at 1-2 AU is estimated as: $T^B_{col} \sim (1+100i_B) \times 10^3$ yrs, where $0 < i_B < 10^o$, (3)disks with gas densities of 0.3-1.0 MMSN and inclinations of 1^o-10^o with respect to the binary orbit, are found to be the favorable conditions in which planetesimals are likely to survive and grow up to planetary embryos, (4)even for the accretion-favorable conditions, accretion is significantly less efficient as compared to the single-star case, and the time taken by accretion of km-sized planetesimals into planetary embryos or cores would be at least several times of T^B_{col}, which is probably longer than the timescale of gas depletion in such a close binary system. In other words, our results suggest that formation of Earth-like planets through accretion of km-sized planetesimals is possible in α CenB, while formation of gaseous giant planets is not favorable.

Download/Website: `http://arxiv.org/abs/1001.2614v1`

Contact: `xiejiwei@gmail.com`

3 Conference announcements

2010 Sagan Exoplanet Summer Workshop: Stars as Homes for Habitable Planetary Systems

Dr. Dawn M. Gelino
NASA Exoplanet Science Institute, California Institute of Technology, Pasadena, CA, USA

Pasadena, CA, July 26-30, 2010; Financial Support Deadline: March 5, 2010

The 2010 Sagan Exoplanet Summer Workshop: "Stars as Homes for Habitable Planetary Systems", will take place on the Caltech campus July 26 - 30. With results from missions such as CoRoT and Kepler, we are learning more and more about planetary host stars. This timely workshop will consist of a series of tutorial and scientific lectures covering theory and observations of stars and their potentially habitable planetary systems. In addition, attendees will have the opportunity to present brief summaries of their research. Financial assistance for travel and accommodations will be available for successful applicants.

More information, including a draft agenda and instructions on applying for financial assistance to attend the workshop (applications due March 5), can be found on the workshop website: http://nexsci.caltech.edu/workshop/2010/

All attendees must register for the workshop at the above URL. Register before June 5 to take advantage of the early registration fee!

Registration Fee includes:

- Conference attendance, materials, and internet access
- Transportation between Pasadena Hilton and Workshop on Workshop Dates
- Opening Reception Registration and Snacks
- Light breakfast each day of the workshop
- Box lunches on Monday, Wednesday and Friday
- Snacks and drinks during morning and afternoon breaks each day of the workshop
- 1 ticket to attend tour of Griffith Observatory on Wednesday afternoon (extra tickets will be available for purchase)
- 1 ticket to attend workshop dinner on Thursday (extra tickets will be available for purchase)

Download/Website: `http://nexsci.caltech.edu/workshop/2010/index.shtml`
Contact: `sagan_workshop@ipac.caltech.edu`

Astronomy of Exoplanets with Precise Radial Velocities

Sponsored by: the Penn State Center for Exoplanets and Habitable Worlds (CEHW), the NASA Exoplanet Science Institute (NExScI), and the Penn State Department of Astronomy and Astrophysics

The Pennsylvania State University, University Park, PA, USA, August 16-19, 2010

This workshop will be devoted to a thorough discussion of the current capabilities and a future potential of the radial velocity technique to discover and characterize exoplanets. Emphasis will be placed on future developments in instrumentation, calibration techniques, and data analysis algorithms to further improve the precision of radial velocity measurements at visible and near-infrared wavelengths. A special session is planned to review applications of precise radial velocity measurements beyond exoplanet detection, including asteroseismology and cosmology.

Download/Website: Further announcements will be posted on the websits of the CEHW (http://exoplanets.astro.psu.edu) and NExScI (http://nexsci.caltech.edu)

Contact: SOC chair Alex Wolszczan (alex@astro.psu.edu)
LOC chair Jason Wright (jtwright@astro.psu.edu)
Dawn Gelino (dawn@ipac.caltech.edu)

4 Jobs and positions

Postdocal Position in Exoplanet Detection

Jason T Wright
Penn State University, Department of Astronomy

University Park, PA, Summer/Fall 2010

One postdoctoral research position in radial velocity exoplanet detection is available in the Department of Astronomy and Astrophysics at the Pennsylvania State University. A PhD in astrophysics or related field is required. The initial appointment will be for one year, renewable to a total of three years contingent upon continued funding and can begin as early as summer, 2010.
The successful applicant will work with Dr. Jason T. Wright on the acquisition and interpretation of precise radial velocity data from the Hobby-Eberly Telescope and other instruments. He or she will also be expected to pursue independent research and contribute to the in the vibrant research atmosphere of the department.
Applicants should submit electronic applications (pdf, postscript, or text) containing a curriculum vitae, list of publications, brief statement of research interests and relevant experience, and contact information for three references to jtwright@astro.psu.edu. Review of the applications will begin immediately and continue until the position is filled. Penn State is committed to affirmative action, equal opportunity and the diversity of its workforce.

Download/Website: http://www.astro.psu.edu/index.php/employment

Contact: jtwright@astro.psu.edu

5 Announcements

Exoplanet Orbit Database and Exoplanet Data Exoplorer

Jason T Wright[1], *Onsi Fakhouri*[2]*, and the California Planet Survey*
[1] Penn State University
[2] University of California, Berkeley

http://exoplanets.org/, Wright et al. 2010 in preparation

We announce the new Exoplanet Orbit Database, a significant expansion and update of the Catalog of Nearby Exoplanets. The Exoplanet Orbit Database contains quality, peer-reviewed orbital and stellar parameters for over 350 exoplanets, including transit parameters, asymmetric errors, and extensive references. Derived parameters such as $m \sin i$ and a are calculated using the latest values of stellar masses and orbital periods.
The Database can be downloaded in its entirety, or more easily browsed with the Exoplanet Data Explorer, a dynamic Web-based filtering and plotting tool. Complex and arbitrary filters, including logical and arithmetic operations on all database fields, allow the user to select, for example, only RV-detected planets, or only multiple planets, or planets within 200pc, or those with periods or amplitudes measured to within 5%. The plotter is a powerful, customizable way to produce presentation-quality plots on arbitrary portions of the database quickly and easily. The plotter supports arithmetically defined axes, dynamic panning and zooming, control over plot color, thickness, overplotting, logarithmic axes and histogram binning, and asymmetric error bars.
exoplanets.org supports Safari 3+ (Safari 4+ preferred), Firefox 2+ (Firefox 3+ preferred), Chrome 2+. Internet Explorer support is limited. The methodology of the Database will be presented in Wright et al. 2010 (in preparation). Comments and corrections for the Exoplanet Orbit Database are welcome at jtwright@astro.psu.edu, and for the website and Exoplanet Data Explorer at onsi@berkeley.edu

Download/Website: `http://exoplanets.org`

Contact: `jtwright@astro.psu.edu`

6 As seen on astro-ph

The following list contains all the entries relating to exoplanets that we spotted on astro-ph during December 2009 and January 2010. If you spot any that we missed, please let us know and we'll include them in the next issue. And of course, the best way to ensure we include your paper is to send us the abstract.

Exoplanets

astro-ph/0912.0404: **Checking Stability Of Planet Orbits In Multiple-planet Systems** by *F. Malbet, J. Catanzarite, M. Shao et al*

astro-ph/0912.0561: **CARMENES: Calar Alto high-Resolution search for M dwarfs with Exo-earths with a Near-infrared Echelle Spectrograph** by *A. Quirrenbach, P. J. Amado, H. Mandel*

astro-ph/0912.1133: **Nightside Pollution of Exoplanet Transit Depths** by *David M. Kipping* & *Giovanna Tinetti*

astro-ph/0912.1171: **A Cold Neptune-Mass Planet OGLE-2007-BLG-368Lb: Cold Neptunes Are Common** by *T. Sumi, D.P. Bennett, I.A. Bond et al*

astro-ph/0912.1299: **Giant planet formation in stellar clusters: the effects of stellar fly-bys** by *Moritz Fragner* & *Richard Nelson*

astro-ph/0912.1337: **CoRoT-7 b: Super-Earth or Super-Io?** by *Rory Barnes, Sean N. Raymond, Richard Greenberg*

astro-ph/0912.1347: **First Results from the Transit Ephemeris Refinement and Monitoring Survey (TERMS)** by *Stephen R. Kane, Suvrath Mahadevan, Kaspar von Braun et al*
astro-ph/0912.1409: **On the existence of energetic atoms in the upper atmosphere of exoplanet HD20945** by *Lotfi Ben-Jaffel & S. Sona Hosseini*
astro-ph/0912.1594: **Empirical Constraints on the Oblateness of an Exoplanet** by *Joshua A. Carter & Joshua N. Winn*
astro-ph/0912.1621: **Parent Stars of Extrasolar Planets. X. Lithium Abundances and vsini Revisited** by *G. Gonzalez, M. K. Carlson, R. W. Tobin*
astro-ph/0912.1639: **Radii of Rapidly-Rotating Stars, with Application to Transiting-Planet Hosts** by *Timothy M. Brown*
astro-ph/0912.1770: **Forming Planet Systems With N-Body Simulations I. Model and Statistics Comparing to Observations** by *Huigen Liu, Ji-lin Zhou, S. Wang*
astro-ph/0912.1907: **Tidally Heated Terrestrial Exoplanets: Viscoelastic Response Models** by *Wade G. Henning, Richard J. O'Connell, Dimitar D. S*
astro-ph/0912.2095: **Tidal Constraints on Planetary Habitability** by *Rory Barnes, Brian Jackson, Richard Greenberg*
astro-ph/0912.2132: **Studying the atmosphere of the exoplanet HAT-P-7b via secondary eclipse measurements with EPOXI, Spitzer and Kepler** by *Jessie L. Christiansen, Sarah Ballard, David Charbonneau et al*
astro-ph/0912.2312: **Limb-darkening measurements for a cool red giant in microlensing event OGLE 2004-BLG-482** by *M. Zub, A. Cassan, D. Heyrovsky*
astro-ph/0912.2313: **Thermal Tides in Fluid Extrasolar Planets** by *Phil Arras & Aristotle Socrates*
astro-ph/0912.2359: **Day-side z'-band emission and eccentricity of Wasp-12b** by *E. K. Simpson, D. Pollacco, G. Hebrard et al*
astro-ph/0912.2585: **On the Fundamental Mass-Period Functions of Extrasolar Planets** by *Ing-Guey Jiang, Li-Chin Yeh, Yen-Chang Chang et al*
astro-ph/0912.2716: **A long-period planet orbiting a nearby Sun-like star** by *Hugh R.A. Jones, R. Paul Butler, C.G. Tinney et al*
astro-ph/0912.2730: **The California Planet Survey II. A Saturn-Mass Planet Orbiting the M Dwarf Gl649** by *John Asher Johnson, Andrew W. Howard, Geoffrey W. Marcy et al*
astro-ph/0912.2733: **Evidence of a massive planet candidate orbiting the young active K5V star BD+20 1** by *M. Hernan-Obispo, M.C. Galvez-Ortiz, G. Anglada-Escude et al*
astro-ph/0912.3025: **Planet formation in binary systems: A separation-dependent mechanism?** by *G. Duchene*
astro-ph/0912.3144: **Modeling the Formation of Giant Planet Cores I: Evaluating Key Processes** by *H.F. Levison E. Thommes M.J. Duncan et al*
astro-ph/0912.3202: **The HARPS search for southern extra-solar planets. XX. Planets around the active star BD-08:2823** by *N.C. Santos, M. Mayor, W. Benz et al*
astro-ph/0912.3216: **The HARPS search for southern extrasolar planets XXI. Three new giant planets orbiting the metal-poor stars HD5388, HD181720, and HD190984** by *N.C. Santos, M. Mayor, W. Benz et al*
astro-ph/0912.3229: **A super-Earth transiting a nearby low-mass star** by *David Charbonneau, Zachory K. Berta, Jonathan Irwin et al*
astroph0912.3288A Framework for Quantifying the Degeneracies of Exoplanet Interior CompositionsL. A. Rogers & S. Seager
astro-ph/0912.3484: **Characterizing Habitable Exo-Moons** by *L. Kaltenegger*
astro-ph/0912.3643: **The spin-orbit alignment of the transiting exoplanet WASP-3b from Rossiter-McLaughlin observations** by *E. K. Simpson, D. Pollacco, G. Hebrard et al*
astro-ph/0912.3915: **Formation and evolution of planetary systems: the impact of high angular resolution optical techniques** by *Olivier Absil & Dimitri Mawet*
astro-ph/0912.4428: **Multi-band transit observations of the TrES-2b exoplanet** by *D. Mislis, S. Schroter,*

J.H.M.M. Schmitt et al

astro-ph/0912.4655: **CoRoT's first seven planets: An overview** by *R. Dvorak, J. Schneider, H. Lammer*

astro-ph/1001.0032: **Asteroseismic Investigation of Known Planet Hosts in the Kepler Field** by *J. Christensen-Dalsgaard, H. Kjeldsen, T. M. Brown et al*

astro-ph/1001.0043: **Strong Constraints to the Putative Planet Candidate around VB 10 using Doppler spectroscopy** by *Guillem Anglada-Escude, Evgenya L. Shkolnik, Alycia J. Weinb et al*

astro-ph/1001.0190: **Kepler-7b: A Transiting Planet with Unusually Low Density** by *David W. Latham, William J. Borucki, David G. Koch et al*

astro-ph/1001.0333: **A Transiting Hot Jupiter Orbiting a Metal-Rich Star** by *Edward W. Dunham, William J. Borucki, David G. Koch et al*

astro-ph/1001.0392: **Pre-Spectroscopic False Positive Elimination of Kepler Planet Candidates** by *N.M. Batalha, J.F. Rowe, R.L. Gilliland et al*

astro-ph/1001.0403: **WASP-19b: the shortest period transiting exoplanet yet discovered** by *Leslie Hebb, A.Collier-Cameron, A.H.M.J. Triaud et al*

astro-ph/1001.0413: **The Discovery of Ellipsoidal Variations in the Kepler Light Curve of HAT-P-7** by *William F. Welsh, Jerome A. Orosz, Sara Seager*

astro-ph/1001.0414: **Photometric Variability in Kepler Target Stars: The Sun Among Stars – A First Look** by *Gibor Basri, Lucianne M. Walkowicz, Natalie Batalha et al*

astro-ph/1001.0416: **Discovery and Rossiter-McLaughlin Effect of Exoplanet Kepler-8b** by *Jon M. Jenkins, William J. Borucki, David G. Koch et al*

astro-ph/1001.0470: **Near-infrared integral-field spectra of the planet/brown dwarf companion AB Pic b** by *M.Bonnefoy, G. Chauvin, P. Rojo et al*

astro-ph/1001.0488: **The outcome of protoplanetary dust growth: pebbles, boulders, or planetesimals? II. Introducing the bouncing barrier** by *A. Zsom, C.W. Ormel, C. Guettler et al*

astro-ph/1001.0572: **Frequency of Solar-Like Systems and of Ice and Gas Giants Beyond the Snow Line from High-Magnification Microlensing Events in 2005-2008** by *A. Gould, Subo Dong, B.S. Gaudi et al*

astro-ph/1001.0604: **Kepler-4b: Hot Neptune-Like Planet of a G0 Star Near Main-Sequence Turnoff** by *William J. Borucki, Davig G. Koch, Timothy M. Brown et al*

astro-ph/1001.0682: **The SOPHIE search for northern extrasolar planets. II. A multi-planet system around HD9446** by *G. Hebrard, X. Bonfils, D. Segransan et al*

astro-ph/1001.0913: **Discovery of the Transiting Planet Kepler-5b** by *David G. Koch, William J. Borucki, Jason F. Rowe et al*

astro-ph/1001.0976: **The Nature of the Atmosphere of the Transiting Super-Earth GJ 1214b** by *E. Miller-Ricci & J. J. Fortney*

astro-ph/1001.1171: **A time-dependent radiative model for the atmosphere of the eccentric exoplanets** by *N. Ir0 & L. D. Deming*

astro-ph/1001.1174: **M2K: I. A Jovian mass planet around the M3V star HIP79431** by *Kevin Apps, Kelsey I. Clubb, Debra A. Fischer et al*

astro-ph/1001.1426: **Transiting exoplanets from the CoRoT space mission IX. CoRoT-6b: a transiting 'hot Jupiter' planet in an 8.9d orbit around a low-metallicity star** by *M. Fridlund, G. Hebrard, R. Alonso et al*

astro-ph/1001.2010: **Transits and Occultations** by *Joshua N. Winn*

astro-ph/1001.2017: **Spatially resolved spectroscopy of the exoplanet HR 8799 c** by *M. Janson, C. Bergfors, M. Goto at al*

astro-ph/1001.2105: **Detection of Exoplanets in M31 with Pixel-Lensing: The Event Pa-99-N2 Case** by *G. Ingrosso, F. De Paolis, S. Calchi Novati*

astro-ph/1001.2319: **Thermal Emission and Tidal Heating of the Heavy and Eccentric Planet XO-3b** by *Pavel Machalek, Tom Greene, Peter R. McCullough et al*

astro-ph/1001.2482: **Circumstellar Habitable Zones to Ecodynamic Domains: A Preliminary Review and Suggested Future Directions** by *Martin J. Heath & Laurance R. Doyle*
astro-ph/1001.2595: **The Survival of Water within Extrasolar Minor Planets** by *M. Jura & S. Xu*
astro-ph/1001.2980: **The Interior Dynamics of Water Planets** by *Roger Fu, Richard J. OConnell, Dimitar D. Sasselov*
astro-ph/1001.0: **Planetesimal collisions in binary systems** by *S.-J. Paardekooper & Z.M. Leinhardt*
astro-ph/1001.3059: **Limits on Transit Timing Variations in HAT-P-6 and WASP-1** by *Gy. M. Szabo, O. Haja, K. Szatmary, A. Pal et al*
astro-ph/1001.3060: **Ground-based near-IR observations of the secondary eclipse of CoRoT-2b** by *R. Alonso, H.J. Deeg, P. Kabath et al*
astro-ph/1001.3091: **Orbital parameters of extrasolar planets derived from polarimetry** by *D.M. Fluri & S.V. Berdyugina*
astro-ph/1001.3420: **Kepler Observations of Transiting Hot Compact Objects** by *Jason F. Rowe (NASA Postdoctoral Program Fellow, NASA Ames Research Center), William J. Borucki, David Koch et al*
astro-ph/1001.3577: **The physical properties of extrasolar planets** by *J. C. Bond, D. S. Lauretta, D. P. O'Brien*
astro-ph/1001.3901: **The Diversity of Extrasolar Terrestrial Planets** by *J. C. Bond, D. S. Lauretta, D. P. O'Brien*
astro-ph/1001.4079: **The determination of planetary structure in tidally relaxed inclined systems** by *Rosemary A. Mardling*
astro-ph/1001.4093: **Five Long-period Extrasolar Planets in Eccentric orbits from the Magellan Planet Search Program** by *Pamela Arriagada, R. Paul Butler, Dante Minniti et al*
astro-ph/1001.4342: **Search for exoplanets in M31 with pixel-lensing and the PA-99-N2 event revisited** by *G. Ingrosso, S. Calchi-Novati, F. De Paolis et al*
astro-ph/1001.4624: **Cellular Automation of Galactic Habitable Zone** by *Branislav Vukotic & Milan M. Cirkovic*
astro-ph/1001.4774: **The HARPS search for southern extra-solar planets XIX. Characterization and dynamics of the GJ876 planetary system** by *A.C.M. Correia, J. Couetdic, J. Laskar et al*
astro-ph/1001.4851: **Mass-radius relationships for exoplanets** by *Damian Swift, Jon Eggert, Damien Hicks et al*
astro-ph/1001.5022: **Dead Zones as Thermal Barriers to Rapid Planetary Migration in Protoplanetary Disks** by *Yasuhiro Hasegawa & Ralph E. Pudritz*

Disks

astro-ph/0912.0964: **Protoplanetary migration in turbulent isothermal disks** by *C. Baruteau & D. N. C. Lin*
astro-ph/0912.1681: **Global 3D Simulations of Disc Accretion onto the classical T Tauri Star V2129 Oph** by *Marina M. Romanova, Min Long, Frederick K. Lamb et al*
astro-ph/0912.1720: **Protoplanetary disks of TTauri binaries in Orion: Prospects for planet formation** by *M.G. Petr-Gotzens, S. Daemgen, S. Correia*
astro-ph/0912.3356: **Dust Properties of Protoplanetary Disks in the Taurus-Auriga Star Forming Region from Millimeter Wavelengths** by *L. Ricci, L. Testi, A. Natta et al*
astro-ph/0912.5022: **Dead Zones as Thermal Barriers to Rapid Planetary Migration in Protoplanetary Disks** by *Yasuhiro Hasegawa & Ralph E. Pudritz*
astro-ph/0912.5165: **Warm absorber and truncated accretion disc in IRAS 05078+1626** by *Jiri Svoboda, Matteo Guainazzi, Vladimir Karas*
astro-ph/0912.5439: **Emergence of Protoplanetary Disks and Successive Formation of Gaseous Planets by Gravitational Instability** by *Shu-ichiro Inutsuka, Masahiro N. Machida, Tomoaki Matsumoto*
astro-ph/1001.0109: **The Validity of the Super-Particle Approximation during Planetesimal Formation** by *Hanno Rein, Geoffroy Lesur, Zoe M. Leinhardt*
astro-ph/1001.0657: **Eccentricity pumping of a planet on an inclined orbit by a disc** by *Caroline Terquem & Aikel Ajmia*
astro-ph/1001.1532: **Water Vapor in the Inner 25 AU of a Young Disk around a Low-Mass Protostar** by *Jes K. Jorgensen & Ewine F. van Dishoeck*

astro-ph/1001.2146: **Full 2D radiative transfer modelling of transitional disk LkCa 15** by *G.D. Mulders, C. Dominik, M. Min*
astro-ph/1001.2491: **The complex structure of the disk around HD100546: the inner few astronomical units** by *M. Benisty, E. Tatulli, F. Menard et al*
astro-ph/1001.2570: **The observable effects of tidally induced warps in protostellar discs** by *C.J. Nixon & J.E. Pringle*
astro-ph/1001.2614: **Planetesimal Accretion in Binary Systems: Could Planets Form Around Alpha Centauri B ?** by *Ji-Wei Xie, Ji-Lin Zhou, Jian Ge*
astro-ph/1001.3409: **Planet-planet scattering in planetesimal disks II: Predictions for outer extrasolar planetary systems** by *Sean N. Raymond, Philip J. Armitage, Noel Gorelick*
astro-ph/1001.4378: **The Accretion Disc Dynamo in the Solar Nebula** by *A.R. King & J.E. Pringle*
astro-ph/1001.5141: **Rotation-disk connection for very low mass and substellar objects in the Orion Nebula Cluster** by *Maria V. Rodriguez-Ledesma, Reinhard Mundt, Jochen Eisloffel*

Instrumentation and Techniques

astro-ph/0912.0400: **Detecting and characterizing extrasolar planetary systems with astrometry: review from the Blue Dots astrometry working group** by *F. Malbet, A. Sozzetti, P. Lazorenko et al*
astro-ph/0912.0515: **Weak Microlensing** by *Jonathan Coles, Prasenjit Saha, Hans Martin Schmid*
astro-ph/0912.0588: **Characterization of Stellar Spots in Next-Generation Microlensing Surveys** by
astro-ph/0912.0887: **Blue Dots Team Transits Working Group Review** by *A. Sozzetti, C. Afonso, R. Alonso et al*
astro-ph/0912.0948: **Detectability of Oort cloud objects using Kepler** by *Eran O. Ofek & Ehud Nakar*
astro-ph/0912.1167: **Microlensing pulsars** by *S. Dai & R. X. Xu*
astro-ph/0912.1240: **The LAOG-Planet Imaging Surveys** by *G. Chauvin, A.-M. Lagrange, D. Mouillet et al*
astro-ph/0912.2076: **Detectability of extrasolar moons as gravitational microlenses** by *Christine Liebig, Joachim Wambsganss*
astro-ph/0912.2287: **The Vector Vortex Coronagraph: Laboratory Results and First Light at Palomar Observatory** by *D. Mawet, E. Serabyn, K. Liewer et al*
astro-ph/0912.2318: **Response to Concerning Thermal Tides on Hot Jupiters** by *Phil Arras & Aristotle Socrates*
astro-ph/0912.2350: **Transmission Spectra of Three-Dimensional Hot Jupiter Model Atmospheres** by *J. J. Fortney, M. Shabram, A. P. Showman et al*
astro-ph/0912.2644: **ASTEP South: An Antarctic Search for Transiting ExoPlanets around the celestial South pole** by *Nicolas Crouzet, Tristan Guillot, Karim Agabi et al*
astro-ph/0912.2667: **Pixel lensing: Microlensing towards M31** by *S. Calchi Novati*
astro-ph/0912.2696: **The POINT-AGAPE Survey: Comparing Automated Searches of Microlensing Events toward M31** by *Y. Tsapras, B.J. Carr, M.J. Weston et al*
astro-ph/0912.4585: **Hot Jupiters and the evolution of stellar angular momentum** by *A. F. Lanza*
astro-ph/0912.5325: **The Calan-Hertfordshire Extrasolar Planet Search** by *J.S. Jenkins, H.R.A. Jones, K. Gozdziewski*
astro-ph/0912.5415: **Nainital Microlensing Survey – detection of short period Cepheids in the disk of M31** by *Y. C. Joshi, D. Narasimha, A. K. Pandey et al*
astro-ph/1001.0032: **Asteroseismic Investigation of Known Planet Hosts in the Kepler Field** by *J. Christensen-Dalsgaard, H. Kjeldsen, T. M. Brown et al*
astro-ph/1001.0035: **Preliminary Astrometric Results from Kepler** by *David G. Monet, Jon M. Jenkins, Edward W. Dunham et al*
astro-ph/1001.0142: **Initial Characteristics of Kepler Short Cadence Data** by *Ronald L. Gilliland, J. M. Jenkins, W. J. Borucki et al*
astro-ph/1001.0216: **Instrument Performance in Kepler's First Months** by *Douglas A. Caldwell, Jeffery J. Kolodziejczak, Jeffrey E. Van Cleve*

astro-ph/1001.0256: **Initial Characteristics of Kepler Long Cadence Data For Detecting Transiting Planets** by *Jon M. Jenkins, Douglas A. Caldwell, Hema Chandrasekaran*

astro-ph/1001.0258: **Overview of the Kepler Science Processing Pipeline** by *Jon M. Jenkins, Douglas A. Caldwell, Hema Chandrasekaran et al*

astro-ph/1001.0268: **Kepler Mission Design, Realized Photometric Performance, and Early Science** by *David G. Koch, William J. Borucki, Gibor Basri et al*

astro-ph/1001.0331: **The Kepler Pixel Response Function** by *Stephen T. Bryson, Peter Tenenbaum, Jon M. Jenkins*

astro-ph/1001.0349: **Selection, Prioritization, and Characteristics of Kepler Target Stars** by *N.M. Batalha, W.J. Borucki, D.G. Koch et al*

astro-ph/1001.0352: **The Kepler Follow-up Observation Program** by *Thomas N. Gautier III, Natalie M. Batalha, William J. Borucki*

astro-ph/1001.0437: **Kepler Science Operations** by *Michael R. Haas, Natalie M. Batalha, Steve T. Bryson et al*

astro-ph/1001.1634: **Microlensing events from galactic globular clusters** by *Philippe Jetzer*

astro-ph/1001.1879: **PHASES: a concept for a satellite-borne ultra-precise spectrophotometer** by *Carlos del Burgo, Carlos Allende Prieto, Tully Peacocke*

astro-ph/1001.3349: **EUCLID : Dark Universe Probe and Microlensing planet Hunter** by *J.P. Beaulieu, D.P. Bennett, V Batista*

astro-ph/1001.5010: **Phase closure nulling of HD 59717 with AMBER/VLTI . Detection of the close faint companion** by *G. Duvert, A. Chelli, F. Malbet et al*