ExoPlanet News
An Electronic Newsletter

*No. 25, December 1st, 2009*

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# Contents

# 1 Editorial

Welcome to the twenty-fifth edition of ExoPlanet News, an electronic newsletter reporting the latest developments and research outputs in the field of exoplanets. This month looks to be a particularly strong one for upcoming conferences and meetings. Please see the five announcements in this issue.
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.
We plan to take a break in the usual schedule of newsletter production over the Christmas period, but 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 February 2010. As for this issue, if you wish to include ONE figure per abstract, please do so.

Best wishes
Andrew Norton & Glenn White
The Open University

# 2 Abstracts of refereed papers

### Line-profile tomography of exoplanet transits I: The Doppler shadow of HD 189733b

*A. Collier Cameron*[1], *V. A. Bruce*[1], *G. R. M. Miller*[1], *A. H. M. J. Triaud*[2], *D. Queloz*[2]
[1] SUPA, School of Physics and Astronomy, University of St Andrews, North Haugh, St Andrews, Fife KY16 9SS, UK.
[2] Observatoire de l'Université de Genève, Chemin des Maillettes 51, CH-1290 Sauverny, Switzerland.

*Monthly Notices of the Royal Astronomical Society, in press (arXiv:0911.5361)*

The misalignment between the orbital plane of a transiting exoplanet and the spin axis of its host star provides important insights into the system's dynamical history. The amplitude and asymmetry of the radial-velocity distortion during a planetary transit (the Rossiter-McLaughlin effect) depend on the projected stellar rotation rate $v \sin I$ and misalignment angle $\lambda$, where the stellar rotation axis is inclined at angle $I$ to the line of sight. The parameters derived from modelling the R-M effect have, however, been found to be prone to systematic errors arising from the time-variable asymmetry of the stellar spectral lines during transit. Here we present a direct method for isolating the component of the starlight blocked by a planet as it transits the host star, and apply it to spectra of the bright transiting planet HD 189733b. We model the global shape of the stellar cross-correlation function as the convolution of a limb-darkened rotation profile and a gaussian representing the Doppler core of the average photospheric line profile. The light blocked by the planet during the transit is a gaussian of the same intrinsic width, whose trajectory across the line profile yields a precise measure of the misalignment angle and an independent measure of $v \sin I$. We show that even when $v \sin I$ is less than the width of the intrinsic line profile, the travelling Doppler "shadow" cast by the planet creates an identifiable distortion in the line profiles which is amenable to direct modelling. Direct measurement of the trajectory of the missing starlight yields self-consistent measures of the projected stellar rotation rate, the intrinsic width of the mean local photospheric line profile, the projected spin-orbit misalignment angle, and the system's centre-of-mass velocity. Combined with the photometric rotation period, the results give a geometrical measure of the stellar radius which agrees closely with values obtained from high-precision transit photometry if a small amount of differential rotation is present in the stellar photosphere.

*Download/Website:* `http://arxiv.org/abs/0911.5361`

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## Stellar Encounters in the Context of Outburst Phenomena

*D. Forgan, K.Rice*
SUPA, Institute for Astronomy, University of Edinburgh

*Monthly Notices of the Royal Astronomical Society, in press (arXiv:0911.0531)*

Monthly Notices of the Royal Astronomical SocietyMonthly Notices of the Royal Astronomical Society Young stellar systems are known to undergo outbursts, where the star experiences an increased accretion rate, and the system's luminosity increases accordingly. The archetype is the FU Orionis (FU Ori) outburst, where the accretion rate can increase by three orders of magnitude (and the brightness of the system by five magnitudes). The cause appears to be instability in the circumstellar disc, but there is currently some debate as to the nature of this instability (e.g. thermal, gravitational, magneto-rotational). This paper details high resolution Smoothed Particle Hydrodynamics (SPH) simulations that were carried out to investigate the influence of stellar encounters on disc dynamics. Star-star encounters (where the primary has a self-gravitating, marginally stable protostellar disc) were simulated with various orbital parameters to investigate the resulting disc structure and dynamics. Crucially, the simulations include the effects of radiative transfer to realistically model the resulting thermodynamics. Our results show that the accretion history and luminosity of the system during the encounter displays many of the features of outburst phenomena. In particular, the magnitudes and decay times seen are comparable to those of FU Ori. There are two caveats to this assertion: the first is that these events are not expected to occur frequently enough to explain all FU Ori or EX Lupi; the second is that the inner discs of these simulations are subject to numerical viscosity, which will act to reduce the accretion rate (although it has less of an effect on the total mass accreted). In short, these results cannot rule out binary interactions as a potential source of some FU Ori-esque outbursts.

*Download/Website:* `http://arxiv.org/abs/0911.0531`

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## The role of disc self-gravity in the formation of protostars and protostellar discs

*W.K.M. Rice* [1], *J.H. Mayo* [1], *P.J. Armitage* [2,3]
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[3] Department of Astrophysical and Planetary Sciences, University of Colorado, Boulder CO 80309

*Monthly Notices of the Royal Astronomical Society, in press (arXiv:0911.1202)*

We use time-dependent, one-dimensional disc models to investigate the evolution of protostellar discs that form through the collapse of molecular cloud cores and in which the primary transport mechanism is self-gravity. We assume that these discs settle into a state of thermal equilibrium with $Q = 2$ and that the strength of the angular momentum transport is set by the cooling rate of the disc. The results suggest that these discs will attain a quasi-steady state that persists for a number of free-fall times and in which most of the mass within $100$ au is located inside $10 - 20$ au. This pile-up of mass in the inner disc could result in temperatures that are high enough for the growth of MHD turbulence which could rapidly drain the inner disc and lead to FU Orionis-like outbursts. In all our simulations, the inner regions of the discs ($r < 40$ au) were stable against fragmentation, while fragmentation was possible in the outer regions ($r > 40$ au) of discs that formed from cores that had enough initial angular momentum to deposit sufficient mass in these outer regions. The large amounts of mass in these outer regions, however, suggests that fragmentation will lead to the formation of sub-stellar and stellar mass companions, rather than planetary mass objects. Although mass accretion rates were largely consistent with observations, the large disc masses suggest that an additional transport mechanism (such as MRI occuring in the upper layers of the disc) must operate in order to drain the remaining disc material within observed disc lifetimes.

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# $N$-Body Simulation of Planetesimal Formation through Gravitational Instability and Coagulation. II. Accretion Model

*S. Michikoshi*[1], *E. Kokubo*[2], *S. Inutsuka*[3]

[1] Center for Computational Astrophysics, National Astronomical Observatory of Japan, Osawa, Mitaka, Tokyo 181-8588, Japan
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*Astrophysical Journal, published (2009ApJ...703.1363M)*

The gravitational instability of a dust layer is one of the scenarios for planetesimal formation. If the density of a dust layer becomes sufficiently high as a result of the sedimentation of dust grains toward the midplane of a protoplanetary disk, the layer becomes gravitationally unstable and spontaneously fragments into planetesimals. Using a shearing box method, we performed local $N$-body simulations of gravitational instability of a dust layer and subsequent coagulation without gas and investigated the basic formation process of planetesimals. In this paper, we adopted the accretion model as a collision model. A gravitationally bound pair of particles is replaced by a single particle with the total mass of the pair. This accretion model enables us to perform long-term and large-scale calculations. We confirmed that the formation process of planetesimals is the same as that in the previous paper with the rubble pile models. The formation process is divided into three stages: the formation of non-axisymmetric structures, the creation of planetesimal seeds, and their collisional growth. We investigated the dependence of the planetesimal mass on the simulation domain size. We found that the mean mass of planetesimals formed in simulations is proportional to $L_y^{3/2}$, where $L_y$ is the size of the computational domain in the direction of rotation. However, the mean mass of planetesimals is independent of $L_x$, where $L_x$ is the size of the computational domain in the radial direction if $L_x$ is sufficiently large. We presented the estimation formula of the planetesimal mass taking into account the simulation domain size.

*Download/Website:* `http://arxiv.org/abs/0908.3546`

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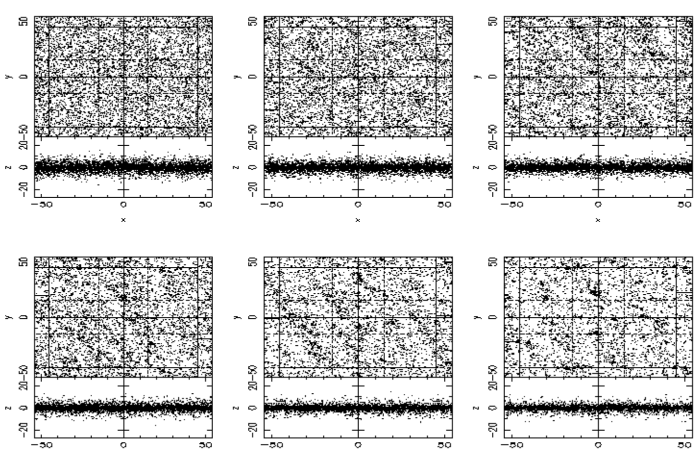

Figure 1: (Michkoshi et al.) Spatial distribution of particles in the standard model (model 1) at $t/T_{\rm K} = 0.0$ (*top left panel*), $t/T_{\rm K} = 0.4$ (*top middle panel*), $t/T_{\rm K} = 0.8$ (*top right panel*), $t/T_{\rm K} = 1.2$ (*bottom left panel*), $t/T_{\rm K} = 1.6$ (*bottom middle panel*), and $t/T_{\rm K} = 2.0$ (*bottom right panel*). Circles represent particles and their size is proportional to the physical size of particles.

## Numerical Modeling of the Coagulation and Porosity Evolution of Dust Aggregates

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*Astrophysical Journal, in press (arXiv:0911.0239)*

Porosity evolution of dust aggregates is crucial in understanding dust evolution in protoplanetary disks. In this study, we present useful tools to study the coagulation and porosity evolution of dust aggregates. First, we present a new numerical method for simulating dust coagulation and porosity evolution as an extension of the conventional Smoluchowski equation. This method follows the evolution of the mean porosity for each aggregate mass simultaneously with the evolution of the mass distribution function. This method reproduces the results of previous Monte Carlo simulations with much less computational expense. Second, we propose a new collision model for porous dust aggregates on the basis of our $N$-body experiments on aggregate collisions. As the first step, we focus on "hit-and-stick" collisions, which involve neither compression nor fragmentation of aggregates. We first obtain empirical data on porosity changes between the classical limits of ballistic cluster–cluster and particle–cluster aggregation. Using the data, we construct a recipe for the porosity change due to general hit-and-stick collisions as well as formulae for the aerodynamical and collisional cross sections. Our collision model is thus more realistic than a previous model of Ormel et al. based on the classical aggregation limits only. Simple coagulation simulations using the extended Smoluchowski method show that our collision model explains the fractal dimensions of porous aggregates observed in a full $N$-body simulation and a laboratory experiment. By contrast, similar simulations using the collision model of Ormel et al. result in much less porous aggregates, meaning that this model underestimates the porosity increase upon unequal-sized collisions. Besides, we discover that aggregates at the high-mass end of the distribution can have a considerably small aerodynamical cross section per unit mass compared with aggregates of lower masses. This occurs when aggregates drift under uniform acceleration (e.g., gravity) and their collision is induced by the difference in their terminal velocities. We point out an important implication of this discovery for dust growth in protoplanetary disks.

*Download/Website:* `http://arxiv.org/abs/0911.0239`

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## Discovery of the Coldest Imaged Companion of a Sun-Like Star

*C. Thalmann*[1,2], *J. Carson*[1,3], *M. Janson*[4], *M. Goto*[1], *M. McElwain*[5], *S. Egner*[6], *M. Feldt*[1], *J. Hashimoto*[7], *Y. Hayano*[6], *T. Henning*[1], *K. W. Hodapp*[8], *R. Kandori*[7], *H. Klahr*[1], *T. Kudo*[7], *N. Kusakabe*[7], *C. Mordasini*[1], *J.-I. Morino*[7], *H. Suto*[7], *R. Suzuki*[6], *M. Tamura*[7]

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*Astrophysical Journal Letters, published (arXiv:0911.1127)*

We present the discovery of a brown dwarf or possible planet at a projected separation of $1.9'' = 29\,\mathrm{AU}$ around the star GJ 758, placing it between the separations at which substellar companions are expected to form by core accretion ($\sim$5 AU) or direct gravitational collapse (typically $\geq$100 AU). The object was detected by direct imaging of its thermal glow with Subaru/HiCIAO. At 10–40 times the mass of Jupiter and a temperature of 550–640 K,

GJ 758 B constitutes one of the few known T-type companions, and the coldest ever to be imaged in thermal light around a sun-like star. Its orbit is likely eccentric and of a size comparable to Pluto's orbit, possibly as a result of gravitational scattering or outward migration. A candidate second companion is detected at $1.2''$ at one epoch.

*Download/Website:* `http://arxiv.org/abs/0911.1127`

*Contact:* `thalmann@mpia.de`

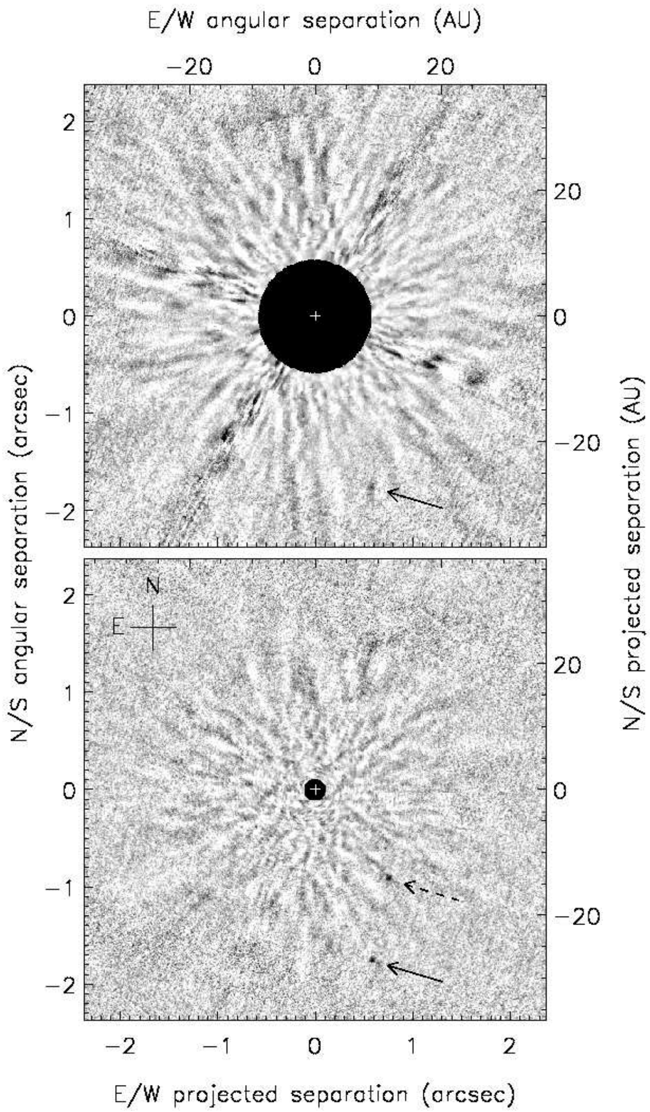


Figure 2: (Thalmann et al.) Signal-to-noise maps of the discovery images for GJ 758 B after ADI data reduction, for the May 2009 (top) and August 2009 (bottom) observations. The greyscale stretch is $[-1\,\sigma, 5\,\sigma]$. The S/N ratio is calculated in concentric annuli around the star. GJ 758 B is marked with solid arrows. A possible second object in the August images is pointed out with dashed arrows. The white plus sign marks the location of the host star GJ 758; the black disks designate the regions in which the field rotation arc is insufficient for ADI.

## The role of disc self-gravity in the formation of protostars and protostellar discs

*W.K.M. Rice* [1], *J.H. Mayo* [1], *P.J. Armitage* [2,3]

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*Monthly Notices of the Royal Astronomical Society, in press (arXiv:0911.1202)*

We use time-dependent, one-dimensional disc models to investigate the evolution of protostellar discs that form through the collapse of molecular cloud cores and in which the primary transport mechanism is self-gravity. We assume that these discs settle into a state of thermal equilibrium with $Q = 2$ and that the strength of the angular momentum transport is set by the cooling rate of the disc. The results suggest that these discs will attain a quasi-steady state that persists for a number of free-fall times and in which most of the mass within $100$ au is located inside $10 - 20$ au. This pile-up of mass in the inner disc could result in temperatures that are high enough for the growth of MHD turbulence which could rapidly drain the inner disc and lead to FU Orionis-like outbursts. In all our simulations, the inner regions of the discs ($r < 40$ au) were stable against fragmentation, while fragmentation was possible in the outer regions ($r > 40$ au) of discs that formed from cores that had enough initial angular momentum to deposit sufficient mass in these outer regions. The large amounts of mass in these outer regions, however, suggests that fragmentation will lead to the formation of sub-stellar and stellar mass companions, rather than planetary mass objects. Although mass accretion rates were largely consistent with observations, the large disc masses suggest that an additional transport mechanism (such as MRI occuring in the upper layers of the disc) must operate in order to drain the remaining disc material within observed disc lifetimes.

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## Dust Transport in Protostellar Disks Through Turbulence and Settling

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*Astrophysical Journal, in press (arXiv:0911.1533)*

We apply ionization balance and MHD calculations to investigate whether magnetic activity moderated by recombination on dust grains can account for the mass accretion rates and the mid-infrared spectra and variability of protostellar disks. The MHD calculations use the stratified shearing-box approach and include grain settling and the feedback from the changing dust abundance on the resistivity of the gas. The two-decade spread in accretion rates among Solar-mass T Tauri stars is too large to result solely from variations in the grain size and stellar X-ray luminosity, but can plausibly be produced by varying these parameters together with the disk magnetic flux. The diverse shapes and strengths of the mid-infrared silicate bands can come from the coupling of grain settling to the distribution of the magneto-rotational turbulence, through the following three effects. First, recombination on grains 1 $\mu$m or smaller yields a magnetically-inactive dead zone extending more than two scale heights from the midplane, while turbulent motions in the magnetically-active disk atmosphere overshoot the dead zone boundary by only about one scale height. Second, grains deep in the dead zone oscillate vertically in wave motions driven by the turbulent layer above, but on average settle at the rates found in laminar flow, so that the interior of the dead zone is a particle sink and the disk atmosphere will become dust-depleted unless resupplied from elsewhere. Third, with sufficient depletion, the dead zone is thinner and mixing dredges grains off the midplane. The last of these processes enables evolutionary signatures such as the degree of settling to sometimes decrease with age. The MHD results also show

that the magnetic activity intermittently lifts clouds of small grains into the atmosphere. Consequently the photosphere height changes by up to one-third over timescales of a few orbits, while the extinction along lines of sight grazing the disk surface varies by factors of two over times down to a tenth of an orbit. We suggest that the changing shadows cast by the dust clouds on the outer disk are a cause of the daily to monthly mid-infrared variability found in many young stars.

*Download/Website:* http://arxiv.org/abs/0911.1533

*Contact:* neal.turner@jpl.nasa.gov

# 3 Other abstracts

## A Photometric Transit Search for Planets around Cool Stars from the Italian Alps: Results from a Feasibility Study

*M. Damasso[1], P. Calcidese[1], A. Bernagozzi[1], E. Bertolini[1], P. Giacobbe[2], M.G. Lattanzi[3], R. Smart[3], A. Sozzetti[3]*

[1] Astronomical Observatory of the Autonomous Region of the Aosta Valley, Loc. Lignan 39, Nus (Aosta), Italy
[2] Dept. of Physics, University of Turin, Via Giuria 1, I-10125, Turin, Italy
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*ASP conference series, in press (arXiv:0911.3587v2)*

A feasibility study was carried out at the Astronomical Observatory of the Autonomous Region of the Aosta Valley demonstrating that it is a well-poised site to conduct an upcoming observing campaign aimed at detecting small-size (R<$R_{Neptune}$) transiting planets around nearby cool M dwarf stars. Three known transiting planet systems were monitored from May to August 2009 with a 25 cm f/3.8 Maksutov telescope. We reached seeing-independent, best-case photometric RMS less than 0.003 mag for stars with V$<13$, with a median RMS of 0.006 mag for the whole observing period.

*Download/Website:* http://arxiv.org/abs/0911.3587

*Contact:* m.damasso@gmail.com

## Where can we find Super-Earths?

*E. Podlewska-Gaca, E. Szuszkiewicz*

CASA* and Institute of Physics, University of Szczecin, Poland

*Contribution to the conference proceedings for 'Pathways towards habitable planets', arXiv:0911.5233*

In recent years we have been witnessing the discovery of one extrasolar gas giant after another. Now the time has come to detect more low-mass planets like Super-Earths and Earth-like objects. An interesting question to ask is: where should we look for them? We have explored here the possibility of finding Super-Earths in the close vicinity of gas giants, as a result of the early evolution of planetary systems. For this purpose, we have considered a young planetary system containing a Super-Earth and a gas giant, both embedded in a protoplanetary disc. We have shown that, if the Super-Earth is on the internal orbit relative to the gas giant, the planets can easily become locked in a mean motion resonance. This is no longer true, however, if the Super-Earth is on the external orbit. In this case we have obtained that the low-mass planet is captured in a trap at the outer edge of the gap opened by the giant planet and no first order mean motion commensurabilities are expected. Our investigations might be particularly useful for the observational TTV (Transit Timing Variation) technique.

*Download/Website:* http://arxiv.org/abs/0911.5233

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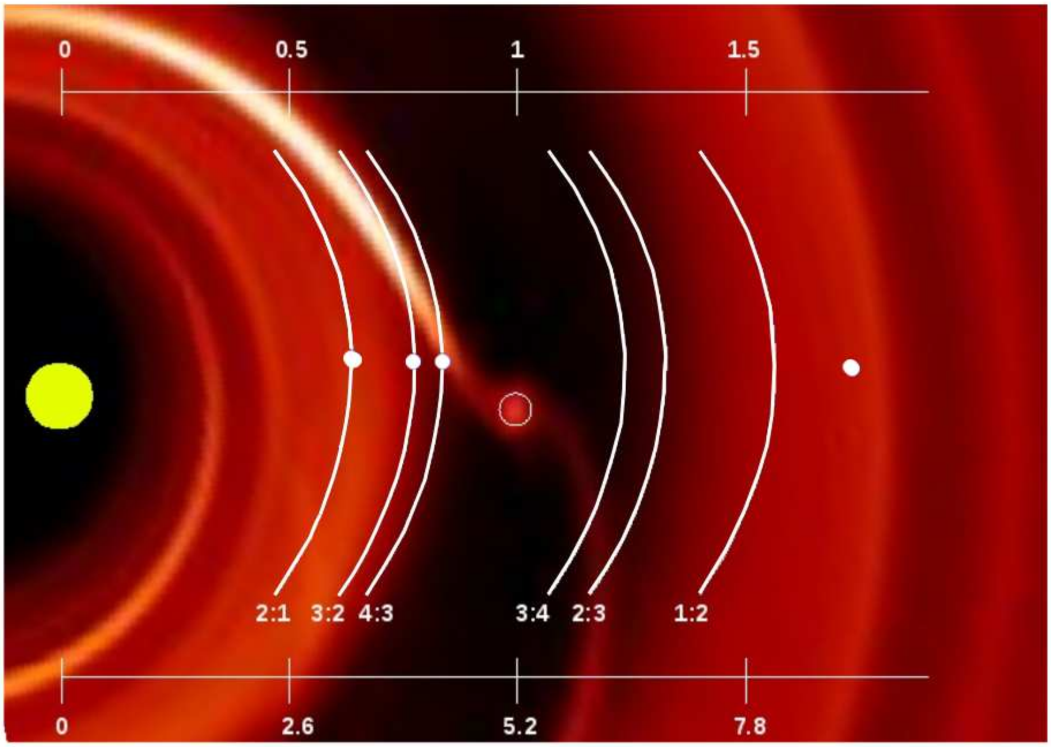


Figure 3: (Podlewska-Gaca & Szuszkiewicz) The possible locations of the Super-Earth (denoted as white dots) in the system containing the Jupiter mass gas giant.

# 4 Conference announcements

## Building Habitable Worlds

*Astrobiology Society of Britain*
Royal Holloway, University of London, UK

*Royal Holloway, University of London, UK, 7-9 April 2010*

Astrobiology is a multidisciplinary topic that brings together many branches of science. This conference will cover all aspects of research related to astrobiology, including (but not exclusively): Astronomy, Astrochemistry, Astrobiology Technology, Biology, Development of Life-Forms in Other Environments, Exoplanets, Extremophiles, Geomicrobiology, Humans in Space, Lifes Origins, Mars, Meteorites, Microbial Communities, Panspermia, Planetary

Protection, Prebiotic Climates, Public Engagement.

Papers are solicited on all these and related topics but are particularly encouraged if they relate to the conference theme ”Building Habitable Worlds” which concerns the characteristics that make a world naturally habitable. Abstracts (200 words) should be submitted by Feb 1, 2010.

Keynote Speakers:
Helmut Lammer (Austrian Academy of Sciences): The classification of habitats and the evolution of habitable planets (provisional title).
Euan Nisbet (Royal Holloway): The evolution of Earth’s atmosphere (provisional title).
Barrie Jones (OU): Impacts and Habitability (provisional title).

Conference Fees:
Early Registration Fee: £180 (by Feb 1, includes ASB membership for 2 years)
Registration: £200 (includes ASB membership for 2 years).
Accommodation at Royal Holloway: £44.61 per night (Single, en-suite).
We anticipate that bursaries will be available to assist attendance by Postgraduate students.

*Download/Website:* `http://www.astrobiologysociety.org/`

*Contact:* `conference@astrobiologysociety.org`

## ExoPAG 1: Initial Meeting of the Exoplanet Exploration Program Analysis Group (ExoPAG)

*NASA ExoPAG*
Marriot Wardman Park, Washington DC, USA

*Marriot Wardman Park, Washington DC, USA, Jan. 7-8, 2010*

The kickoff meeting for NASA’s ExoPAG will be held Thursday afternoon/Friday morning, Jan. 7-8, directly following the 215th American Astronomical Society meeting in Washington DC. The ExoPAG is established to provide a conduit for community input into the development and execution of NASA’s Exoplanet Exploration Program. It is designed to serve as a community-based, interdisciplinary forum for analysis in support of Exoplanet exploration objectives and of their implications for architecture planning and activity prioritization and for future exploration. The ExoPAG will provide its inputs and the results of its analyses to NASA through regular reports to the Astrophysics Subcommittee of the NASA Advisory Council. ExoPAG membership is free and open to all members of the scientific community with an interest in the detection and characterization of planets and planetary systems around other stars.

Topics for discussion include: 1) What information do we need to know in order to characterize an exoplanet, and what can be done from the ground? 2) What is the impact of zodiacal and exozodiacal dust on direct imaging of exoplanets, and what can be done to improve our knowledge of exozodis? 3) What do we need to know about planetary system architectures, and how can we obtain this information? 4) What can be learned about exoplanets from the ground using proposed extremely large telescopes? Time will also be reserved for a general discussion of future priorities for extrasolar planets research. All ExoPAG meetings are open to the community. The meeting will end around midday on Friday, Jan. 8.

*Download/Website:* `http://exep.jpl.nasa.gov/ExoPAG`

*Contact:* `NASA-ExoPAG@nasa.gov`

## Detection and dynamics of transiting exoplanets

*C. Moutou (SOC chair), S. Udry (SOC co-chair), F. Bouchy (LOC chair)*

*Observatoire de Haute Provence, Saint Michel l'Observatoire, France, 23-27 August 2010*

In the decade since the first detection of an exoplanetary transit, more than 60 transiting exoplanets have been discovered and characterized, using both ground-based and space-based observations. A few systems including a transiting planet have also been discovered, providing precise data that can be used for dynamical modelling and for investigating the processes of planet formation and migration. More systems are expected to be discovered in the coming years, especially with Kepler and CoRoT, which offer the long temporal baseline needed for such detections.
Observations of transits provide not only fundamental parameters of the planet, but also the relative inclination between the orbit and the stellar rotation axis, which offers additional constraints on formation and migration scenarios. The Colloquium "Detection and dynamics of transiting exoplanets" is intended to review all the observed characteristics of transiting systems, and all theoretical works related to the measured properties. Main topics of this colloquium include:

- masses and radii of transiting planets
- internal structure modelling
- observed inclination and eccentricity of transiting systems
- dynamics of systems, links from observations to theory
- formation and migration scenarios
- observations and modelling of transit timing variations
- star-planet interactions in transiting systems: tides, irradiation
- future observational projects

The Observatoire de Haute Provence is located in southern France, near the village of Saint Michel l'Observatoire. Among the discoveries made from this location are 51 Peg b in 1995 and HD 189733 b in 2005 with ELODIE. The 193-cm telescope is now equipped with SOPHIE, which makes important contributions to studies of transiting exoplanets. Up to 80 participants are expected. Half of them can be lodged inside the Observatory for the period of the Colloquium. Students and post-docs are encouraged to participate and contribute their work, and can apply for a travel grant.
Important deadlines:
November 2009 : first announcement
1st January - 1st May 2010: registration open
1st January - 1st July : abstract submission
23 27 August 2010 : Colloquium
15 December 2010 : publication of proceedings

SOC: G. Bakos, F. Bouchy, A. Cameron, A. Correia, S. Ferraz-Melo, G. Hébrard, J. Laskar, D. Latham, G. Laughlin, C. Moutou (chair), S. Udry (co-chair), J. Winn
LOC: L. Arnold, F. Bouchy (chair), N. Bressand, R. Diaz, A.M. Galliano, A. Laloge (secretary), A. Santerne

*Download/Website:* `http://www.obs-hp.fr/ohp2010/`

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## The Diversity of Planetary Atmospheres

*Frédéric Pont, Suzanne Aigrain & Isabelle Baraffe*
University of Exeter, UK

*Exeter, UK, 7-10 September 2010*

Planetary atmospheres are complex and evolving entities, as mankind is rapidly coming to realise whilst attempting to understand, forecast and mitigate human-induced climate change. In the Solar System, our neighbours Venus and Mars provide striking examples of two endpoints of planetary evolution, runaway greenhouse and loss of atmosphere to space.

The variety of extra-solar planets brings a wider angle to the issue: from scorching “hot jupiters” to ocean worlds, exo-atmospheres explore many configurations unknown in the Solar System, such as iron clouds, silicate rains, extreme plate tectonics, and steam volcanoes. Exoplanetary atmospheres have recently become accessible to observations. The aim of this conference in Exeter is to bring together Earth, Solar System and Exoplanet specialists to discuss recent results and the way ahead, and put our own climate in the wider context of the trials and tribulations of planetary atmospheres.

*Scientific committee*
Jonathan Lunine - University of Arizona
Peter Cox - University of Exeter
Adam Showman - University of Arizona
Christophe Sotin - Jet Propulsion Laboratory
Frdric Pont - University of Exeter
Suzanne Aigrain - Oxford University
Isabelle Baraffe - University of Exeter
Roger Yelle - University of Arizona
Fred Taylor - University of Oxford
Franois Forget - Universit Paris 6

*Download/Website:* `http://www.exeter.ac.uk/exoclimes`

*Contact:* `fpont@astro.ex.ac.uk`

## Putting our Solar System in context: origin, dynamical and physical evvolution of multiple planet systems

*ESF-FWF Conference in partnership with LFUI*
Obsergurgl, Austria

*Obergurgl, Austria, 25-30 April 2010*

The present-day catalogue of extrasolar planets includes a panoply of astoundingly diverse systems containing more than one planetary companion. The observational data on multiple systems (orbital architectures, mass distributions, stellar host properties) have important implications for the proposed models of formation and early evolution of planetary systems, provide important clues on the relative role of several proposed mechanisms of dynamical interactions between forming planets, gaseous/planetesimals disks, and distant companion stars, and allow to measure the likelihood of formation and survival of terrestrial planets in the Habitable Zone of the parent star. Multiple-planet systems are thus clearly excellent laboratories to search for fossil evidence of formation and dynamical evolution mechanisms. However, given the present theoretical limitations to elucidate in an unified manner the complex processes of planet formation and evolution, some of the key questions on the physical architecture of planetary systems still await a definitive answer. To this end, help from future data, obtained with a variety of techniques, over a wide range of wavelengths, both from the ground and in space, will prove invaluable.

This conference will aim at reaching two overarching goals. First, it will strive to create a global picture of the origin, dynamical and physical evolution of multiple-planet systems, as well as of extrasolar planets orbiting stars in multiple stellar systems, by comparing the latest observational findings with new theoretical developments in the field. This could help in the design of incipient ESA and NASA exoplanet research programs and could also help guide future ground-based and space-borne observing campaigns. Second, and perhaps more important, would be the further integration of Solar-system science into the astronomy of exoplanets. To date, exoplanet research has been driven by astronomers, while planetary scientists have by and large focused almost exclusively on our Solar System. However, the expertise in planetary science is vast, and merging such knowledge with the new discoveries outside the Solar System would greatly enrich both.

Invited Speakers will include (list to be completed):
Prof. Armando Blanco, Universit del Salento, IT
Anne Eggenberger, Observatoire de Grenoble, FR
Tristan Guillot, Observatoire de la Cte dAzur (OCA), FR
Lisa Kaltenegger, Harvard-Smithsonian CfA, US
Helmut Lammer, Space Research Institute (IWF), AT
Jacques Laskar, Institut de mcanique cleste et de calcul des phmrides (IMCCE), FR
David W. Latham, Harvard-Smithsonian CfA, US
Prof. Renu Malhotra, University of Arizona, US
Dr. Francesco Marzari, University of Padova, IT
Alessandro Morbidelli, Observatoire de la Cte dAzur (OCA), FR
Heike Rauer, German Aerospace Center (DLR), DE

Closing date for applications: 31 January 2010.

This conference is organised by the European Science Foundation (ESF), in partnership with the Fonds zur Förderung der wissenschaftlichen Forschung in Österreich (FWF) and the Leopold-Franzens-Universität Innsbruck (LFUI).

*Download/Website:* `http://www.esf.org/conferences/10314`

*Contact:* `apiccolotto@esf.org`

# 5 Jobs and positions

## Two Post Doctoral Positions in theoretical Astrophysics/Planetary Sciences

*Dr. Y. Alibert & Prof. W. Benz*
University of Bern, Sidlerstrasse 5, CH-3012 Bern, Switzerland.

*University of Bern, 01/02/10*

The group for Space Research and Planetary Sciences of the Physikalisches Institut at the University of Bern, Switzerland, invites applications for two Research Associate appointments to work in the groups of Dr. Y. Alibert and Prof. W. Benz. Applications will be reviewed as soon as available, until selection of the two successful candidates. The starting date is February 1. 2010, or later, upon mutual agreement.

The successful applicant is expected to be a recent PhD recipient in theoretical astrophysics and/or planetary sciences. Fields of particular interests to the group include the theory of formation and/or evolution of giant and terrestrial planets, the physics of protoplanetary disks (gas, planetesimals and their interactions), and disk-planet interactions. He/she should be able to carry out independent research in relation with the interests of the groups as well as to participate actively in the other activities of the department.

Salary is according to qualifications and conditions stipulated by the University of Bern. The appointments will be for a period of two years, renewable for an additional year.

Candidates should submit as soon as possible a curriculum vitae, a list of publications, a description of current and planned research activities, and arrange for three letters of reference to be sent to Mrs. K. Weyeneth, University of Bern, Sidlerstrasse 5, CH-3012 Bern, Switzerland.

For further information call Y. Alibert ++41 31 631 44 05 (direct) or W. Benz ++41 31 631 44 03 (direct)

*Download/Website:* `http://space.unibe.ch/`

*Contact:* `yann.alibert@space.unibe.ch, wbenz@space.unibe.ch`

# 6 As seen on astro-ph

The following list contains all the entries relating to exoplanets that we spotted on astro-ph during November 2009. 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/0911.0328: **On homogeneous statistical distributions exoplanets for their dynamic parameters** by *B. R. Mushailov, L .M. Ivanovskaya, V. S. Teplitskaya*

astro-ph/0911.0728: **Thermometric Soots on Hot Jupiters?** by *K. Zahnle, M. S. Marley, J. J. Fortney*

astro-ph/0911.0924: **On the Super-Earths locked in the 3:2 mean-motion resonance** by *A. Lacny, E. Szuszkiewicz*

astro-ph/0911.0968: **Detection of a Planetary Companion around the giant star $\gamma^1$ leo** by *Inwoo Han, B. C. Lee, K. M. Kim et al*

astro-ph/0911.1127: **Discovery of the coldest imaged companion of a Sun-like star** by *Thalmann, Carson, Janso, et al*

astro-ph/0911.1555: **Dynamical architectures of planetary systems induced by orbital migration** by *Ewa Szuszkiewicz, John C. B. Papaloizou*

astro-ph/0911.1925: **Search for very low-mass brown dwarfs and free-floating planetary-mass objects in Taurus** by *Sascha P. Quanz, Bertrand Goldman, Thomas Henning et al*

astro-ph/0911.1982: **Biological Damage due to Photospheric, Chromospheric and Flare Radiation in the Environments of Main-Sequence Stars** by *M. Cuntz, E. F. Guinan, R. L. Kurucz*

astro-ph/0911.2218: **Spitzer IRAC Secondary Eclipse Photometry of the Transiting Extrasolar Planet HAT-P-1b** by *Kamen Todorov, Drake Deming, Jospeph Harrington et al* astro-ph/0911.2256: **Cloud Formation and Dynamics in Cool Dwarf and Hot Exoplanetary Atmospheres** by *Adam J. Burgasser*

astro-ph/0911.2468: **Interactions between a massive planet and a disc** by *Pau Amaro-Seoane, Ignasi Ribas, Ulf Loeckmann et al*

astro-ph/0911.2704: **A Spitzer Census of Transitional Protoplanetary Disks with AU-Scale Inner Holes** by *James Muzerolle, Lori E. Allen, S. Thomas Megeath et al*

astro-ph/0911.2706: **Masses and Orbital Constraints for the OGLE-2006-BLG-109Lb,c Jupiter/Saturn Analog Planetary System** by *D.P. Bennett, S.H. Rhie, S. Nikolaev et al*

astro-ph/0911.2796: **ThReT: A new survey for Extrasolar Planetary transits at Mt. Holomon, Greece** by *John Antoniadis, Vassilis Karamanavis, Dimitris M et al*

astro-ph/0911.2936: **Exoplanet Characterization and the Search for Life** by *J. Kasting, W. Traub, A. Roberge et al*

astro-ph/0911.3170: **Atmospheric Circulation of Exoplanets** by *Adam P. Showman, James Y-K. Cho, Kristen Menou*

astro-ph/0911.3271: **How Common are Extrasolar, Late Heavy Bombardments?** by *Mark Booth, Mark C. Wyatt, Alessandro Morbidelli et al*

astro-ph/0911.3419: **Constraints on Secondary Eclipse Probabilities of Long-Period Exoplanets from Orbital Elements** by *Kaspar von Braun, Stephen R. Kane*

astro-ph/0911.3585: **Transit timing analysis of CoRoT-1b** by *Sz. Csizmadia, S. Renner, P. Barge et al*

astro-ph/0911.3390: **Do we expect to find the Super-Earths close to the gas giants?** by *E. Podlewska*

astro-ph/0911.3783: **The Formation of Uranus and Neptune in Solid-Rich Feeding Zones: Connecting Chemistry and Dynamics** by *Sarah E. Dodson-Robinson, Peter Bodenheimer*

astro-ph/0911.3791: **Surface structure of the CoRoT CP2 target star HD 50773** by *T. Luftinger, H.-E. Frohlich, W. Wei et al*

astro-ph/0911.4381: **Jupiter - friend or foe? III: the Oort cloud comets** by *J Horner, B W Jones, J Chambers*

astro-ph/0911.4532: **Tidal and Magnetic Interactions between a Hot Jupiter and its Host Star in the Magnetospheric Cavity of a Protoplanetary Disk** by *Shih-Hsin Chang, Pin-Gao Gu, Peter Bodenheimer*

astro-ph/0911.4645: **The Mass of the Candidate Exoplanet Companion to HD136118 from Hubble Space Telescope Astrometry and High-Precision Radial Velocities** by *Eder Martioli, Barbara E. McArthur, G. Fritz Benedict et al*

astro-ph/0911.4862: **51 Pegasi - a planet-bearing Maunder minimum candidate** by *K. Poppenhaeger, J. Robrade, J.H.M.M. Schmitt et al*

astro-ph/0911.5087: **The thermal emission of the young and massive planet CoRoT-2b at 4.5 and 8 microns** by *M. Gillon, A. A. Lanotte, T. Barman et al*

astro-ph/0911.5170: **Pathways Towards Habitable Moons** by *David M. Kipping, Stephen J. Fossey, Giammarco Campanella et al*

astro-ph/0911.5233: **Where can we find Super-Earths?** by *E. Podlewska-Gaca, E. Szuszkiewicz*

astro-ph/0911.5361: **Line-profile tomography of exoplanet transits I: The Doppler shadow of HD 189733b** by *A. Collier Cameron, V. A. Bruce, G. R. M. Miller*

**Disks**

astro-ph/0911.0311: **Protoplanetary Disk Winds by Magnetorotational Instability : Formation of an Inner Hole and a Crucial Assist for Planet Formation** by *Takeru K. Suzuki, Takayuki Muto, Shu-ichiro Inutsuka*

astro-ph/0911.0819: **Planetary Dynamics and Habitable Planet Formation In Binary Star Systems** by *Nader Haghighipour, Rudolf Dvorak, Elke Pilat-Lohinger*

astro-ph/0911.1010: **Dust Processing and Mineralogy in Protoplanetary Accretion Disks** by *Thomas Henning, Gwendolyn Meeus*

astro-ph/0911.1202: **The role of disc self-gravity in the formation of protostars and protostellar discs** by *W.K.M. Rice, J.H. Mayo, P.J. Armitage*

astro-ph/0911.1893: **Does the anomalous solar chemical composition come from planet formation?** by *I. Ramirez, J. Melendez, M. Asplund*
astro-ph/0911.1949: **Radiation thermo-chemical models of protoplanetary disks II. Line diagnostics** by *I. Kamp, I. Tilling, P. Woitke et al*
astro-ph/0911.2032: **Gas Accretion from a Circumbinary Disk** by *Tomoyuki Hanawa, Yasuhiro Ochi, Koichi Ando*
astro-ph/0911.2271: **Observational diagnostics of gas in protoplanetary disks** by *Andres Carmona*
astro-ph/0911.3426: **Target selection for the SUNS and DEBRIS surveys for debris discs in the solar neighbourhood** by *N. M. Phillips, J. S. Greaves, W. R. F. Dent et al*
astro-ph/0911.3587: **A Photometric Transit Search for Planets around Cool Stars from the Italian Alps: Results from a Feasibility Study** by *M. Damasso, P. Calcidese, A. Bernagozzi et al*
astro-ph/0911.3653: **Revealing the sub-AU asymmetries of the inner dust rim in the disk around the Herbig Ae star R CrA** by *S. Kraus, K.-H. Hofmann, F. Malbet et al*
astro-ph/0911.4129: **Variations on Debris Disks II. Icy Planet Formation as a Function of the Bulk Properties and Initial Sizes of Planetesimals** by *Scott J Kenyon & Benjamin C. Bromley*
astro-ph/0911.4363: **Strong near-infrared emission in the sub-AU disk of the Herbig Ae star HD163296: evidence for refractory dust?** by *M. Benisty, A. Natta, A. Isella et al*
astro-ph/0911.4803: **The Location of the Snow Line in Protostellar Disks** by *Morris Podolak*
astro-ph/0911.5361: **Candidate Coronagraphic Detections of Protoplanetary Disks around Four Young Stars** by *J.L. Karr, N. Ohashi, T. Kudo et al*

**Instrumentation and Techniques**

astro-ph/0911.0132: **The NASA Infrared Telescope Facility** by *S.J. Bus, J.T. Rayner, A.T. Tokunaga et al*
astro-ph/0911.1307: **High Contrast Imaging and Wavefront Control with a PIAA Coronagraph: Laboratory System Validation** by *Olivier Guyon (1 and 2), Eugene Pluzhnik (3), Frantz Martinache et al*
astro-ph/0911.2008: **Starspot Jitter in Photometry, Astrometry and Radial Velocity Measurements** by *V.V. Makarov, C.A. Beichman, J.H. Catanzarite et al*
astro-ph/0911.2465: **Self-coherent camera as a focal plane wavefront sensor: simulations** by *Raphael Galicher, Pierre Baudoz, Gerard Rousset et al*
astro-ph/0911.2468: **Interactions between a massive planet and a disc** by *Pau Amaro-Seoane, Ignasi Ribas, Ulf Loeckmann et al*
astro-ph/0911.2703: **An Efficient Method for Modeling High Magnification Planetary Microlensing Events** by *David P. Bennett*
astro-ph/0911.3200: **Terrestrial Planet Finder Coronagraph (TPF-C) Flight Baseline Concept** by *Marie Levine, D. Lisman, S. Shaklan et al*
astro-ph/0911.4424: **Mapping the Probability of Microlensing Detection of Extra-Solar Planets** by *Karan Molaverdikhani, Maryam Tabeshian*
astro-ph/0911.5285: **Bayesian analysis of caustic-crossing microlensing events** by *A. Cassan, K. Horne, N. Ka et al*