ExoPlanet News
An Electronic Newsletter

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# Contents

**1 Editorial** **2**

**2 Abstracts of refereed papers** **2**
– The History of the Solar System's Debris Disc: Observable Properties of the Kuiper Belt *Booth et al.* . 2
– Eleven Exoplanet Host Star Angular Diameters from the CHARA Array *Baines et al.* . . . . . 3
– Imaging search for the unseen companion to $\epsilon$ Ind A – Improving the detection limits with 4 $\mu$m observations *Janson et al.* . . . . . 3
– Stellar coronal magnetic fields and star-planet interaction *Lanza* . . . . . 4
– Follow-up Observations of the Neptune Mass Transiting Extrasolar Planet HAT-P-11b *Dittmann et al.* 4
– A Tentative Detection of a Starspot During Consecutive Transits of an Extrasolar Planet from the Ground: No Evidence of a Double Transiting Planet System Around TrES-1 *Dittmann et al.* . . . . 5
– Local Linear Analysis of Interaction between a Planet and Viscous Disk and an Implication on Type I Planetary Migration *Muto & Inutsuka* . . . . . 6
– Massive Protoplanetary Disks in Orion Beyond the Trapezium Cluster *Mann & Williams* . . . . . 6
– A SuperWASP search for additional transiting planets in 24 known systems *Smith et al.* . . . . . 7
– Resolving the hot dust around HD69830 and eta Corvi with MIDI and VISIR *Smith, Wyatt & Haniff* . 8
– A Third Planet Orbiting HIP 14810 *Wright et al.* . . . . . 10

**3 Conference announcements** **11**
– Building Habitable Worlds: Fourth Conference of the Astrobiology Society of Britain *Royal Holloway, University of London* . . . . . 11
– Pathways towards habitable planets *Barcelona, Spain* . . . . . 11
– 2009 Sagan Summer Workshop: Exoplanetary Atmospheres *Pasadena, CA* . . . . . 12
– 41st Meeting of the AAS Division for Planetary Sciences (DPS) *Puerto Rico* . . . . . 12

**4 Jobs and positions** **13**
– Postdoctoral Fellow(s) - Exo-Planets, Brown Dwarfs and Young Stars *University of Toronto* . . . . . 13

**5 Announcements** **13**
– The SONG Network and Extrasolar Planets *Chaplin et al.* . . . . . 13

**6 As seen on astro-ph** **14**

# 1 Editorial

Welcome to the twentieth edition of ExoPlanet News, an electronic newsletter reporting the latest developments and research outputs in the field of exoplanets. This issue, for the first time, we have included some figures with abstracts where authors have submitted them.

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 . As ever, we rely on you, the subscribers of the newsletter, to send us your abstracts of recent papers, conference announcements, thesis abstracts, job adverts etc for each edition.

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 August 2009. 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

## The History of the Solar System's Debris Disc: Observable Properties of the Kuiper Belt

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*Monthly Notices of the Royal Astronomical Society, in press (arXiv:0906.3755v1)*

The Nice model of Gomes et al. (2005) suggests that the migration of the giant planets caused a planetesimal clearing event which led to the Late Heavy Bombardment (LHB) at 880 Myr. Here we investigate the IR emission from the Kuiper belt during the history of the Solar System as described by the Nice model. We describe a method for easily converting the results of n-body planetesimal simulations into observational properties (assuming black-body grains and a single size distribution) and further modify this method to improve its realism (using realistic grain properties and a three-phase size distribution). We compare our results with observed debris discs and evaluate the plausibility of detecting an LHB-like process in extrasolar systems. Recent surveys have shown that 4% of stars exhibit 24 $\mu$m excess and 16% exhibit 70 $\mu$m excess. We show that the Solar System would have been amongst the brightest of these systems before the LHB at both 24 and 70 $\mu$m. We find a significant increase in 24 $\mu$m emission during the LHB, which rapidly drops off and becomes undetectable within 30 Myr, whereas the 70 $\mu$m emission remains detectable until 360 Myr after the LHB. Comparison with the statistics of debris disc evolution shows that such depletion events must be rare occurring around less than 12% of Sun-like stars and with this level of incidence we would expect approximately 1 of the 413 Sun-like, field stars so far detected to have a 24 $\mu$m excess to be currently going through an LHB. We also find that collisional processes are important in the Solar System before the LHB and that parameters for weak Kuiper belt objects are inconsistent with the Nice model interpretation of the LHB.

*Download/Website:* `http://arxiv.org/abs/0906.3755`

*Contact:* `mbooth@ast.cam.ac.uk`

## Eleven Exoplanet Host Star Angular Diameters from the CHARA Array

*E. K. Baines[1], H. A. McAlister[2], T. A. ten Brummelaar[2], J. Sturmann[2], L. Sturmann[2], N. H. Turner[2], S. T. Ridgway[3]*

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*Astrophysical Journal, in press (arXiv:0906.2702)*

We directly measured the angular diameters for eleven exoplanet host stars using Georgia State University's CHARA Array interferometer and calculated their linear radii and effective temperatures. The sample tends towards evolving or evolved stars and includes one dwarf, four subgiants, and six giants. We then estimated masses and ages for the stars using our effective temperatures combined with metallicity measurements from the literature.

*Download/Website:* `http://arxiv.org/abs/0906.2702`

## Imaging search for the unseen companion to $\epsilon$ Ind A – Improving the detection limits with 4 $\mu$m observations

*M. Janson[1], D. Apai[2], M. Zechmeister[3], W. Brandner[3], M. Kürster[3], M. Kasper[4], S. Reffert[5], M. Endl[6], D. Lafrenière[1], K. Geißler[3], S. Hippler[3], Th. Henning[3]*

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*MNRAS, accepted (arXiv:0906.4145)*

$\epsilon$ Ind A is one of the nearest sun-like stars, located only 3.6 pc away. It is known to host a binary brown dwarf companion, $\epsilon$ Ind Ba/Bb, at a large projected separation of 6.7′, but radial velocity measurements imply that an additional, yet unseen component is present in the system, much closer to $\epsilon$ Ind A. Previous direct imaging has excluded the presence of any stellar or high-mass brown dwarf companion at small separations, indicating that the unseen companion may be a low-mass brown dwarf or high-mass planet. We present the results of a deep high-contrast imaging search for the companion, using active angular differential imaging (aADI) at 4 $\mu$m, a particularly powerful technique for planet searches around nearby and relatively old stars. We also develop an additional PSF reference subtraction scheme based on locally optimized combination of images (LOCI) to further enhance the detection limits. No companion is seen in the images, although we are sensitive to significantly lower masses than previously achieved. Combining the imaging data with the known radial velocity trend, we constrain the properties of the companion to within approximately 5-20 $M_{\rm jup}$, 10-20 AU, and $i > 20^{\rm o}$, unless it is an exotic stellar remnant. The results also imply that the system is probably older than the frequently assumed age of $\sim$1 Gyr.

*Download/Website:* `http://arxiv.org/abs/0906.4145`

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## Stellar coronal magnetic fields and star-planet interaction

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*Astronomy & Astrophysics, in press (arXiv:0906.1738v1)*

Evidence of magnetic interaction between late-type stars and close-in giant planets is provided by the observations of stellar hot spots rotating synchronously with the planets and showing an enhancement of chromospheric and X-ray fluxes. Possible photospheric signatures of such an interaction have also been reported. We investigate star-planet interaction in the framework of a magnetic field model of a stellar corona, considering the interaction between the coronal field and that of a planetary magnetosphere moving through the corona. This is motivated, among others, by the difficulty of accounting for the energy budgets of the interaction phenomena with previous models. A linear force-free model is applied to describe the coronal field and study the evolution of its total magnetic energy and relative helicity according to the boundary conditions at the stellar surface and the effects related to the planetary motion through the corona. The energy budget of the star-planet interaction is discussed assuming that the planet may trigger a release of the energy of the coronal field by decreasing its relative helicity. The observed intermittent character of the star-planet interaction is explained by a topological change of the stellar coronal field, induced by a variation of its relative helicity. The model predicts the formation of many prominence-like structures in the case of highly active stars owing to the accumulation of matter evaporated from the planet inside an azimuthal flux rope in the outer corona. Moreover, the model can explain why stars accompanied by close-in planets have a higher X-ray luminosity than those with distant planets. It predicts that the best conditions to detect radio emission from the exoplanets and their host stars are achieved when the field topology is characterized by field lines connected to the surface of the star, leading to a chromospheric hot spot rotating synchronously with the planet. The main predictions of the model can be verified with present observational techniques, by a simultaneous monitoring of the chromospheric flux and X-ray (or radio) emission, and spectropolarimetric observations of the photospheric magnetic fields.

*Download/Website:* `http://web.ct.astro.it/preprints/`

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## Follow-up Observations of the Neptune Mass Transiting Extrasolar Planet HAT-P-11b

*Dittmann, Jason A., Close, Laird M., Green, Elizabeth M., Scuderi, Louis J., Males, Jared R.*
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*Astrophysical Journal Letters, published (2009ApJ...699L..48D)*

We have confirmed the existence of the transiting super Neptune extrasolar planet HAT-P-11b. On May 1, 2009 UT the transit of HAT-P-11b was detected at the University of Arizona's 1.55m Kuiper Telescope with 1.7 millimag rms accuracy. We find a central transit time of $T_c = 2454952.92534 \pm 0.00060$ BJD; this transit occurred $80 \pm 73$ seconds sooner than previous measurements (71 orbits in the past) would have predicted. Hence, our transit timing rules out the presence of any large ($> 200$s) deviations from the ephemeris of Bakos et al. (2009). We obtain a slightly more accurate period of $P = 4.8878045 \pm 0.0000043$ days. We measure a slightly larger planetary radius of $R_p = 0.452 \pm 0.020 R_J$ ($5.07 \pm 0.22 R_{earth}$) compared to Bakos and co-workers' value of $0.422 \pm 0.014 R_J$ ($4.73 \pm 0.16 R_{earth}$). Our values confirm that HAT-P-11b is very similar to GJ 436b (the only other known transiting super Neptune) in radius and other bulk properties.

*Contact:* `dittmann@email.arizona.edu`

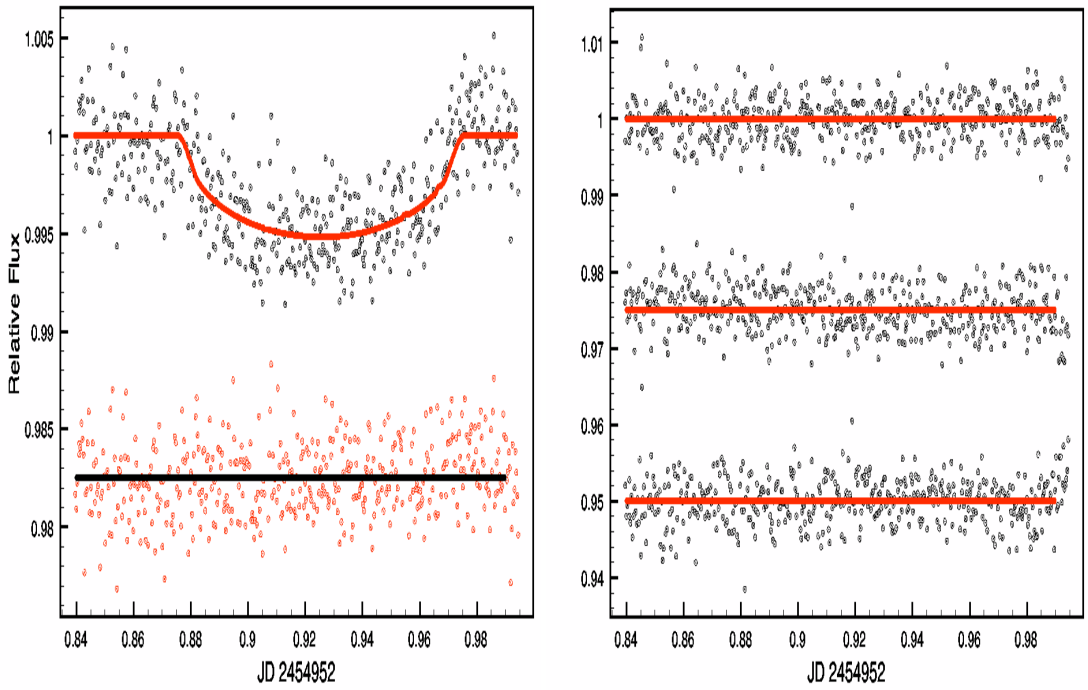


Figure 1: (Dittmann et al.) **Left:** The timeseries of HAT-P-11 during the Transit of May 1, 2009 UT. We show our best fit (reduced $\chi^2_\nu$ =1.06) with simultaneous fits of $R_p/R_* = 0.0621 \pm 0.0011$ and $T_c = 2454952.92534$ ( solid red curve). The 1.7 mmag rms residuals of the fit are shown below. **Right:** The timeseries of our three calibrator stars (each normalized by the sum of the remaining two calibrator stars). The excellent conditions of the night allowed for mmag photometry in individual 17 or 20 second exposures even on these fainter reference stars.

## A Tentative Detection of a Starspot During Consecutive Transits of an Extrasolar Planet from the Ground: No Evidence of a Double Transiting Planet System Around TrES-1

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*Astrophysical Journal, in press (arXiv:0906.4320)*

There have been numerous reports of anomalies during transits of the planet TrES-1b. Recently, Rabus and coworkers' analysis of HST observations lead them to claim brightening anomalies during transit might be caused by either a second transiting planet or a cool starspot. Observations of two consecutive transits are presented here from the University of Arizona's 61-inch Kuiper Telescope on May 12 and May 15, 2008 UT. A $5.4 \pm 1.7$ mmag ($0.54 \pm 0.17\%$) brightening anomaly was detected during the first half of the transit on May 12 and again in the second half of the transit on May 15th. We argue that the significance of these spot events are 3.2 and 2.9 $\sigma$ for May 12 and May 15 respectively and we estimate that each of these have a probability $\geq 90\%$ of not being systematic red noise peaks. Therefore we conclude that this is a tentative detection of a r $\geq 6R_{earth}$ starspot rotating on the surface of the star. We suggest that all evidence to date suggest TrES-1 has a spotty surface and there is no need to introduce a second transiting planet in this system to explain these anomalies. Assuming that the spin axis of

the star and orbital axis of the planet are aligned (and in the plane of the sky) suggests a stellar rotational period of $40.2 \pm 0.1$ days. Introducing the $\lambda = 30 \pm 21^{\circ}$ inclination of the stellar spin axis with respect to the planetary orbital axis of Narita et al. (2007) adds much more uncertainty and we are only able to constrain the rotational period of the star to $40.2^{+22.9}_{-14.6}$ days, which is consistent with the previously observed $P_{obs} = 33.2^{+22.3}_{-14.3}$ day period. We note that this technique could be applied to other transiting systems for which starspots exist on the star in the transit path of the planet in order to constrain the rotation rate of the star.

*Download/Website:* `http://arxiv.org/abs/0906.4320`

*Contact:* `dittmann@email.arizona.edu`

## Local Linear Analysis of Interaction between a Planet and Viscous Disk and an Implication on Type I Planetary Migration

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*Astrophysical Journal, accepted (arXiv:0902.1887)*

We investigate the effects of viscosity on disk-planet interaction and discuss how type I migration of planets is modified. We have performed a linear calculation using shearing-sheet approximation and obtained the detailed, high resolution density structure around the planet embedded in a viscous disk with a wide range of viscous coefficients. We use a time-dependent formalism that is useful in investigating the effects of various physical processes on disk-planet interaction. We find that the density structure in the vicinity of the planet is modified and the main contribution to the torque comes from this region, in contrast to inviscid case. Although it is not possible to derive total torque acting on the planet within the shearing-sheet approximation, the one-sided torque can be very different from the inviscid case, depending on the Reynolds number. This effect has been neglected so far but our results indicate that the interaction between a viscous disk and a planet can be qualitatively different from an inviscid case and the details of the density structure in the vicinity of the planet is critically important.

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## Massive Protoplanetary Disks in Orion Beyond the Trapezium Cluster

*R. K. Mann & J. P. Williams*
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*Astrophysical Journal Letters, published (v. 699, p. 55)*

We present Submillimeter Array observations of the $880\,\mu$m continuum emission from three circumstellar disks around young stars in Orion that lie several arcminutes ($> 1$ pc) north of the Trapezium cluster. Two of the three disks are in the binary system 253-1536. Silhouette disks 216-0939 and 253-1536a are found to be more massive than any previously observed Orion disks, with dust masses derived from their submillimeter emission of $0.045\,M_{\odot}$ and $0.066\,M_{\odot}$, respectively. The existence of these massive disks reveals the disk mass distribution in Orion does extend to high masses, and that the truncation observed in the central Trapezium cluster is a result of photoevaporation due to the proximity of O-stars. 253-1536b has a disk mass of $0.018\,M_{\odot}$, making the 253-1536 system the first optical binary in which each protoplanetary disk is massive enough to potentially form Solar systems.

*Download/Website:* `http://arxiv.org/abs/0906.1400`

*Contact:* `rmann@ifa.hawaii.edu`

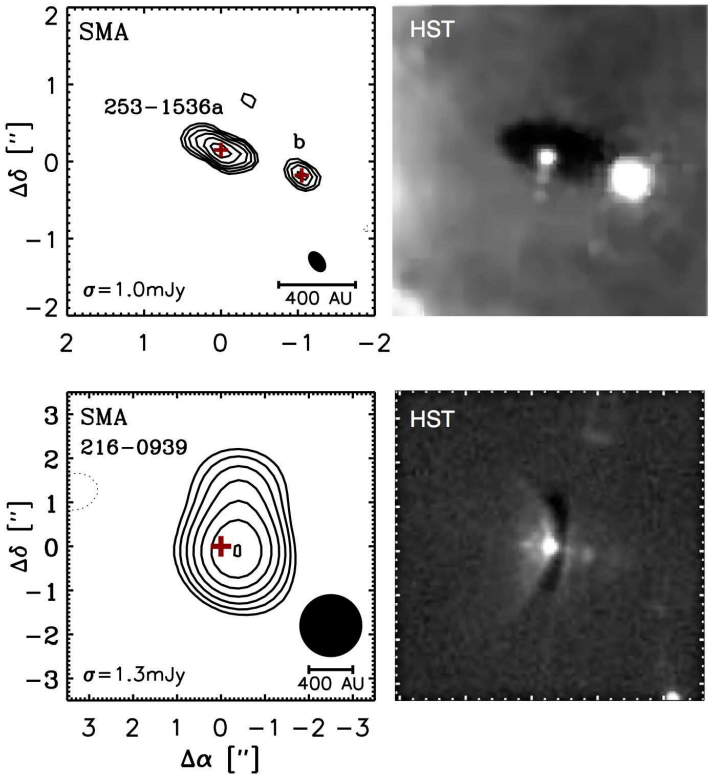


Figure 2: (Mann et al.) SMA images of the 880 $\mu$m continuum emission from Orion disks 216-0939 and 253-1536a, 253-1536b. HST H$\alpha$ discovery images were taken directly from Smith et al. (2005) and are also shown using the same field of view: $4'' \times 4''$ for 253-1536a and b. and $7'' \times 7''$ for 216-0939. Contours begin at the $5\sigma$ level, where $\sigma$ is the rms noise level in the map, and is specified in the lower left corner. Each step represents a factor of 1.5 in intensity. The synthesized beam size is shown in the lower right corner of each map.

## A SuperWASP search for additional transiting planets in 24 known systems

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*Monthly Notices of the Royal Astronomical Society, in press (arXiv:0906.3414)*

We present results from a search for additional transiting planets in 24 systems already known to contain a transiting planet. We model the transits due to the known planet in each system and subtract these models from lightcurves obtained with the SuperWASP survey instruments. These residual lightcurves are then searched for

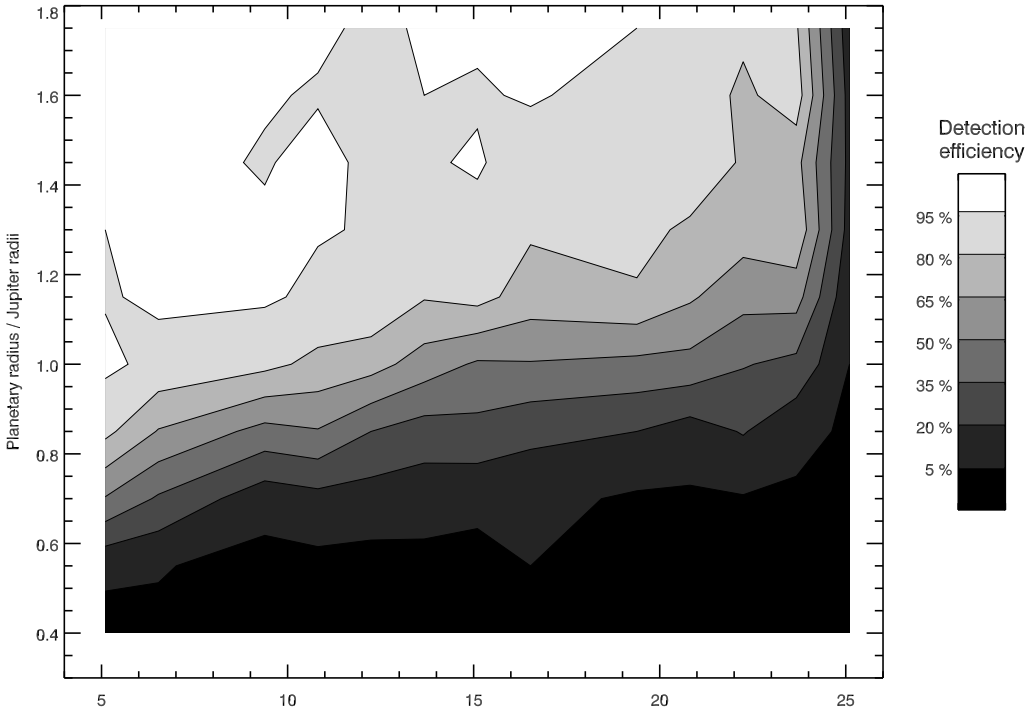


Figure 3: (A.M.S. Smith et al.) Simulation results for a second planet in the WASP-1 system. Contour map showing SuperWASP detection efficiency as a function of orbital period and planetary radius.

evidence of additional periodic transit events. Although we do not find any evidence for additional planets in any of the planetary systems studied, we are able to characterise our ability to find such planets by means of Monte Carlo simulations. Artificially generated transit signals corresponding to planets with a range of sizes and orbital periods were injected into the SuperWASP photometry and the resulting lightcurves searched for planets. As a result, the detection efficiency as a function of both the radius and orbital period of any second planet, is calculated. We determine that there is a good ($> 50$ per cent) chance of detecting additional, Saturn-sized planets in $P \sim 10$ d orbits around planet-hosting stars that have several seasons of SuperWASP photometry. Additionally, we confirm previous evidence of the rotational stellar variability of WASP-10, and refine the period of rotation. We find that the period of the rotation is $11.91 \pm 0.05$ d, and the false alarm probability for this period is extremely low ($\sim 10^{-13}$).

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## Resolving the hot dust around HD69830 and eta Corvi with MIDI and VISIR

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*Astronomy & Astrophysics, in press*

Most of the known debris discs exhibit cool dust in regions analogous to the Edgeworth-Kuiper Belt. However, a rare subset show hot excess from within a few AU, which is often inferred to be transient. We examine 2 such sources to place limits on their location to help distinguish between different interpretations for their origin. We use

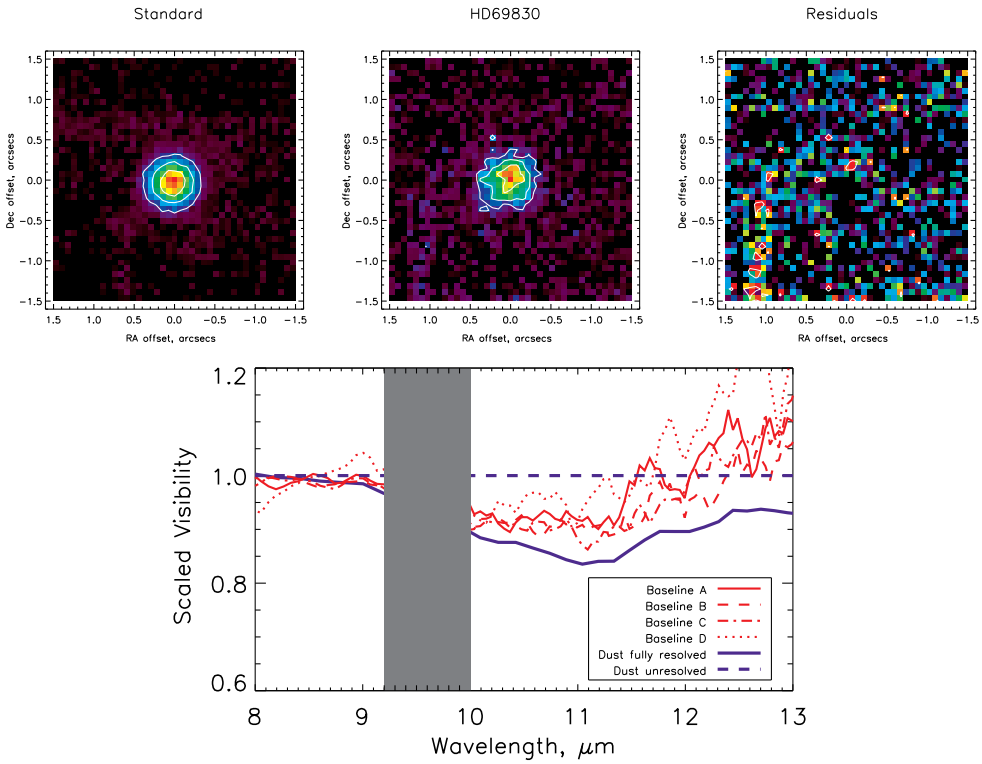


Figure 4: (R. Smith et al.) Top row: VISIR observations of planet and debris disc host HD69830 at Q show no evidence for extended emission. Bottom: MIDI observations resolve the dust emission on baselines 44-130m long. Combined limits from MIDI and VISIR place the dust between 0.05-2.4AU.

MIDI on the VLTI to observe the debris discs around $\eta$ Corvi and HD69830 using baseline lengths from 44-130m. New VISIR observations of HD69830 at 18.7$\mu$m are also presented. These observations are compared with disc models to place limits on disc size. The visibility functions measured with MIDI for both sources show significant variation with wavelength across 8-13um in a manner consistent with the disc flux being well resolved, notably with a dip at 10–11.5um due to the silicate emission feature. The average ratio of visibilities measured between 10-11.5um and 8-9um is 0.934$\pm$0.015 for HD69830 and 0.880$\pm$0.013 for eta Corvi over the 4 baselines for each source, a departure of 4 and 9sigma from that expected if the discs were unresolved. HD69830 is unresolved by VISIR at 18.7um. The combined limits from MIDI and 8m imaging constrain the warm dust to lie within 0.05–2.4AU for HD69830 and 0.16–2.98AU for $\eta$ Corvi. These results represent the first resolution in the mid-IR of dust around main sequence stars. The constraints placed on the location of the dust are consistent with radii predicted by SED modelling. Tentative evidence for a common position angle for the dust at 1.7AU with that at 150AU around eta Corvi, which might be expected if the hot dust is fed from the outer disc, demonstrates the potential of this technique for constraining the origin of the dust and more generally for the study of dust in the terrestrial regions of main sequence stars.

*Download/Website:* `http://arxiv.org/abs/0906.3704`

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## A Third Planet Orbiting HIP 14810

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*Astrophysical Journal Letters, accepted, arXiv:0906.0567*

We present new precision radial velocities and a three-planet Keplerian orbit fit for the $V = 8.5$, G5 V star HIP 14810. We began observing this star at Keck Observatory as part of the N2K Planet Search Project. Wright et al. (2007) announced the inner two planets to this system, and subsequent observations have revealed the outer planet planet and the proper orbital solution for the middle planet. The planets have minimum masses of 3.9, 1.3, and 0.6 $M_{\rm Jup}$ and orbital periods of 6.67, 147.7, and 952 d, respectively. We have numerically integrated the family of orbital solutions consistent with the data and find that they are stable for at least $10^6$ yr. Our photometric search shows that the inner planet does not transit.

*Contact:* jtwright@astro.cornell.edu

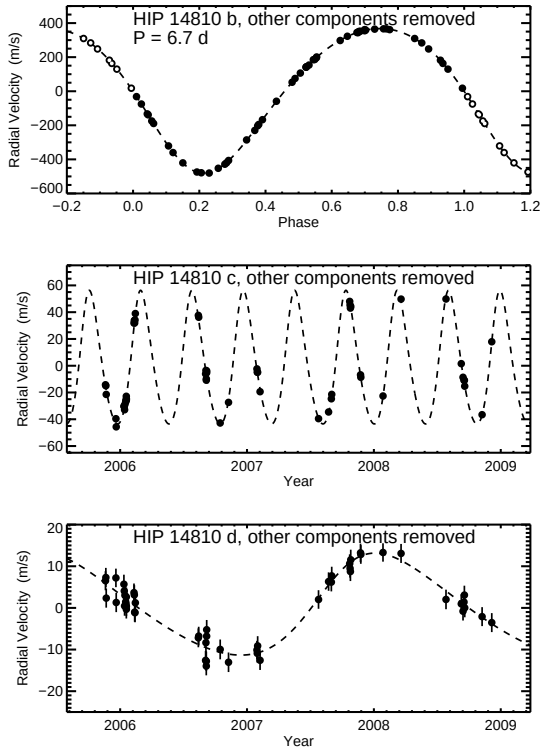


Figure 5: (Wright et al.) RV curves of the three components of the HIP 14810 triple-giant-planet system, from data taken at Keck Observatory.

# 3 Conference announcements

## Building Habitable Worlds: Fourth Conference of the Astrobiology Society of Britain

*Astrobiology society of Great Britain*

*Royal Holloway, University of London, April 7th to 9th, 2010*

First Announcement & Call for Abstracts.

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 concern the conference theme "Building Habitable Worlds". Abstracts (200 words) should be submitted by Feb 1, 2010.

Conference Fees:
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.

*Contact:* `conference@astrobiologysociety.org`

## Pathways towards habitable planets

*Vincent Coudé du Foresto*

*Barcelona, Spain, 14–18 September 2009*

Dear Colleagues,
This is a reminder that the deadline for early registration to the Pathways conference is June 28th. After that date, only poster papers can be accepted and the registration fee will no longer include the conference dinner.
We encourage you to visit the main conference website (http://www.pathways2009.net) for further details, to submit your abstract, and register.
Important dates:

- June 28th: deadline for early registration and abstract submission
- July 15th: publication of the final programme in the web
- July 15th: deadline for full refund (except for 15? handling fee)
- September 14th-18th: conference
- November 15th: deadline for submission of proceedings
- Spring 2010: distribution of proceedings

Looking forward to seeing you in Barcelona,
Vincent Coudé du Foresto and Ignasi Ribas for the Scientific Organizing Committee

*Contact:* `soc@pathways2009.net`

*Download/Website:* `http://www.pathways2009.net`

## 2009 Sagan Summer Workshop: Exoplanetary Atmospheres

*Dr. Dawn Gelino on behalf of the SOC: Chas Beichman (NExScI), Dawn Gelino (NExScI), Glenn Orton (JPL), Sara Seager (MIT), Mark Swain (JPL), Wes Traub (JPL)*

*Caltech Campus, Pasadena, California, USA, July 19 - 24, 2009*

The 2009 Sagan Summer Workshop, hosted by the NASA Exoplanet Science Institute, will consist of a series of tutorial discussions covering theory and observations of exoplanetary atmospheres. In addition, attendees will have the opportunity to present brief summaries of their research during short research Pops.
*Final chances to register!*
*Registration Fee includes:* conference attendance and materials; transportation between Pasadena Hilton; and Workshop on Workshop Dates; lunches on Monday, Wednesday and Friday; light breakfast, snacks, and drinks during morning and afternoon breaks each day of the workshop; opening reception; 1 ticket to attend workshop dinner on Thursday (extra tickets available for purchase); and 1 ticket to attend tour to the Griffith Observatory on Wednesday afternoon (extra tickets available for purchase)
*Interactive activities*
*Research POPs*: Registered attendees are invited to submit short presentations (pops) on their research. These presentations should be submitted by July 6 and will be presented Monday and Tuesday of the workshop.
*Design Your Own Mission!*: This year, learn the basics of designing a space or ground-based mission. There will be 5 different types of missions that you can sign-up to design: 1. Combined Light; 2. Coronography; 3. Interferometry; 4. Ground-based; 5. Transit
You will hear about the science drivers for each type of mission, as well as the technical aspects to consider. Experts in each area will advise the groups throughout the week, culminating in presentations on Friday afternoon. All workshop participants are encouraged to sign-up for a mission project. Prizes will be given out in a number of categories!
*Important Dates:* July 6: Deadline to submit research pops; July 10: On-line registration deadline; July 19: Opening reception; July 24: On-site registration deadline
See the workshop website for more information, current participant list, and the workshop agenda complete with speaker names!

*Download/Website:* `http://nexsci.caltech.edu/workshop/2009/`

*Contact:* `sagan_workshop@ipac.caltech.edu`

## 41st Meeting of the AAS Division for Planetary Sciences (DPS)

*DPS SOC*

*San Juan, Puerto Rico, 4-9 October 2009*

Dear colleagues,
We are inviting you to submit abstracts to this year's DPS meeting, that is planning 3 special sessions on exoplanets (abstract deadline July 22 2009)
1) Characterizing Exoplanets
2) Detected Extrasolar Planet Systems and Super-Earths
3) Habitability and Extremophiles

Abstract deadline: 9:00 PM EDT, Wednesday, 22 July 2009
Deadline for student travel grants: July 8th
http://dps.aas.org/meetings/travel_grant_application

We are looking forward to lively discussions and exciting new results from current ground-based searches and space missions.
See you all in Puerto Rico.
Lisa Kaltenegger (for the DPS SOC)
P.S. Abstract submission for exoplanets: currently use 'Others' if you do not find the session listed (the session list is work in progress)

*Download/Website:* `http://dps09.naic.edu/abs.shtml`

*Contact:* `lkaltene@cfa.harvard.edu`

# 4 Jobs and positions

## Postdoctoral Fellow(s) - Exo-Planets, Brown Dwarfs and Young Stars

*Prof. Ray Jayawardhana*
University of Toronto

*University of Toronto, January 2010*

Applications are invited for one or more postdoctoral research position(s) at the University of Toronto to start in January 2010 or later. The successful candidate(s) will work with **Prof. Ray Jayawardhana** and his collaborators on observational and analytical studies of extra-solar planets, brown dwarfs and young stars, and will be encouraged to pursue independent research on related topics. On-going projects include high-contrast imaging searches for companions around young stars, the SONYC (Substellar Objects in Nearby Young Clusters) ultra-deep survey, photometric and spectroscopic studies of exo-planets, and investigations of brown dwarf variability, using data from VLT, Subaru, Gemini, Keck, Spitzer, CFHT, Las Campanas and other major observatories. The position is for two years, with extension to a third year possible, and comes with funds for research expenses. Applicants should send a curriculum vitae, a description of research interests and plans and a list of publications, and should arrange for three letters of recommendation to be sent directly to Prof. Ray Jayawardhana, Dept. of Astronomy & Astrophysics, University of Toronto, 50 St. George Street, Room 101, Toronto, ON M5S 3H4, CANADA. E-mail submission preferred. Applications received before 2009 August 15 will receive full consideration. Early expressions of interest and inquiries are welcome.

*Download/Website:* `http://www.astro.utoronto.ca`

*Contact:* `rayjay@astro.utoronto.ca`

# 5 Announcements

## The SONG Network and Extrasolar Planets

*W. J. Chaplin*[1]*, Y.P. Elsworth*[1]*, I.R. Stevens*[1]*, M.J. Thompson*[2] *et al.*
[1] School of Physics & Astronomy, University of Birmingham, Birmingham B15 2TT, UK
[2] School of Mathematics & Statistics, University of Sheffield, Sheffield, S3 7RH, UK

The SONG network is planned to consist of eight 1 metre class telescopes, distributed around the world. Although the principle purpose for SONG is asteroseismology, enabling continuous observations of asteroseismic targets, SONG is also being designed to have an important role in studying extrasolar planets.

SONG is designed to overcome the difficultly of securing continuous data on stars. Although the KEPLER mission will revolutionize our view of asteroseismology (and transiting exoplanets) with photometric observations, SONG will principally provide long, well-filled Doppler-velocity observations, which will have a higher signal to noise in the pulsation mode. Long duration, continuous observations are essential for these asteroseismic studies.
Each of the identical SONG telescopes will have two main instruments: The main instrument is a high precision spectrometer (with iodine cell), capable of a spectral resolution of 1 m/s. In addition to monitoring the surface motion of pulsating stars, the spectrometer will be capable of detecting exoplanets by means of the Doppler wobble. The second instrument is a photometer, designed to monitor gravitational lensing events and hence find planets via microlensing. The continuous monitoring enabled by the SONG network will greatly enhance the prospects of finding the short duration planetary microlensing events.
SONG is currently being funded by two Danish organizations and there is money sufficient for the initial prototype SONG node, to be located on Tenerife, with installation occurring in 2010. After that the hope is for additional funding to be forthcoming from various organizations around the world. Currently interested parties include the US, China, Australia and the UK. Possible future sites could include a number of those of the existing BISON solar oscillation network.
There has been a recent meeting on SONG, held in Aarhus, Denmark. Further details of SONG can found at the SONG website:
Current UK interest in SONG consists of scientists at the universities of Birmingham, Sheffield, UCLancs and St. Andrews.

*Download/Website:* `http://astro.phys.au.dk/SONG/`

*Contact:* `irs@star.sr.bham.ac.uk`

# 6 As seen on astro-ph

The following list contains all the entries relating to exoplanets that we spotted on astro-ph during June 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/0906.0353: **Planetesimals and Satellitesimals: Formation of the Satellite Systems** by *Ignacio Mosqueira, Paul R. Estrada & Diego Turrini*

astro-ph/0906.0361: **Characterizing Habitable Extrasolar Planets using Spectral Fingerprints** by *L. Kaltenegger & F. Selsis*

astro-ph/0906.0364: **Spitzer/IRAC Limits to Planetary Companions of Fomalhaut and epsilon Eridani** by *M. Marengo, K. Stapelfeldt, M. W. Werner et al*

astro-ph/0906.0378: **Stellar Aspects of Habitability: Characterizing Target Stars for Terrestrial Planet Search Missions** by *L. Kaltenegger, C. Eiroa, I. Ribas et al*

astro-ph/0906.0544: **An Ultracool Star's Candidate Planet** by *Steven H. Pravdo & Stuart B. Shaklan*

astro-ph/0906.0570: **Earthshine observations of an inhabited planet** by *Enric Palle*

astro-ph/0906.0769: **Gifts from Exoplanetary Transits** by *Norio Narita*

astro-ph/0906.0864: **On posterior probability and significance level: application to the power spectrum of HD49933 observed by CoRoT** by

astro-ph/0906.1274: **M Star Astrosphere Size Fluctuations and Habitable Planet Descreening** by *David S. Smith & John M. Scalo*

astro-ph/0906.1293: **Detection of Thermal Emission of XO-2b: Evidence for a Weak Temperature Inversion** by *Pavel Machalek, Peter R. McCullough, Adam Burrows et al*

astro-ph/0906.1587: **The Role of Planet Accretion in Creating the Next Generation of Red Giant Rapid Rotators** by *Joleen K. Carlberg, Steven R. Majewski, Phil Arras*

astro-ph/0906.1649: **Search for Life on Exoplanets: Toward an International Institutional Coordination** by *Jean Schneider, Vincent Coude du Foresto & Marc Ollivier*

astro-ph/0906.1783: **Stellar coronal magnetic fields and star-planet interaction** by *A. F. Lanza*

astro-ph/0906.1785: **Tidal Limits to Planetary Habitability** by *Rory Barnes, Brian Jackson, Richard Greenberg et al*

astro-ph/0906.2193: **Title: Detecting planetary geochemical cycles on exoplanets: Atmospheric signatures and the case of SO2** by *L. Kaltenegger & D. Sasselov*

astro-ph/0906.2207: **Mass and radius determinations for five transiting M-dwarf stars** by *Jose M. Fernandez, David W. Latham, Guillermo Torres et al*

astro-ph/0906.2590: **Effects of Mutual Transits by Extrasolar Planet-Companion Systems on Light Curves** by *Masanao Sato & Hideki Asa*

astro-ph/0906.2263: **Deciphering Spectral Fingerprints of Habitable Extrasolar Planets** by *L. Kaltenegger, F. Selsis, M. Fridlund et al*

astro-ph/0906.2590: **Effects of Mutual Transits by Extrasolar Planet-Companion Systems on Light Curves** by *Masanao Sato & Hideki Asada*

astro-ph/0906.2702: **Eleven Exoplanet Host Star Angular Diameters from the CHARA Array** by *Ellyn K. Baines, Harold A. McAlister, Theo A. ten Brummelaar et al*

astro-ph/0906.2780: **The HARPS search for southern extra-solar planets XVIII. An Earth-mass planet in the GJ 581 planetary system** by *M. Mayor, X. Bonfils, T. Forveille et al*

astro-ph/0906.2783: **GMRT radio observations of the transiting extrasolar planet HD189733b at 244 and 614 MHz** by *A. Lecavelier des Etangs, S. K. Sirothia et al*

astro-ph/0906.2814: **The secondary eclipse of the transiting exoplanet CoRoT-2b** by *R. Alonso, T. Guillot, T. Mazeh et al*

astro-ph/0906.2958: **The transmission spectrum of Earth through lunar eclipse observation** by *Enric Palle, Maria Rosa Zapatero Osorio, Pilar Montanes-Rodriguez et al*

astro-ph/0906.3414: **A SuperWASP search for additional transiting planets in 24 known systems** by *A. M. S. Smith, L. Hebb, A. Collier Cameron et al*

astro-ph/0906.3604: **How stellar activity affects the size estimates of extrasolar planets** by *S. Czesla, K. F. Huber, U. Wolter et al*

astro-ph/0906.3675: **DNA Nucleobase Synthesis at Titan Atmosphere Analog by Soft X-rays** by *S. Pilling, D. P. P. Andrade, Alvaro C. Neto et al*

astro-ph/0906.4030: **General Analysis of Type I Planetary Migration with Stochastic Perturbations** by *Fred C. Adams & Anthony M. Bloch*

astro-ph/0906.4130: **Collisions, Cosmic Radiation and the Colors of the Trojan Asteroids** by *M.D. Melita, G. Strazzulla & A. Bar-Nun*

astro-ph/0906.4140: **Transit mapping of a starspot on CoRoT-2 - Probing a stellar surface by planetary transits** by *U. Wolter, J.H.M.M. Schmitt, K.F. Huber et al*

astro-ph/0906.4320: **A Tentative Detection of a Starspot During Consecutive Transits of an Extrasolar Planet from the Ground: No Evidence of a Double Transiting Planet System Around TrES-1** by *Jason A. Dittmann, Laird M. Close, Elizabeth M. Green et al*

astro-ph/0906.4369: **Dynamical Models of Terrestrial Planet Formation** by *Jonathan I. Lunine, David P. O'Brien, Sean N. Raymond et al*

astro-ph/0906.4515: **Magnetic cycles of the planet-hosting star Tau Bootis: II. a second magnetic polarity reversal** by *R. Fares, J.-F. Donati, C. Moutou et al*

astro-ph/0906.4574: **A record of planet migration in the Main Asteroid Belt** by *David A. Minton & Renu Malhotra*

astro-ph/0906.4619: **The Frequency of Low-mass Exoplanets** by *S.J. O'Toole, H.R.A. Jones, C.G. Tinney et al*
astro-ph/0906.4904: **Spin-orbit misalignement for the transiting planet HD 80606b** by *M. Gillon*
astro-ph/0906.4934: **Abundance analysis of prime B-type targets for asteroseismology II. B6–B9.5 stars in the field of view of the CoRoT** by *E. Niemczura, T. Morel & C. Aerts*
astro-ph/0906.5011: **Characteristics of solar-like oscillations in red giants observed in the CoRoT exoplanet field** by *S. Hekker, T. Kallinger, F. Baudin et al*

**Disks**

astro-ph/0906.0448: **Hot and cool water in Herbig Ae protoplanetary disks. A challenge for Herschel** by *Peter Woitke, Wing-Fai Thi, Inga Kamp, Michiel R. Hogerheijde*
astro-ph/0906.0730: **Protoplanetary Disk Structures in Ophiuchus** by *Sean M. Andrews, D. J. Wilner, A. M. Hughes et al*
astro-ph/0906.0888: **The dynamical role of the circumplanetary disc in planetary migration** by *A. Crida, C. Baruteau, W. Kley et al*
astro-ph/0906.1017: **Limits on the location of planetesimal formation in self-gravitating protostellar discs** by *C. Clarke & G. Lodato*
astro-ph/0906.1375: **Planet Shadows in Protoplanetary Disks. II: Observable Signatures** by *Hannah Jang-Condell*
astro-ph/0906.3755: **The History of the Solar System's Debris Disc: Observable Properties of the Kuiper Belt** by *Mark Booth, Mark C. Wyatt, Alessandro Morbidelli et al*
astro-ph/0906.4347: **Numerical simulations of disc-planet interactions** by *Richard P. Nelson & Sijme-Jan Paardekooper*
astro-ph/0906.4507: **Circumstellar Disk Evolution: Constraining Theories of Planet Formation** by *Michael R. Meyer*
astro-ph/0906.5011: **Initial Conditions of Planet Formation: Lifetimes of Primordial Disks** by *Eric E. Mamajek*

**Instrumentation and Techniques**

astro-ph/0906.0068: **Pathway Toward a Mid-Infrared Interferometer for the Direct Characterization of Exoplanets** by *Jean Schneider*
astro-ph/0906.3486: **Tools for discovering and characterizing extrasolar planets** by *Andras Pal*