ExoPlanet News
An Electronic Newsletter

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Contents

1 Editorial

Dear readers,

Welcome to the November edition of the ExoPlanet News!

In this issue you will find abstracts of scientific papers, job advertisements, announcements (conferences, book), the latest exoplanet talks, updates from the Exoplanet archive, and an overview of exoplanet-related articles on astro-ph.

We remind you of some **guidelines for using our templates**. If you follow these guidelines, you will make our job easier:

- Please rename the *.tex* file you send from *abstract_template* to something with your last name, like *jobs_smith* or *announcement_miller*
- Avoid using hyperlinks, the newsletter template cannot yet handle the package *hyperref*.
- Do not use any defined command or additional packages
- Abstract: should occupy maximum one page of the pdf without figure. If the list of authors is too large for this, please cut the list of authors, add "et al." followed by "(a complete list of authors can be found on the publication)".
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- Please remember to fill the brackets {} after the title with author names.

For the next month we look forward to your paper abstracts, job ads or meeting announcements. Also special announcements are welcome. As always, we would also be happy to receive feedback concerning the newsletter. The Latex template for submitting contributions, as well as all previous editions of ExoPlanet News, can be found on the ExoPlanet News webpage (http://nccr-planets.ch/exoplanetnews/).

The next issue will appear on December 16, 2021.

Lokesh Mishra
Julia Venturini
Holly Capelo
Daniel Angerhausen
Timm-Emanuel Riesen

2 Abstracts of refereed papers

Beyond Runaway: Initiation of the Post-runaway Greenhouse State on Rocky Exoplanets

R. Boukrouche[1], *T. Lichtenberg*[1], *R. T. Pierrehumbert*[1]
University of Oxford, Parks Road, Oxford, UK

The Astrophysical Journal, published

The runaway greenhouse represents the ultimate climate catastrophe for rocky, Earth-like worlds: when the incoming stellar flux cannot be balanced by radiation to space, the oceans evaporate and exacerbate heating, turning the planet into a hot wasteland with a steam atmosphere overlying a possibly molten magma surface. The equilibrium state beyond the runaway greenhouse instellation limit depends on the radiative properties of the atmosphere and its temperature structure. Here, we use 1D radiative-convective models of steam atmospheres to explore the transition from the tropospheric radiation limit to the post-runaway climate state. To facilitate eventual simulations with 3D global circulation models, a computationally efficient band-gray model is developed, which is capable of reproducing the key features of the more comprehensive calculations. We analyze two factors that determine the equilibrated surface temperature of post-runaway planets. The infrared cooling of the planet is strongly enhanced by the penetration of the dry adiabat into the optically thin upper regions of the atmosphere. In addition, thermal emission of both shortwave and near-IR fluxes from the hot lower atmospheric layers, which can radiate through window regions of the spectrum, is quantified. Astronomical surveys of rocky exoplanets in the runaway greenhouse state may discriminate these features using multiwavelength observations.

Download/Website: `https://iopscience.iop.org/article/10.3847/1538-4357/ac1345`

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Why Do M Dwarfs Have More Transiting Planets?

Gijs D. Mulders[1,2,3], *Joanna Drążkowska*[4], *Nienke van der Marel*[5,6], *Fred J. Ciesla*[5,3], *Ilaria Pascucci*[3,8]

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Astrophysical Journal Letters, 2021ApJ...920L...1M

We propose a planet formation scenario to explain the elevated occurrence rates of transiting planets around M dwarfs compared to sun-like stars discovered by *Kepler*. We use a pebble drift and accretion model to simulate the growth of planet cores inside and outside of the snow line. A smaller pebble size interior to the snow line delays the growth of super-Earths, allowing giant planet cores in the outer disk to form first. When those giant planets reach pebble isolation mass they cut off the flow of pebbles to the inner disk and prevent the formation of close-in super-Earths. We apply this model to stars with masses between 0.1 and 2 $M_\odot$ and for a range of initial disk masses. We find that the masses of hot super-Earths and of cold giant planets are anti-correlated. The fraction of our simulations that form hot super-Earths is higher around lower-mass stars and matches the exoplanet occurrence rates from *Kepler*. The fraction of simulations forming cold giant planets is consistent with the stellar mass dependence from radial velocity surveys. A key testable prediction of the pebble accretion hypothesis is that the occurrence rates of super-Earths should decrease again for M dwarfs near the sub-stellar boundary like Trappist-1.

Download/Website: `https://arxiv.org/abs/2110.02971`

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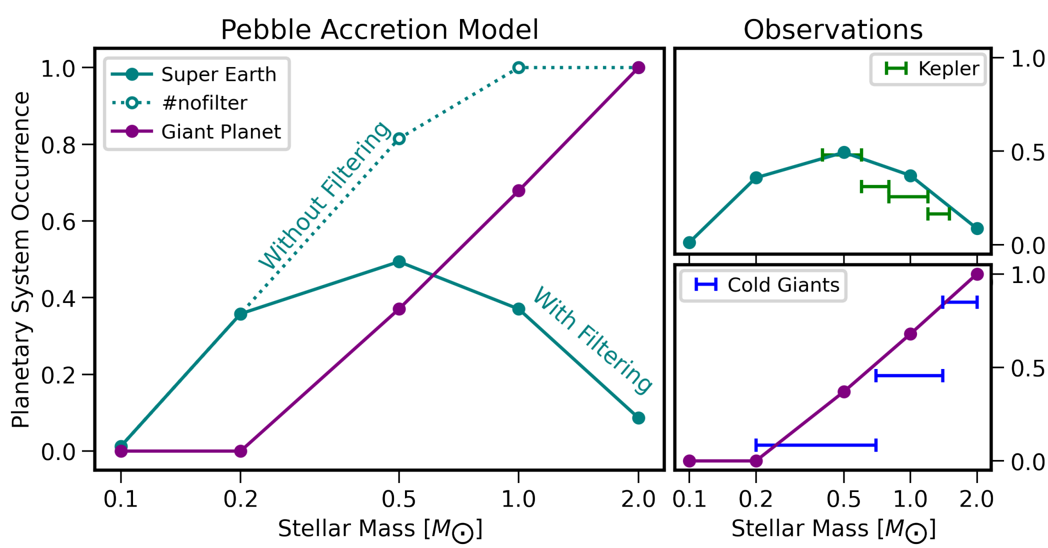

Figure 1: Fraction of pebble accretion models that form super-Earth cores (teal) or a giant planet cores (purple). For reference the fraction of models that would form super-earths in the absence of giant planet filtering is indicated with a dotted line. The right panels show the observed planetary system occurrence rates from *Kepler* (top) and radial velocity (bottom)

K2 Discovery of a Circumsecondary Disk Transiting EPIC 220208795

L. van der Kamp [1], *D.M. van Dam*[1], *M.A. Kenworthy*[1], *E.E. Mamajek*[2,3], *G. Pojmański*[4]
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Astronomy & Astrophysics, in press (arXiv:2110.15086)

Observations of the star EPIC 220208795 (2MASS J01105556+0018507) reveal a single, deep and asymmetric eclipse, which we hypothesize is due to an eclipsing companion surrounded by a tilted and inclined opaque disk, similar to those seen around V928 Tau and EPIC 204376071.
We aim to derive physical parameters of the disk and orbital parameters for the companion around the primary star. The modeling is carried out using a modified version of the `python` package `pyPplusS`, and optimization is done using `emcee`. The period analysis makes use of photometry from ground-based surveys, where we perform a period folding search for other possible eclipses by the disk. Parameters obtained by the best model fits are used to obtain the parameter space of the orbital parameters, while the most likely period obtained is used to constrain these parameters. The best model has an opaque disk with a radius of $1.14 \pm 0.03\ R_\odot$, an impact parameter of $0.61 \pm 0.02\ R_\odot$, an inclination of $77.01^\circ \pm 0.03^\circ$, a tilt of $36.81^\circ \pm 0.05^\circ$ and a transverse velocity of 77.45 ± 0.05 km s^{-1}. The two most likely periods are $\sim$ 290 days and $\sim$ 236 days, allowing us to make predictions for the epochs of the next eclipses. All models with tilted and inclined disks result in a minimum derived eccentricity of 0.3, which in combination with the two other known small transiting disk candidates V928 Tau and EPIC 204376071, suggest that there may be a common origin for their eccentric orbits.

Download/Website: `https://arxiv.org/abs/2110.15086`

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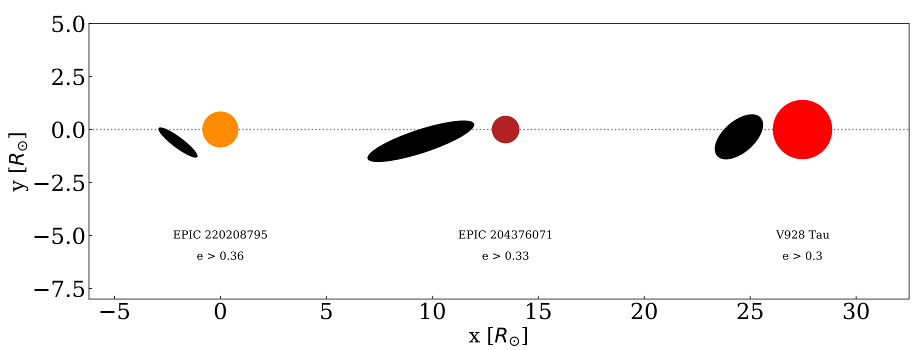

Figure 2: A comparison of three disk occulters. The disks move from left to right. The colours of the stars are based on their effective temperature relative to each other, where dark red is the coldest and orange is the hottest star. EPIC 220208795 has been mirrored along a line through $y = 0$ compared to the model obtained earlier as this has no effect on the shape of the light curve.

Hidden water in magma ocean exoplanets

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JApJL, in press (https://arxiv.org/abs/2110.15069)

We demonstrate that the deep volatile storage capacity of magma oceans has significant implications for the bulk composition, interior and climate state inferred from exoplanet mass and radius data. Experimental petrology provides the fundamental properties on the ability of water and melt to mix. So far, these data have been largely neglected for exoplanet mass-radius modeling. Here, we present an advanced interior model for water-rich rocky exoplanets. The new model allows us to test the effects of rock melting and the redistribution of water between magma ocean and atmosphere on calculated planet radii. Models with and without rock melting and water partitioning lead to deviations in planet radius of up to 16% for a fixed bulk composition and planet mass. This is within current accuracy limits for individual systems and statistically testable on a population level. Unrecognized mantle melting and volatile redistribution in retrievals may thus underestimate the inferred planetary bulk water content by up to one order of magnitude.

Download/Website: `http://nccr-planets.ch/`

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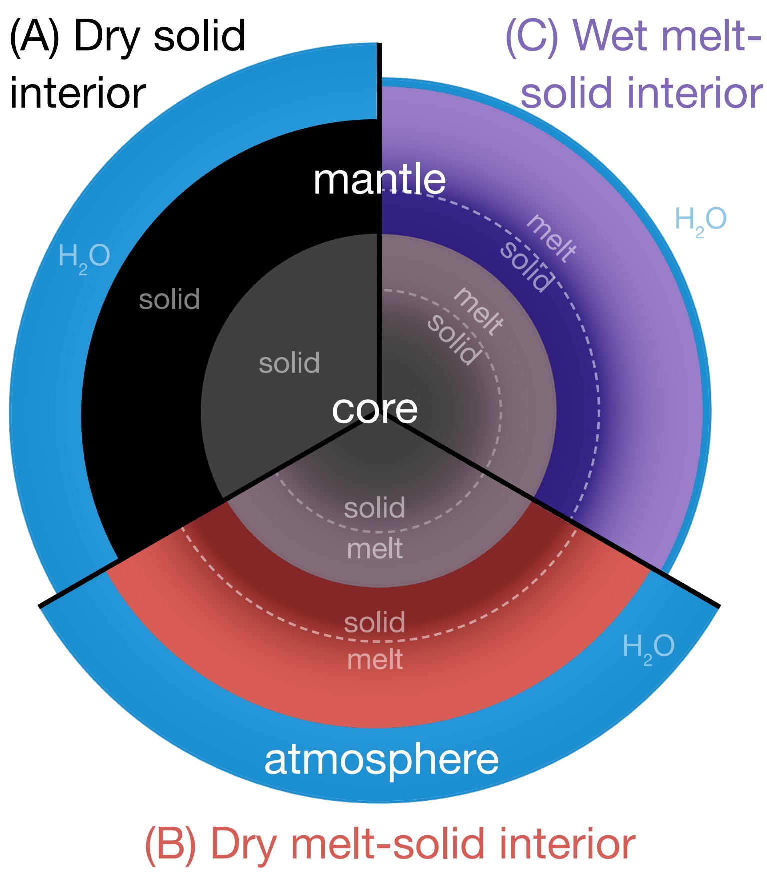

Laboratory exploration of mineral precipitates from Europa's subsurface ocean

Stephen P. Thompson[1], *Hilary Kennedy*[2], *Benjamin M. Butler*[3], *Sarah J. Day*[1], *Emmal Safi*[1,4], *Aneurin Evans*[4]
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Journal of Applied Crystallography, 2021, **54***, 1455–1479*

The precipitation of hydrated phases from a chondrite-like Na–Mg–Ca–SO_4-Cl solution is studied using *in situ* synchrotron X-ray powder diffraction, under rapid- (360 K h^{-1}, $T = 250 - 80$ K, $t = 3$ h) and ultra-slow-freezing (0.3 K day^{-1}, $T = 273 - 245$ K, $t = 242$ days) conditions. The precipitation sequence under slow cooling initially follows the predictions of equilibrium thermodynamics models. However, after ~ 50 days at 245 K, the formation of the highly hydrated sulfate phase $Na_2Mg(SO_4)_2.16H_2O$, a relatively recent discovery in the $Na_2Mg(SO_4)_2-H_2O$ system, was observed. Rapid freezing, on the other hand, produced an assemblage of multiple phases which formed within a very short timescale (≤ 4 min, $\Delta T = 2$ K) and, although remaining present throughout, varied in their relative proportions with decreasing temperature. Mirabilite and meridianiite were the major phases, with pentahydrite, epsomite, hydrohalite, gypsum, blödite, konyaite and loweite also observed. $Na_2Mg(SO_4)_2.16H_2O$ was again found to be present and increased in proportion relative to other phases as the temperature decreased. The results are discussed in relation to possible implications for life on Europa and application to other icy ocean worlds.

Download/Website: `https://scripts.iucr.org/cgi-bin/paper?gj5269`

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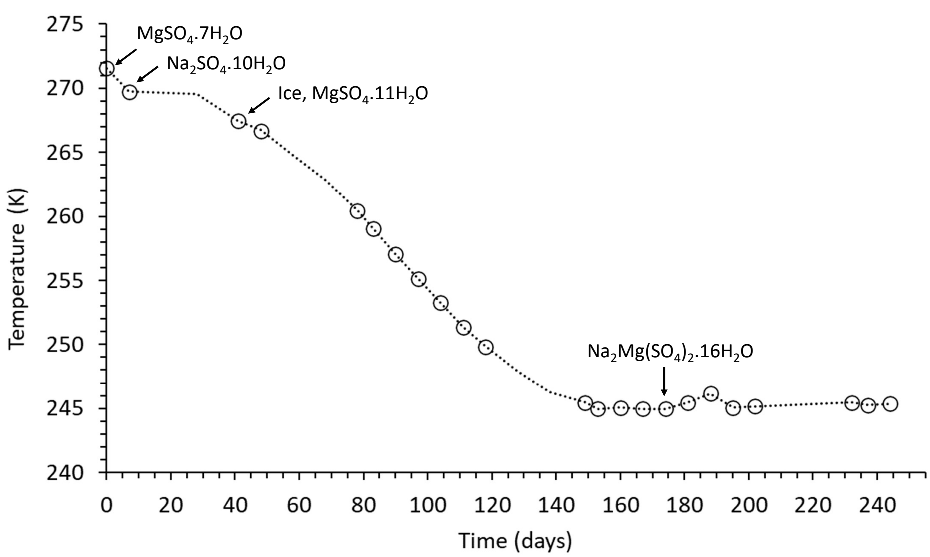

Figure 3: Observed precipitation sequence for model Europan ocean solution cooled at a rate of 0.3 C day^{-1} during the long-duration freezing experiment on beamline I11 at the Diamond Light Source.

Signal preservation of exomoon transits during light curve folding

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Astronomy & Astrophysics, in press (2021arXiv211104444H)

In the search for moons around extrasolar planets (exomoons), astronomers are confronted with a stunning observation. Although 3400 of the 4500 exoplanets were discovered with the transit method and although there are well over 25 times as many moons than planets known in the Solar System (two of which are larger than Mercury), no exomoon has been discovered to date. In the search for exoplanet transits, stellar light curves are usually phase-folded over a range of trial epochs and periods. This approach, however, is not applicable in a straightforward manner to exomoons. Planet-moon transits either have to be modeled in great detail (including their orbital dynamics, mutual eclipses, etc.), which is computationally expensive, or key simplifications have to be assumed in the modeling. One such simplification is to search for moon transits outside of the planetary transits. The question we address in this report is how much in-transit data of an exomoon remains uncontaminated by the near-simultaneous transits of its host planet. We develop an analytical framework based on the probability density of the sky-projected apparent position of an exomoon relative to its planet and test our results with a numerical planet-moon transit simulator. For exomoons with planet-moon orbital separations similar to the Galilean moons, we find that only a small fraction of their in-transit data is uncontaminated by planetary transits: 14 % for Io, 20 % for Europa, 42 % for Ganymede, and 73 % for Callisto. The signal-to-noise ratio (S/N) of an out-of-planetary-transit folding technique is reduced compared to a full photodynamical model to about 38 % (Io), 45 % (Europa), 65 % (Ganymede), and 85 % (Callisto), respectively. For the Earth's Moon, we find an uncontaminated data fraction of typically just 18 % and a resulting S/N reduction to 42 %. These values are astonishingly small and suggest that the gain in speed for any exomoon transit search algorithm that ignores the planetary in-transit data comes at the heavy price of losing a substantial fraction of what is supposedly a tiny signal in the first place. We conclude that photodynamical modeling of the entire light curve has substantial, and possibly essential, advantages over folding techniques of exomoon transits outside the planetary transits, in particular for small exomoons comparable to those of the Solar System.

Download/Website: `https://arxiv.org/abs/2111.04444`

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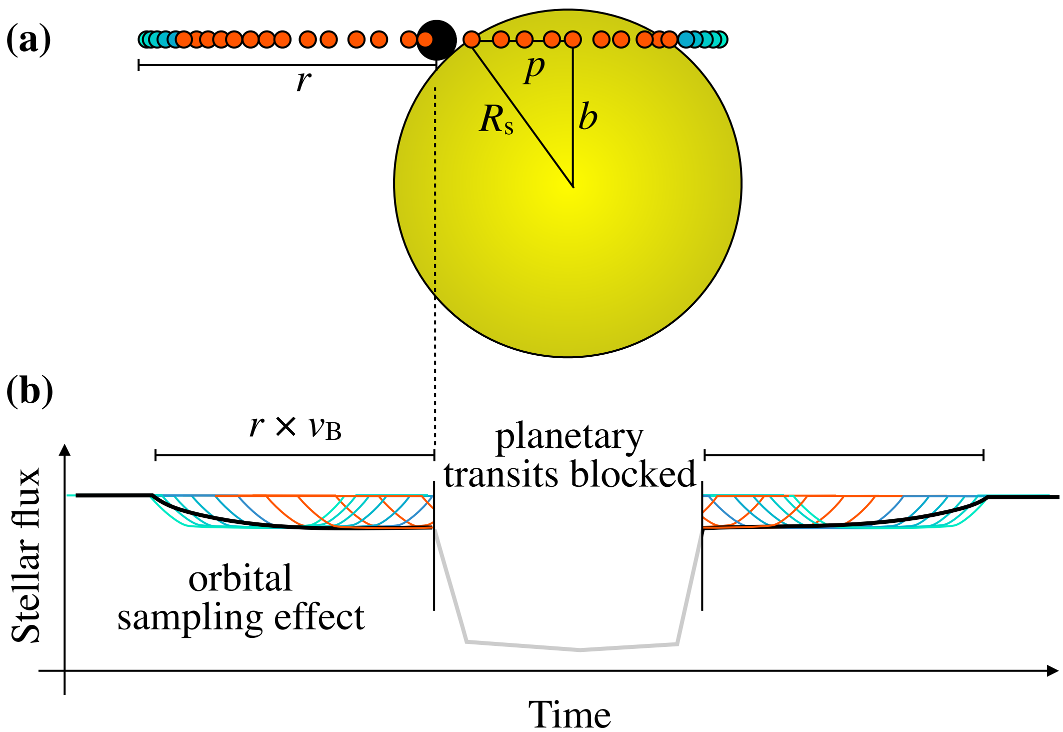

Figure 4: **(a)** Transit geometry of the three-body system consisting of a star (large yellow circle), a planet (black circle), and a moon (orange and blue circles). The transit path across the star equals $2p = 2R_s^2\sqrt{1-b^2}$. **(b)** Illustration of an exomoon's orbital sampling effect (OSE) in the light curve. The circumstellar orbital velocity of the barycenter (v_B) multiplied by the planet-moon orbital separation (r) defines the duration of the OSE feature before and after the planetary transit.

Comparison of planetary H α-emission models: A new correlation with accretion luminosity

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[*] Former Visiting Scholar of the Deutsche Forschungsgemeinschaft (German Research Foundation; DFG) SPP 1992 program

The Astrophysical Journal, published

Accreting planets have been detected through their hydrogen-line emission, specifically H α. To interpret this, stellar-regime empirical correlations between the H α luminosity $L_{\mathrm{H}\,\alpha}$ and the accretion luminosity L_{acc} or accretion rate $\dot{M}$ have been extrapolated to planetary masses, however without validation. We present a theoretical L_{acc}–$L_{\mathrm{H}\,\alpha}$ relationship applicable to a shock at the surface of a planet. We consider wide ranges of accretion rates and masses and use detailed spectrally-resolved, non-equilibrium models of the postshock cooling. The new relationship gives a markedly higher L_{acc} for a given $L_{\mathrm{H}\,\alpha}$ than fits to young stellar objects, because Ly α, which is not observable, carries a large fraction of L_{acc}. Specifically, an $L_{\mathrm{H}\,\alpha}$ measurement needs ten to 100 times higher L_{acc} and $\dot{M}$ than previously predicted, which may explain the rarity of planetary H α detections. We also compare the $\dot{M}$–$L_{\mathrm{H}\,\alpha}$ relationships coming from the planet-surface shock or implied by accretion-funnel emission. Both can contribute simultaneously to an observed H α signal but at low (high) $\dot{M}$ the planetary-surface shock (heated funnel) dominates. Only the shock produces Gaussian line wings. Finally, we discuss accretion contexts in which different emission scenarios may apply, putting recent literature models in perspective, and also present L_{acc}–L_{line} relationships for several other hydrogen lines.

Download/Website: `http://ads.nao.ac.jp/abs/2021ApJ...917L..30A`

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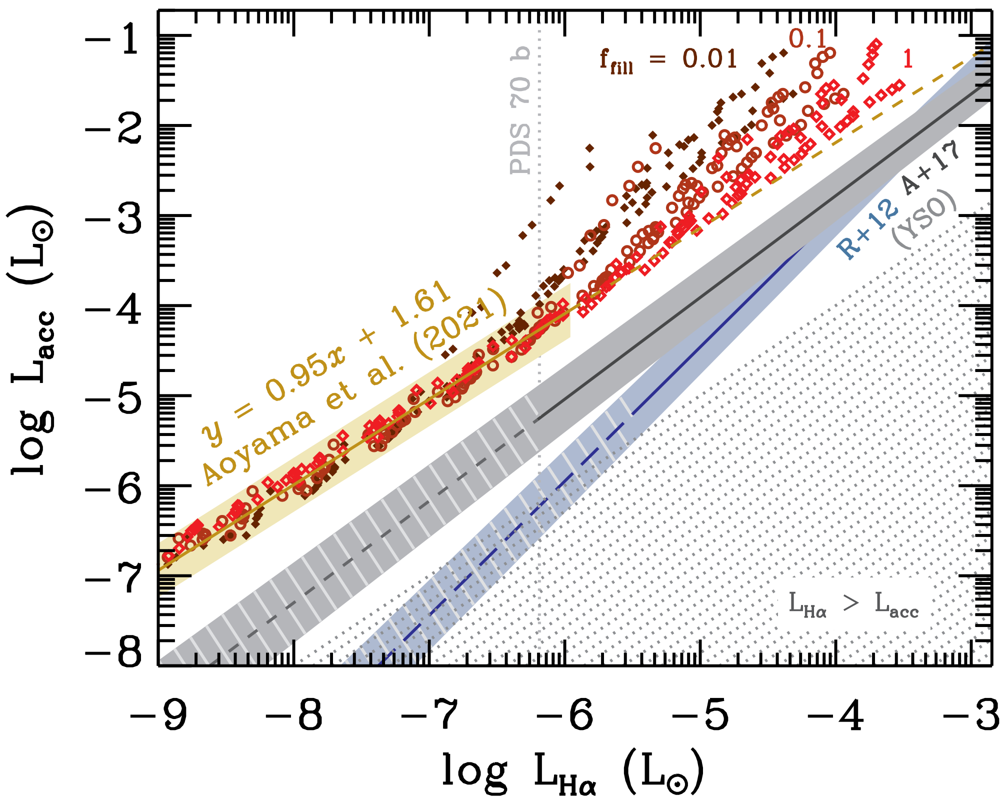

Figure 5: Theoretical relationships between accretion luminosity, $L_{\rm acc}$ and H α luminosity, $L_{\rm H\,\alpha}$. The symbols show our model results for a wide range of accretion rates $\dot{M} = 3\times10^{-10}$–$3\times10^{-5}$ $M_{\rm J}/{\rm yr}$ and masses $M_{\rm p} = 2$–20 $M_{\rm J}$, with filling factor $f_{\rm fill} = 0.01$ (filled diamonds), 0.1 (circles), and 1 (open diamonds). The golden line fits our results up to $\log(L_{\rm acc}/L_\odot) = -4$; the dashed line is an extrapolation. The shaded golden region shows the spread of ±0.3 dex. Fits by Rigliaco et al. (2012; blue) and Alcalà et al. (2017; grey) for stellar-mass objects are also shown. The shaded regions reflect the formal errors, which corresponds to the usual approach but ignores the spread of their data ($\pm$0.5–0.7 dex). The dashed lines indicate extrapolations. Extinction by material around the planet (not included) would only move the points to the left, away from the stellar relationships. Already without considering extinction, our relationship differs clearly from the stellar fits, by up to 2.5 dex here. The dotted region has $L_{\rm H\,\alpha} > L_{\rm acc}$, which seems unlikely (see text).

The Rossiter-McLaughlin effect Revolutions: An ultra-short period planet and a warm mini-Neptune on perpendicular orbits

V. Bourrier[1], *C. Lovis*[1], *M. Cretignier*[1], *R. Allart*[2,1], *X. Dumusque*[1], *J.-B. Delisle*[1], *A. Deline*[1], *S. G. Sousa*[7], *V. Adibekyan*[7,10], *Y. Alibert*[3], *S. C. C. Barros*[7,10], *F. Borsa*[12], *S. Cristiani*[4], *O. Demangeon*[7,10], *D. Ehrenreich*[1], *P. Figueira*[8,7], *J.I. González Hernández*[5,6], *M. Lendl*[1], *J. Lillo-Box*[19], *G. Lo Curto*[9], *P. Di Marcantonio*[4], *C.J.A.P. Martins*[7,8], *D. Mégevand*[1], *A. Mehner*[9], *G. Micela*[15], *P. Molaro*[4,11], *M. Oshagh*[5,6], *E. Palle*[5,6], *F. Pepe*[1], *E. Poretti*[12], *R. Rebolo*[17,6,18], *N. C. Santos*[7,10], *G. Scandariato*[13], *J. V. Seidel*[1], *A. Sozzetti*[14], *A. Suárez Mascareño*[17,6], *M. R Zapatero Osorio*[16],

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Astronomy & Astrophysics, published / 2021A&A...654A.152B

Comparisons of the alignment of exoplanets with a common host star and each other can be used to distinguish among concurrent evolution scenarios for the star and the planets. However, multi-planet systems usually host mini-Neptunes and super-Earths, whose sizes make orbital architecture measurements challenging. We introduce the Rossiter-McLaughlin effect Revolutions (RMR) technique, which can access the spin-orbit angle of small exoplanets by exploiting the full extent of information contained in spectral transit time series. We validated the technique through its application to published HARPS-N data of the mini-Neptune HD 3167c (P = 29.8 d), refining its high sky-projected spin-orbit angle (-108.9$^{+5.4}_{-5.5}$$^{\circ}$), and we applied it to new ESPRESSO observations of the super-Earth HD 3167 b (P = 0.96 d), revealing an aligned orbit (-6.6$^{+6.6}_{-7.9}$$^{\circ}$). Surprisingly different variations in the contrast of the stellar lines occulted by the two planets can be reconciled by assuming a latitudinal dependence of the stellar line shape. In this scenario, a joint fit to both datasets constrains the inclination of the star (111.6$^{+3.1}_{-3.3}$$^{\circ}$) and the 3D spin-orbit angles of HD 3167b (29.5$^{+7.2}_{-9.4}$$^{\circ}$) and HD 3167c (107.7$^{+5.1}_{-4.9}$$^{\circ}$). The projected spin-orbit angles do not depend on the model for the line contrast variations, and so, with a mutual inclination of 102.3$^{+7.4}_{-8.0}$$^{\circ}$, we can conclude that the two planets are on perpendicular orbits. This could be explained by HD 3167b being strongly coupled to the star and retaining its primordial alignment, whereas HD 3167c would have been brought to a nearly polar orbit via secular gravitational interactions with an outer companion. Follow-up observations of the system and simulations of its dynamical evolution are required to search for this companion and explore the likelihood of this scenario. HD 3167 b (R = 1.7 $R_{\rm Earth}$) is the smallest exoplanet with a confirmed spectroscopic Rossiter-McLaughlin signal. The RMR technique opens the way to determining the orbital architectures of the super-Earth and Earth-sized planet populations.

https://www.unige.ch/communication/communiques/en/2021/les-orbites-renversantes-dun-systeme-multi-planetaire/

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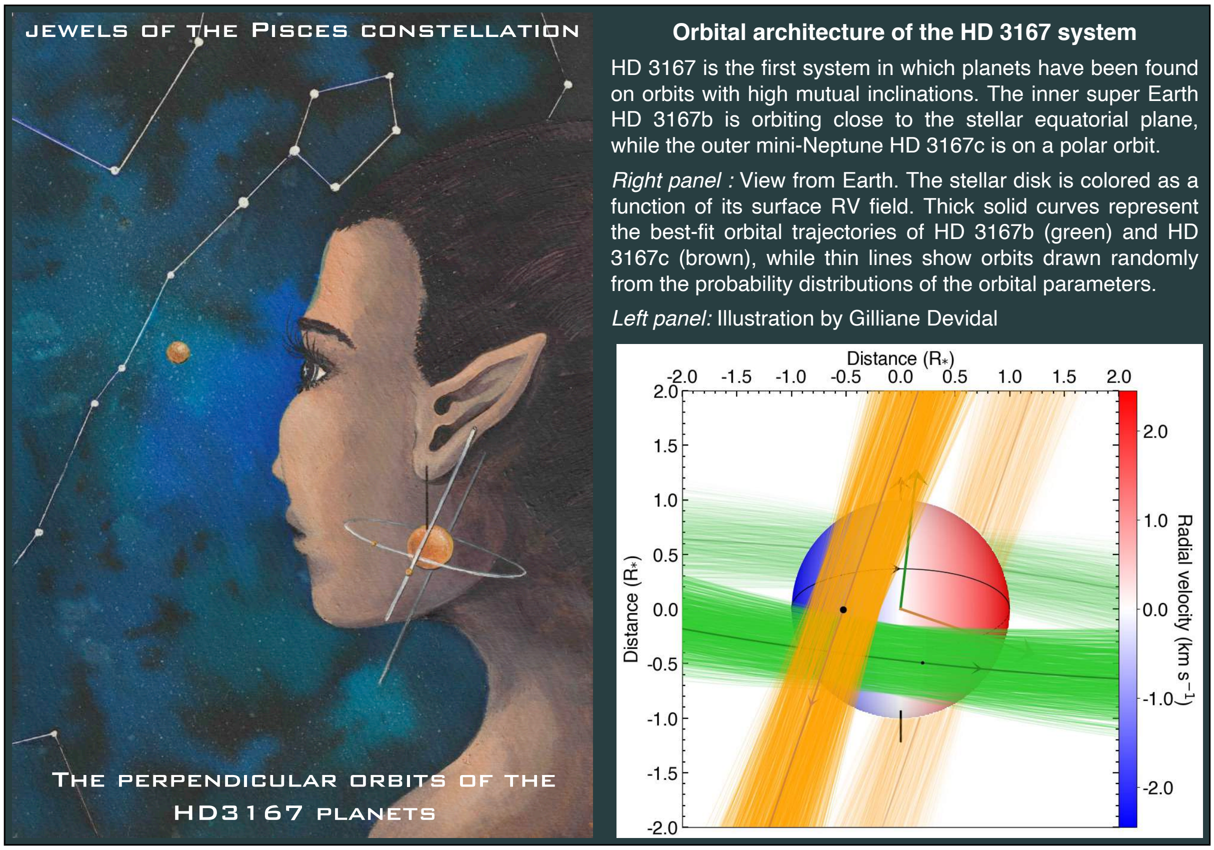

Figure 6: Theoretical relationships between accretion luminosity, $L_{\rm acc}$ and H α luminosity, $L_{\rm H\,\alpha}$. The symbols show our model results for a wide range of accretion rates $\dot{M} = 3\times10^{-10}$–$3\times10^{-5}$ $M_{\rm J}/{\rm yr}$ and masses $M_{\rm p} = 2$–20 $M_{\rm J}$, with filling factor $f_{\rm fill} = 0.01$ (filled diamonds), 0.1 (circles), and 1 (open diamonds). The golden line fits our results up to $\log(L_{\rm acc}/L_{\odot}) = -4$; the dashed line is an extrapolation. The shaded golden region shows the spread of ±0.3 dex. Fits by Rigliaco et al. (2012; blue) and Alcalà et al. (2017; grey) for stellar-mass objects are also shown. The shaded regions reflect the formal errors, which corresponds to the usual approach but ignores the spread of their data (±0.5–0.7 dex). The dashed lines indicate extrapolations. Extinction by material around the planet (not included) would only move the points to the left, away from the stellar relationships. Already without considering extinction, our relationship differs clearly from the stellar fits, by up to 2.5 dex here. The dotted region has $L_{\rm H\,\alpha} > L_{\rm acc}$, which seems unlikely (see text).

3 Jobs and Positions

2 job positions related to PLATO

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[1] Freie Universität Berlin, Fachbereich Geowissenschaften, Institut für Geologische Wissenschaften, FR Planetologie und Fernerkundung, Malteserstr. 74-100, Haus D, 12249 Berlin, Germany

Berlin, Beginning 2022

We announce 2 positions at the FU Berlin related to the PLATO Mission (PLAnetary Transits and Oscillations of stars), whose goal is the search and characterization of extrasolar planets, including Earth-like planets. The FU Berlin (Department of Geosciences/Planetary Sciences) cooperates with the Institute of Planetary Research of the German Aerospace Center e.V. (DLR) within the PLATO mission.

Position 1: Research assistant (Data Engineer) (f/m/d)
full-time job limited to 30.09.2024
Entgeltgruppe 13 TV-L FU
Reference code: WiMi_PLATO-PCOT_Planetologie 2021_EN
Deadline: 29.11.2021
Link: https://www.fu-berlin.de/universitaet/beruf-karriere/jobs/english/GW-WiMi%5FPLATO-PCOT%5FPlanetologie-2021%5FEN.html

The position announced is part of the work performed by the PLATO Mission Consortium (PMC) and will be performed in close cooperation with PMC partners in Berlin (Institut für Planetenforschung des Deutschen Zentrums für Luft- und Raumfahrt e.V.), other European PMC members and with ESA. Applicants shall contribute to the work of the PLATO Calibration and Operations Team (PCOT) and take part in supporting the PLATO Data Center (PDC), the Science Operations Center (SOC) and other groups within the Science Ground Segment (SGS) concerning issues on design, requirements management, integration and verification of the PLATO On-ground data processing Calibration pipeline.

Job description: Ground segment data processing engineering support to the PLATO Calibration and Operations Team (PCOT). Responsibilities:

- Supporting the design and elicitation of requirements of the CPDS (Calibration Parameters Derivation System).
- Supporting definition of the calibration products derived from the CPDS.
- Interface with the Data Processing System (DPS) for the provision of the on-board science configuration parameters via CPDS.
- Interface with PDC for the provision of calibration parameters used for instrumental corrections on the L1 ground-processing pipeline.
- Supporting implementation of CPDS interfaces with the rest of the Ground Data Processing (GDP) subsystems.
- Supporting the CPDS verification and overall GDP verification.
- Supporting the PCOT Manager (PCOTM) with the elaboration of Calibration and Operations plans and P/L User Manual.

Requirements:

- A Master degree in engineering or physics

(Professional) Experience:

- Professional experience in a scientific or technical environment.

Desirable:

- Experience in optical payload operations and associated software systems is highly desirable.
- Experience in Agile and/or DevOps methodologies and DevOps would be a further asset.
- Experience in ground processing pipelines for space instruments (preferably optical payload).
- Understanding of development and maintenance of ground infrastructure and/or software systems.
- Knowledge of large operations and associated software systems, preferably space-based high motivation, ability to work independently as well as part of a team, excellent communication skills.
- very good written and spoken English language competences
- good programming skills
- good documentation skills

Practical information
Applications should be sent by e-mail, together with significant documents, indicating the reference code (WiMi_PLATO-PCOT_Planetologie 2021_EN), in PDF format (preferably as one document) to Mrs. Prof. Dr. Heike Rauer: plansec@zedat.fu-berlin.de or postal to:

Freie Universität Berlin
Fachbereich Geowissenschaften
Institut für Geologische Wissenschaften
FR Planetologie und Fernerkundung
Mrs. Prof. Dr. Heike Rauer
Malteserstr. 74-100
Haus D, 12249 Berlin (Lankwitz)
Germany

With an electronic application, you acknowledge that FU Berlin saves and processes your data. FU Berlin cannot guarantee the security of your personal data if you send your application over an unencrypted connection.
See more information in https://www.fu-berlin.de/universitaet/beruf-karriere/jobs/english/GW-WiMi%5FPLATO-PCOT%5FPlanetologie-2021%5FEN.html

Position 2: Research assistant (physicist, astronomer, astrophysicist, engineer) (f/m/d)
full-time job limited to 30.09.2024
Entgeltgruppe 13 TV-L FU
Reference code: WiMi_PLATO-PPT_Planetologie 2021
Deadline: 29.11.2021
Link: https://www.fu-berlin.de/universitaet/beruf-karriere/jobs/english/GW-WiMi%5FPLATO-PPT%5FPlanetologie-2021%5FEN.html

Applicants shall contribute to the work of the PLATO Performance Team (PPT) in the topics detailed below, including the use of simulation tools to support science performance verification activities, the contribution to discussions in the PLATO Consortium (in particular PLATO Science Working Team; PLATO System Assembly, Integration, and Verification Working Group; Mission System Engineering Working Group; PLATO Progress Meetings, PLATO Weeks), and support the Performance Team activities: on the validation of the science performance requirements and budgets, on the review of the verification of ground segment requirements related to science performance, on the scientific definition and justification of the procedures for in-orbit calibration for aspects related to science performance, on the assessment and discussion of non-conformances with impact of science performance.

Job description: Support to PLATO Science Performance Verification. Responsibilities:

- Definition and justification of the main performance requirements and budgets driving the payload design (noise and signal, pointing, focus, alignment, thermo-mechanical properties...).
- Review of the verification requirements of the units for aspects related to science performance.
- Support of the analysis of the calibration data obtained by the test houses in aspects related to science performance (best focus calibration, etc.).
- Support of the definition and justification of the procedures for the in-orbit calibration of the instrument in aspects related to science performance.
- Support of ground segment validation for aspects related to science performance.
- Support of the discussion of all non-compliances, request for change (RfC), request for deviation (RfD), and request for waiver (RfW) in the project (Camera, DPS, or mission) with impact on science performance.

Requirements:

- A Master degree in engineering or physics

(Professional) Experience:

- Professional experience in a scientific or technical environment.

Desirable:

- Good programming and documentation skills.
- Experience in optical payload assembly, integration, and test, in particular in the analysis of the results.
- Experience in the development and implementation of ground processing pipelines for space instruments (preferably optical payloads).
- Experience in extrasolar planet search and characterization by the method of transits.
- Experience in astroseismology from space.
- For candidates with scientist profile, good publication record.

- High motivation, ability to work independently as well as part of a large international team, excellent communication skills, interest in education and public outreach.
- Very good written and spoken English language competences.

Practical information

Applications should be sent by e-mail, together with significant documents, indicating the reference code (WiMi_PLATO-PPT_Planetologie 2021), in PDF format (preferably as one document) to Mrs. Prof. Dr. Heike Rauer: plansec@zedat.fu-berlin.de or postal to:

Freie Universität Berlin
Fachbereich Geowissenschaften
Institut für Geologische Wissenschaften
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Mrs. Prof. Dr. Heike Rauer
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With an electronic application, you acknowledge that FU Berlin saves and processes your data. FU Berlin cannot guarantee the security of your personal data if you send your application over an unencrypted connection.
See more information in https://www.fu-berlin.de/universitaet/beruf-karriere/jobs/english/GW-WiMi%5FPLATO-PPT%5FPlanetologie-2021%5FEN.html

Download/Website: `https://www.fu-berlin.de/universitaet/beruf-karriere/jobs/english/GW-WiMi%5F`
`https://www.fu-berlin.de/universitaet/beruf-karriere/jobs/english/GW-WiMi%5FPLATO-PCOT%5F`

Contact: `plansec@zedat.fu-berlin.de`

Trottier Postdoctoral Fellow

Prof. René Doyon
Université de Montréal, Montréal, QC, Canada

Montréal, Canada, Starting date: May to September 2022

The Institute for Research on Exoplanets (iREx), affiliated with the physics department of the University of Montreal (UdeM), invites applications for a postdoctoral fellowship in experimental, observational or theoretical astrophysics applied to the study of exoplanets. A number of iREx projects are described below for reference.

Applicants should submit a curriculum vitae, a list of publications, and a statement of research interests (max 2 pages), and should arrange to have three referees send a letter of reference. Applicants may also include a cover letter, but this is not mandatory. All application materials including letters of reference must be received electronically at the following address: **irex@astro.umontreal.ca**, by **December 15th, 2021 for full consideration**. This position will, however, remain open until filled.

A PhD in physics, astronomy or related discipline is required at the time when the position starts. Preference will be given to applicants within 3 years of obtaining their PhD. Applicants with career interruptions resulting from parental, medical or family leaves, or other causes are invited to mention these in their cover letter, if so desired.

The iREx consists of a growing team of over 60 people (professors, postdocs, research assistants and students) mostly from UdeM and McGill University all working on various research programs focused on the study of exoplanets and related fields of stellar astrophysics. Members of iREx are actively involved in large international projects related to the detection and characterisation of exoplanets, notably the future James Webb Space Telescope (JWST), SPIRou, NIRPS and high-dispersion spectroscopy for 8-10m and giant telescopes. In addition, iREx researchers have privileged access to JWST, SPIRou and NIRPS time and data. More information on iREx research programs can be found here: http://www.exoplanetes.umontreal.ca/research/?lang=en.

The successful applicant is expected to start between **May and September 2022**. The position is for two years, renewable for a third year subject to performance and availability of funds.

The Université de Montréal promotes diversity in its workforce through its equal access to employment program. It encourages members of visible and ethnic minorities as well as women, Indigenous people, persons with disabilities and people of all sexual orientations and gender identities to apply.

Download/Website: `http://www.exoplanetes.umontreal.ca/trottier-postdoctoral-fellowship-2022`

Contact: `nathalie@astro.umontreal.ca`

Tenure-track faculty position

Department of Astronomy

New York, NY, USA, Fall 2022

The Department of Astronomy at Columbia University invites applications for a tenure-track, Assistant Professor position in exoplanet research. The position is imagined to include any research area and methodology broadly related to exoplanets, including but not limited to, observational, theoretical, and laboratory studies of exoplanets, planet formation, sub-stellar objects and the signatures of life. The successful candidate will be expected to teach undergraduate and graduate courses, sustain an active, independent research group, participate in committee and service work at the departmental and university levels, and exemplify academic and professional leadership. The position will begin July 1, 2022. All applications must be made through Columbia University's Academic Search and Recruiting (ASR) system. Review of applications will begin on December 15, 2021 and will continue until the position is filled. For more information about the application components, especially on the anonymized text requirements, please visit the linked job advert.

Download/Website: `https://apply.interfolio.com/96746`

Contact: `astro-faculty-search@columbia.edu`

4 Announcements

CHEOPS Science Workshop IV

Y. Alibert (SOC Chair)

Bern, Switzerland, January 11 - 13, 2022

The CHEOPS workshop will be held during 11 – 13 January, 2022, about 2 years after the beginning of CHEOPS science operations. The workshop will be the occasion for the planetary science community at large to discuss and share the first main results of CHEOPS in different fields, from the planetary internal structure to atmospheric characterization, etc. Participants are invited to propose contributed talks and posters on all scientific aspects linked to CHEOPS, including CHEOPS based-results as well as proposals for future observations and synergies with other facilities, as for example: mission update and performances, finding transits of already known planets, mass-radius relation and planetary internal structure, TTV, tidal deformation, moons and rings, tidal decay, phase curves, planet heat redistribution, cloud properties, albedo, et cetera.

ESA is offering up to 5 bursaries for PhD students or early career researchers (within 2 years of the award of their PhD) from ESA member states as a contribution towards the costs of attending the workshop in person. More details are available on the workshop website.

Deadline for registration and abstract submission: 30 November 2021.

Download/Website: `https://cheops.unibe.ch/scienceworkshop2021`

Contact: `yann.alibert@unibe.ch`

CHEOPS AO-3 postponed

Kate Isaak
ESA CHEOPS Project Scientist, European Space Agency/ESTEC, the Netherlands

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Dear Colleagues,

The third annual announcement of opportunity (AO-3) for participation in the CHEOPS Guest Observers Programme, due to open on 9 November 2021, has been postponed and is currently foreseen to come out in early 2022.

The timeline will be circulated widely once available and will also be posted on the ESA CHEOPS Guest Observers Programme webpage:
https://www.cosmos.esa.int/web/cheops-guest-observers-programme/

In the meantime, there are several documents, tools and webpages available to help you to familiarise yourselves with the capabilities of CHEOPS. Details of these can be found on the following webpage:
https://www.cosmos.esa.int/web/cheops-guest-observers-programme/ao-3

The Discretionary Programme remains open, with further details available at:
https://www.cosmos.esa.int/web/cheops-guest-observers-programme/discretionary-programme

Do not hesitate to get in touch with me (at the email address below) directly in case of questions.

Best,

Kate Isaak

Contact: `kate.isaak@esa.int`

PLATO Atmosphere Workshop

Dear Colleagues,
SECOND ANNOUNCEMENT
We are pleased to present the second announcement of the PLATO atmospheres workshop which will be held online via webex on DECEMBER 8-10 2021.
Details of the final programme and schedule are still being finalised. We plan to have the following four afternoon sessions starting each day at 14:00 CET and ending with a short breakout discussion. The speakers (invited) opening the sessions are:
(1) Joint strategies for exoplanet missions (Giovanna Tinetti) (2) Hot Jupiters (Vivien Parmentier) (3) Sub-Neptunes (Eliza Kempton) (4) (Hot) Rocky Exoplanets (Mark Hammond)
Planned are 20-minute invited talks, 10-minute standard talks and a poster session.
For further information see:
https://www.dlr.de/pf/desktopdefault.aspx/tabid-1978
SCIENCE CONTRIBUTIONS
It is possible with PLATO to constrain basic atmospheric information e.g. to observe possible phase curves hence albedo and meridional transport for some favorable Ultra Hot Jupiter or/and Hot Jupiter atmospheres, or to constrain bulk composition via the Rayleigh Absorption Feature with the Fast Camera Filters, or to distinguish different types of massive early steam atmospheres from PLATO measurements of planetary radius and age. PLATO can also reveal the time-variation of the occultation depths. Occultation mapping is possible with the ultrahigh-precision and very short cadence PLATO light curves to map exoplanetary light distributions.
We welcome contributions from the exoplanetay science community at large on hot and cool terrestrial planetary atmospheres. This includes data analyses and modeling studies on atmospheric composition, climate, escape, clouds, retrieval, phase curves and evolution of hot and temperate rocky exoplanets. The organizers particularly welcome a clear demonstrable link with the PLATO mission science goals.
REGISTRATION
Please note that the deadline has been extended to November 15th 2021.
To register please send an email to: PLATO$_atmospheres@dlr.deandstateyourname, institutionandwhetheryourequestatalkorp$
Please accept our apologies if you receive this email multiple times.
Kind Regards,
The PLATO Atmospheres Workshop Team
LOC: Szilard Csizmadia, Alexander Esau, John Lee Grenfell, Barbara Stracke, Ruth Titz-Weider SOC: Szilard Csizmadia, John Lee Grenfell, Tristan Guillot, Manuel Güdel, Helmut Lammer, Tim Lichtenberg, Lena Noack, Heike Rauer, Frank Sohl

2022 Sagan Summer Hybrid Workshop: Exoplanet Science in the Gaia Era

E. Furlan, D. Gelino
NASA Exoplanet Science Institute, California Institute of Technology, Pasadena, CA, USA

Hybrid Workshop, July 25-29, 2022

The 2022 Sagan Summer Workshop will take place July 25-29, 2022. We are expecting that this will be a hybrid workshop with both in-person and on-line attendance. In-person attendance may be limited due to L. A. County, City of Pasadena, and California Institute of Technology COVID safety guidelines at the time of the workshop. The workshop website will be updated with this information going forward.

The 2022 Sagan Summer Workshop will focus on the topic of exoplanet science in the Gaia era. The ESA Gaia mission has been mapping the Galaxy for over seven years, measuring very accurate positions and motions of over 1 billion stars. It has already greatly contributed to exoplanet science through the determination of more accurate stellar parameters, which in turn improve planet parameters, the detection of stellar companions, and the identification and characterization of young moving groups. In the near future, the unprecedented astrometric accuracy will result in the discovery of new exoplanets, as well as the characterization of known planets. The workshop will introduce the basics of astrometry, the impact of Gaia astrometry on astrophysics, and the astrometric detection and characterization of exoplanets. The synergy between the different planet detection techniques of astrometry, transits, radial velocities, and imaging will be discussed, as well as future advances in astrometry.

There is no registration fee for this workshop and registration will open in February 2022.

Please contact us with any questions or to be added to the email list.

Download/Website: `http://nexsci.caltech.edu/workshop/2022`
Contact: `sagan_workshop@ipac.caltech.edu`

Planet Formation and Panspermia: New Prospects for the Movement of Life through Space

B. Vukotić[1], *R. Gordon*[2], *J. Seckbach*[3]

[1] Astronomical Observatory, Belgrade, Serbia
[2] Gulf Specimen Marine Laboratory & Aquarium, Florida, USA
[3] The Hebrew University of Jerusalem, Israel

Wiley-Scrivener, published

This book is part of the series: Astrobiology Perspectives on Life of the Universe, Series Editors: Richard Gordon & Joseph Seckbach, Wiley-Scrivener, Beverly, Massachusetts, USA. The book gives an in-depth view of the panspermia hypothesis examined against the latest knowledge of planetary formation and related processes. Some chapters also give a historical perspective of the panspermia hypothesis.

Contents

Download/Website: `https://tinyurl.com/rnmpyba7`

Contact: `bvukotic@aob.rs, DickGordonCan@xplornet.com, Joseph.Seckbach@mail.huji.ac.il`

Call for Abstracts – (Exo)terrestrial-type planets: Endogenic and exogenic processes at EGU 2022 (in-person + virtual)

Kaustubh Hakim[1], Daniel Kitzmann[1], Meng Tian[1], R.J. Graham[2], Dennis Höning[3]
[1] University of Bern, Switzerland
[2] University of Oxford, UK
[3] Potsdam Institute for Climate Impact Research, Germany

Session Name: Interior-Surface-Atmosphere Volatile Exchange on Earth and Other Terrestrial (Exo)planets,

Dear colleagues,

Please consider submitting an abstract to the session on Interior-Surface-Atmosphere Volatile Exchange on Earth and Other Terrestrial (Exo)planets (PS6) at the European Geosciences Union (EGU) General Assembly 2022. EGU 2022 will be held in a hybrid format – in-person (Vienna, Austria) and virtual.

The abstract deadline is **12 January 2022 (13:00 CET)**, but those seeking travel support should submit their abstract by 1 December 2021 (13:00 CET). Travel support info: https://egu22.eu/about/roland_schlich_travel_support_and_virtual_registration_fee_waivers.html

The aim of this session is to bring together numerical, experimental and observational expertise from Earth and planetary sciences to advance the understanding of volatile exchange on Earth as well as terrestrial (exo)planets. Several important questions arise. Is plate tectonics a necessity to sustain volatile cycling? How do surface rock types (subaerial or submarine) influence the atmospheric composition? What can past climate states of Earth, Venus and Mars tell us about volatile exchange mechanisms and about the climate of exoplanets? What is the role of condensable and non-condensable gases in the preservation of temperate climates? We welcome a wide range of contributions from planetary sciences, atmosphere sciences, climatology, geochemistry, hydrology, petrology, geodynamics, and mineral physics on topics including but not limited to volatile cycles, surface lithology, tectonic regimes, outgassing, mantle redox states, ridge and arc volcanism, subduction zones, water-rock interactions, weathering, habitable zone, climate science, atmospheric structure and composition. We especially welcome contributions from early-career researchers who are new to (exo)planetary science.

Session details: https://meetingorganizer.copernicus.org/EGU22/session/42497

Abstract instructions: https://egu22.eu/abstracts_and_programme/how_to_submit_an_abstract.html

Conference details: https://egu22.eu/

Looking forward to receiving your abstracts.
Kaustubh Hakim, Daniel Kitzmann, Meng Tian, R.J. Graham, Dennis Höning

Contact: `kaustubh.hakim@unibe.ch`

Astronet Science Vision Roadmap

C. Vincent[1]
[1] STFC
Preparation of the new Science Vision and Roadmap for European Astronomy is well underway and drafts of the chapters relating to specific science questions, to computing and to societal aspects, are available on the Astronet web pages for comment (https://www.astronet-eu.org)

Astronet is a consortium of European funding bodies, infrastructures (ESA, ESO, SKA) and community organisations (EAS) charged with developing and maintaining a science vision for all of astronomy, to guide future strategic decisions.

We will shortly be starting of the editing phase in preparation for publication in Spring 2022 but really welcome any further inputs. These can be sent direct to the Panel chairs, listed on the web, or to Malcolm Booy – the project secretary (Malcolm.booy@stfc.ukri.org).

Download/Website: `https://www.astronet-eu.org/`

Contact: `Colin.Vincent@stfc.ukri.org`

5 Exoplanet Archive Updates

October Updates at the NASA Exoplanet Archive

The NASA Exoplanet Archive team
Caltech/IPAC-NASA Exoplanet Science Institute, MC 100-22 Pasadena CA 91125

Pasadena CA USA, November 14, 2021

Note: Unless otherwise noted, all planetary and stellar data mentioned in the news are in the Planetary Systems Table (`http://bit.ly/2Pt0tM1`), which provides a single location for all self-consistent planetary solutions, and its companion table the Planetary Systems Composite Parameters (`https://bit.ly/2Fer9NU`), which offers a more complete table of parameters combined from multiple references and calculations. Data can also be found in the Microlensing Planets Table (`https://bit.ly/3urUyZU`) or Direct Imaging Planets Table (`http://bit.ly/3ayD185`).

October 28, 2021

Thirteen New Planets

We have 13 new planets this week, just in time for Halloween.

Fun Fact: The shortest-period new planet (0.5787d) has an orbital period almost exactly 1,000 times shorter than the longest-period new planet (578.4 d)!

The newest members of the archive's exoplanet club are: HD 25723 b, 17 Sco b, GJ 9689 b, TOI-2285 b, EPIC 201427007.01 (K2-359 b), EPIC 201595106.01 (K2-360 b), EPIC 206024342.01 (K2-299 d), EPIC 206024342.02 (K2-299 c), EPIC 206042996.01 (K2-301 c), EPIC 212624936.02 (K2-361 b), EPIC 212624936.01 (K2-361 c), EPIC 220492298.01 (K2-362 b), and EPIC 228836835.01 (K2-363 b).

October 21, 2021

Seven New Planets, Including TOI-3362 b

We've added seven new planets, including TOI-3362 b, an exoplanet found around a 6500 K star in an 18-day orbit. Due to its highly eccentric orbit, the planet may be a proto-Hot Jupiter that is still undergoing tidal migration. Read the discovery paper (`https://bit.ly/3c2wMfc`) and the media release (`https://bit.ly/3ktGPPe`).

This TESS-based discovery was made possible by NASA's NNExplore program (`https://exoplanets.nasa.gov/exep/NNExplore/`), which funded community access to two telescopes, MINERVA-Australis and CHIRON in Chile, for US researchers.

The other six new planets are TOI-1296 b, TOI-1298 b, TOI-1789 b, HD 63935 b & c, and OGLE-2018-BLG-1185L b.

October 14, 2021

Three New Planets, Four Notable Host Stars

This week's update has three new planets, including KMT-2018-BLG-1743 b, the second planet ever discovered in a microlensing event featuring two source stars.

We've also added TOI-530 b, an example of a transiting giant planet orbiting an M-type star—a rare phenomenon, with only five previously known examples.

The third planet, TOI-1431 b, is an inflated ultra-hot Jupiter orbiting an Am-type star that is one of the hottest and brightest known host stars. The planet also has the second-highest known night-side temperature.

October 7, 2021

Three Planets from NASA's TESS Mission

This week's new planets were all discovered with NASA's TESS mission and include two super-Jupiters, TOI-558 b and TOI-559 b, and the Jupiter-mass planet TIC 257060897 b. TIC 257060897 b's parameters reveal it has two-thirds the mass of Jupiter but is 50% bigger in radius, so its density is five times lower than Jupiter's and 2.5 times lower than Saturn, the least-dense planet in our solar system.

We've also added a new set of parameters for the microlensing planet OGLE-2017-BLG-1434L b.

Download/Website: `https://exoplanetarchive.ipac.caltech.edu`

Contact: `mharbut@caltech.edu`

6 As seen on Exoplanet-talks.org

Download/Website: `http://exoplanet-talks.org`

Contact: `info@exoplanet-talks.org`

Instruction video: http://exoplanet-talks.org/talk/164

The atmosphere of WASP-76b seen with CARMENES: looking for CaII IRT and HeI by *Nuria Casasayas Barris* – talk/395
Hidden water in magma ocean exoplanets by *Caroline Dorn & Tim Lichtenberg* – talk/396
Why do small stars have all the exoplanets? by *Gijs Mulders* – talk/397
Giant planets with large metal masses and metal fractions such as HD 149026b and TOI-849b form via giant impacts in a rapidly dissipating disk by photoevaporation by *Masahiro Ogihara* – talk/398

7 As seen on astro-ph

The following list contains exoplanet related entries appearing on astro-ph in October 2021.

October 2021

astro-ph/2110.00029: **Testing planet formation from the ultraviolet to the millimeter** by *Nick Choksi, Eugene Chiang*

astro-ph/2110.00178: **Size distributions of bluish and reddish small main-belt asteroids obtained by Subaru/Hyper Suprime-Cam** by *Natsuho Maeda et al.*

astro-ph/2110.00184: **iSyMBA: A Symplectic Massive Bodies Integrator with Planets Interpolation** by *Fernando Roig et al.*

astro-ph/2110.00266: **VLT spectropolarimetry of comet 67P: Dust environment around the end of its intense Southern summer** by *Yuna Kwon et al.*

astro-ph/2110.00403: **Cross-sections for heavy atmospheres: H2O continuum** by *Lara O. Anisman et al.*

astro-ph/2110.00432: **UV Transmission in Natural Waters on Prebiotic Earth** by *Sukrit Ranjan et al.*

astro-ph/2110.00489: **TIC 257060897b: an inflated, low-density, hot-Jupiter transiting a rapidly evolving subgiant star** by *M. Montalto et al.*

astro-ph/2110.00503: **Alfnoor: assessing the information content of Ariel's low resolution spectra with planetary population studies** by *Lorenzo V. Mugnai et al.*

astro-ph/2110.00589: **Survival of planet-induced vortices in 2D disks** by *Thomas Rometsch et al.*

astro-ph/2110.00662: **Evaluation of short-term temporal evolution of Pluto's surface composition from 2014-2017 with APO/TripleSpec** by *Bryan J. Holler et al.*

astro-ph/2110.00858: **Self-consistent ring model in protoplanetary disks: temperature dips and substructure formation** by *Shangjia Zhang et al.*

astro-ph/2110.00919: **Rapid formation of Gas Giant Planets via Collisional Coagulation from Dust Grains to Planetary Cores** by *Hiroshi Kobayashi, Hidekazu Tanaka*

astro-ph/2110.00939: **In situ formation of super-Earth/sub-Neptune driven by the planetary rotation** by *Wei Zhong, Cong Yu*

astro-ph/2110.00974: **ALMA Super-resolution Imaging of T Tau: r = 12 au Gap in the Compact Dust Disk around T Tau N** by *Masayuki Yamaguchi et al.*

astro-ph/2110.01019: **Mysterious Dust-emitting Object Orbiting TIC 400799224** by *Brian P. Powell et al.*

astro-ph/2110.01250: **The dispersal of protoplanetary discs – III: Influence of stellar mass on disc photoevaporation** by *Giovanni Picogna, Barbara Ercolano, Catherine C. Espaillat*

astro-ph/2110.01271: **A comparison of chemical models of exoplanet atmospheres enabled by TauREx 3.1** by *Ahmed F. Al-Refaie et al.*

astro-ph/2110.01324: **Search for pairs and groups in the 2006 Geminid meteor shower** by *Pavel Koten et al.*

astro-ph/2110.01466: **Split Peas in a Pod: Intra-System Uniformity of Super-Earths and Sub-Neptunes** by *Sarah C. Millholland, Joshua N. Winn*

astro-ph/2110.01579: **Five new hot-Jupiter transits investigated with Swift-UVOT** by *Lia Corrales et al.*

astro-ph/2110.01630: **A slim disc approach to external photoevaporation of discs** by *James E Owen, Noumahn Altaf*

astro-ph/2110.01908: **Measuring titanium isotope ratios in exoplanet atmospheres** by *Dilovan B. Serindag, Ignas A. G. Snellen, Paul Mollière*

astro-ph/2110.02028: **Retrieving the transmission spectrum of HD 209458b using CHOCOLATE: A new chromatic Doppler tomography technique** by *E. Esparza-Borges et al.*

astro-ph/2110.02247: **Retrieving Exoplanet Atmospheres using Planetary Infrared Excess: Prospects for the Nightside of WASP-43 b and other Hot Jupiters** by *Jacob Lustig-Yaeger et al.*

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