ExoPlanet News
An Electronic Newsletter

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Contents

1 Editorial

Welcome to Edition 191 of ExoPlanet News!

Before the usual brief, we would like to deeply thank Daniel Angerhausen for his service to the newsletter over the years and wish him all the good for his next adventures!

This month, as usual, we bring you abstracts of scientific papers, job ads, conference announcements, and an overview of exoplanet-related articles on astro-ph. Thanks a lot to all of you who contributed to this issue of the newsletter!

For next month, we look forward to continuing receiving your submissions of paper abstracts, job ads, or meeting announcements. Special announcements are also welcome. As always, we would also be happy to receive feedback concerning the newsletter. The LaTeX template (v2.0) for submitting contributions, as well as all previous editions of ExoPlanet News, can be found on the ExoPlanet News webpage (`https://nccr-planets.ch/exoplanetnews/`).

The next issue will appear on Tuesday, June 10th (with a submission deadline ending on Sun June 8th, 2025 CEST).

Thanks again for your support, and best wishes from the editorial team.

Jeanne Davoult
Haiyang Wang
Leander Schlarmann
Timm-Emanuel Riesen

2 Abstracts of refereed papers

Earth-like planet predictor: A machine learning approach

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Astronomy & Astrophysics, published (arXiv:2504.07235)

Searching for planets analogous to Earth in terms of mass and equilibrium temperature is currently the first step in the quest for habitable conditions outside our Solar System and, ultimately, the search for life in the universe. Future missions such as PLATO or LIFE will begin to detect and characterise these small, cold planets, dedicating significant observation time to them. The aim of this work is to predict which stars are most likely to host an Earth-like planet (ELP) to avoid blind searches, minimises detection times, and thus maximises the number of detections. Using a previous study on correlations between the presence of an ELP and the properties of its system, we trained a Random Forest to recognise and classify systems as 'hosting an ELP' or 'not hosting an ELP'. The Random Forest was trained and tested on populations of synthetic planetary systems derived from the Bern model, and then applied to real observed systems. The tests conducted on the machine learning (ML) model yield precision scores of up to 0.99, indicating that 99% of the systems identified by the model as having ELPs possess at least one. Among the few real observed systems that have been tested, 44 have been selected as having a high probability of hosting an ELP, and a quick study of the stability of these systems confirms that the presence of an Earth-like planet within them would leave them stable. The excellent results obtained from the tests conducted on the ML model demonstrate its ability to recognise the typical architectures of systems with or without ELPs within populations derived from the Bern model. If we assume that the Bern model adequately describes the architecture of real systems, then such a tool can prove indispensable in the search for Earth-like planets. A similar approach could be applied to other planetary system formation models to validate those predictions.

Download/Website: `https://doi.org/10.1051/0004-6361/202452434`
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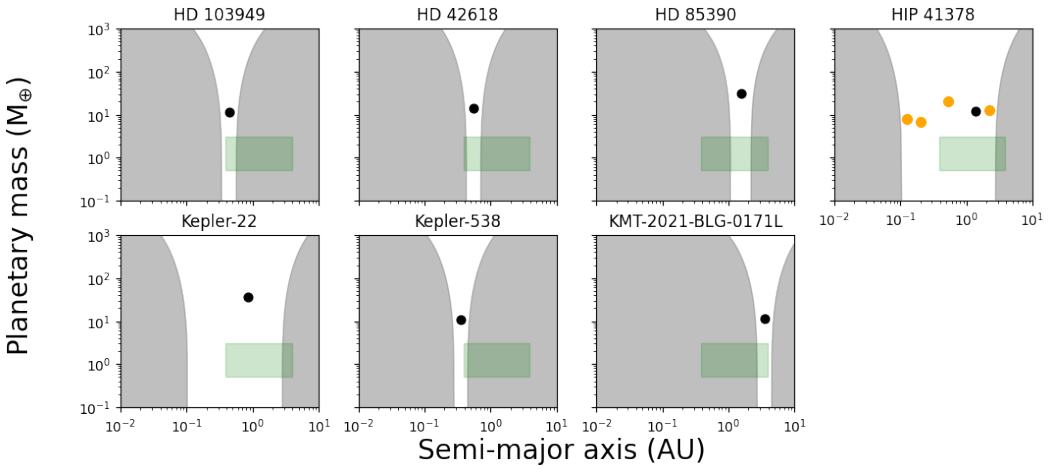

Figure 1: Systems around G stars with a resulting voting rate above 90% (systems identified as very likely to host an Earth-like planet). The green areas represent the definition of an Earth-like planet in the study in terms of equilibrium temperature and mass. The grey areas represent the combinations of mass and semi-major axis for which the Hill-stability criterion is met with the addition of a new planet. The black dots correspond to planets for which we know the mass, and the orange dots correspond to planet for which we only know the radius, and the mass has been derived thanks to the work of Parc et al. (2024). All systems would remain stable with an extra Earth-like planet. Figure from Davoult et al. (2025)

Evidence for a polar circumbinary exoplanet orbiting a pair of eclipsing brown dwarfs

T.A Baycroft[1], *L Sairam*[2], *A.H.M.J Triaud*[1], *A.C.M Correia*[3,4]

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Science Advances, published (2025SciA...11..627B)

One notable example of exoplanet diversity is the population of *circumbinary planets*, which orbit around both stars of a binary star system. There are so far only 16 known circumbinary exoplanets, all of which lie in the same orbital plane as the host binary. Suggestions exist that circumbinary planets could also exist on orbits highly inclined to the binary, close to 90°, *polar* orbits. No such planets have been found yet but polar circumbinary gas and debris discs have been observed and if these were to form planets then those would be left on a polar orbit. We report strong evidence for a polar circumbinary exoplanet, which orbits a close pair of brown dwarfs which are on an eccentric orbit. We use radial-velocities to measure a retrograde apsidal precession for the binary, and show that this can only be attributed to the presence of a polar planet.

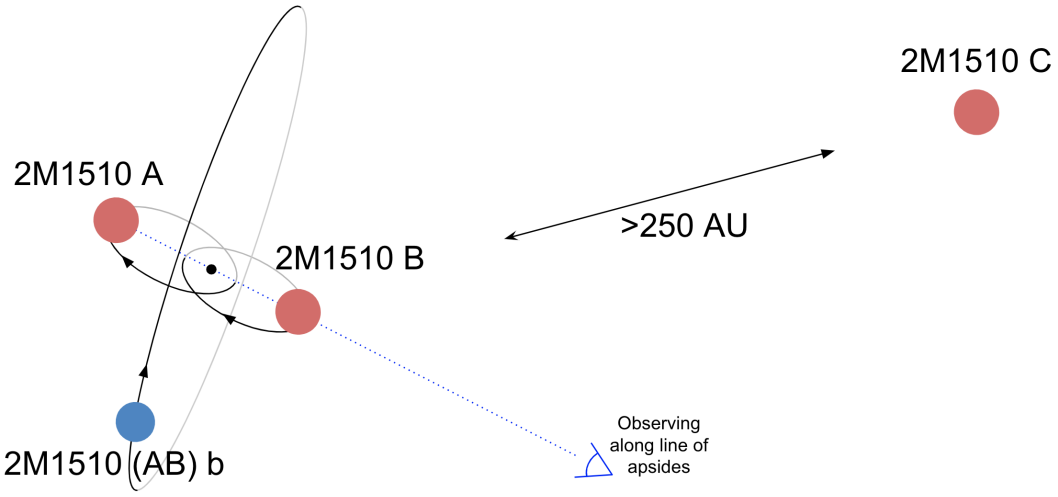

Figure 2: Configuration of 2M1510 and naming convention for the various bodies. Brown dwarfs are in red and the planet is in blue. Direction to earth relative to the binary is shown.

Download/Website: `https://arxiv.org/pdf/2504.12209`

Contact: `txb187@student.bham.ac.uk`

The tidal heating of the exoplanet 55 Cnc e. The role of the orbital eccentricity.

S. Ferraz-Mello[1], *C. Beaugé*[2]

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Astronomy & Astrophysics Letters, in press (arXiv: 2504.17585)

Context. Observations with warm *Spitzer* and JWST have revealed a high and variable brightness in the planet 55 Cnc e.
Aims. Our aim is to make an inventory of the tidal effects on the rotational and orbital evolution of the planet 55 Cnc e enhanced by the nonzero orbital eccentricity.
Methods. The creep-tide theory is used in simulations and dynamical analyses that explore the difficult trapping of the planet's rotation in a 3:2 spin-orbit resonance and the most probable synchronization of the rotation.
Results. The strong tidal dissipation of energy, enhanced by the nonzero orbital eccentricity, may explain the observed brightness anomalies. However, the strong dissipation should also circularize the orbit. The observed nonzero eccentricity, if true, would indicate that an unknown planet in a close orbital resonance with 55 Cnc e perturbing the motion of this planet should exist.

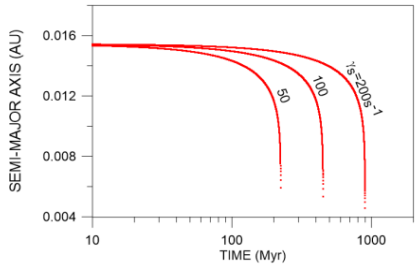

Fig. 2. Evolution of the system with the planetary rotation synchronized with the orbital motion. The labels indicate the stellar tide relaxation factor. The planetary tide effect is negligible.

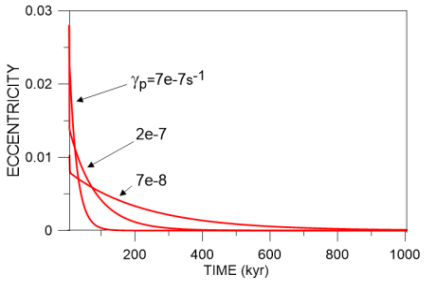

Fig. 4. Evolution of the orbital eccentricity of the planet initially in 3:2 spin-orbit resonance. The labels indicate the planet's relaxation factor.

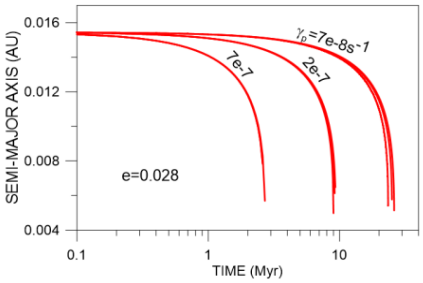

Fig. 3. Evolution of the system with the planet rotation synchronized when the eccentricity is kept fixed at e=0.028. The labels show the planetary relaxation factor. Each line is a bundle of three solutions corresponding to the stellar relaxation factors 50, 100, and 200 s^{-1}.

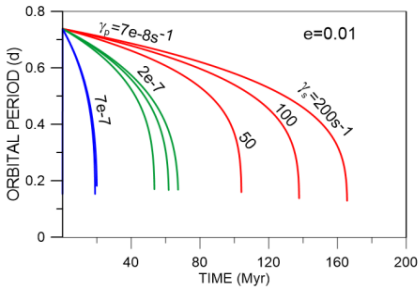

Fig. 7. Evolution of the system with the planet rotation synchronized with the orbital motion, for fixed eccentricity at e=0.1 and relaxation factors as indicated by the labels. The same colors indicate solutions corresponding to the same planetary relaxation factor. Each bundle contains solutions corresponding to three different stellar relaxation factors.

Figure 3: As the captions for individual panels.

Download/Website: `http://nccr-planets.ch/`
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A differentiable N-body code for transit timing and dynamical modelling - II. Photodynamics

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Monthly Notices of the Royal Astronomical Society, in press (arXiv:2410.03874)

Exoplanet transits contain substantial information about the architecture of a system. By fitting transit light curves we can extract dynamical parameters and place constraints on the properties of the planets and their host star. Having a well-defined probabilistic model plays a crucial role in making robust measurements of these parameters, and the ability to differentiate the model provides access to more robust inference tools. Gradient-based inference methods can allow for more rapid and accurate sampling of high-dimensional parameter spaces. We present a fully differentiable photodynamical model for multiplanet transit light curves that display transit-timing variations. We model time-integrated exposures, compute the dynamics of a system over the full length of observations, and provide analytic expressions for derivatives of the flux with respect to the dynamical and photometric model parameters. The model has been implemented in the Julia language and is available open-source on GitHub (`https://github.com/langfzac/photodynamics.jl`). We demonstrate with a simulated dataset that Bayesian inference with the NUTS HMC algorithm, which uses the model gradient, can outperform the affine-invariant (e.g. `emcee`) MCMC algorithm in CPU time per effective sample, and we find that the relative sampling efficiency improves with the number of model parameters.

Download/Website: `https://doi.org/10.1093/mnras/staf687`

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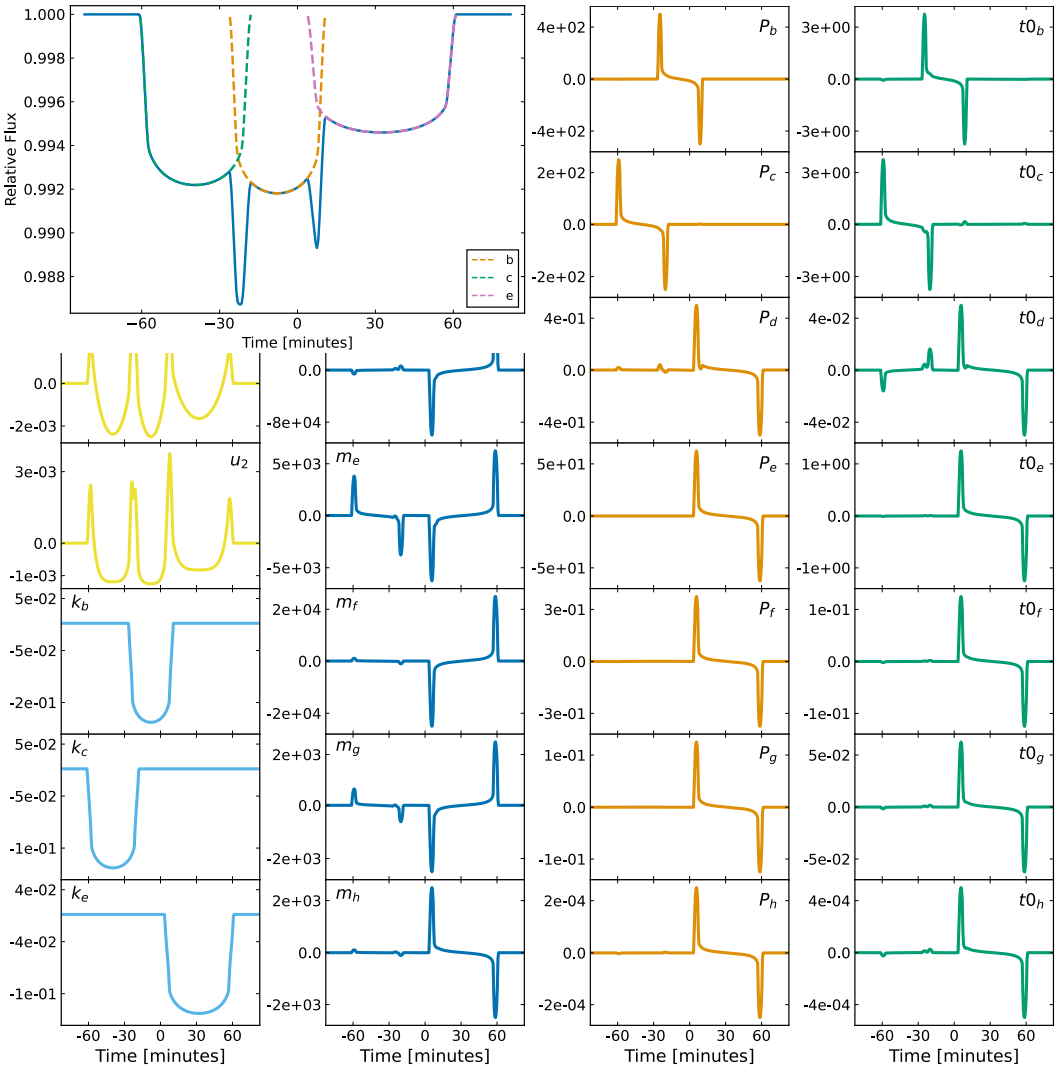

Figure 4: The large, top-left panel shows the relative flux versus time for 3 planet (b,c,e) transits for a simulated 7 planet system. The solid blue curve shows how the observed light curve would appear, and the dashed lines are the individual contributions for each transiting planet. The smaller panels show the derivatives of the flux with respect to the labeled model parameter versus time. The first column shows the two limbdarkening coefficients and the three radius ratios. The next three columns are the masses, periods, and initial times of transits for each planet (b-h), respectively.

Polarimetry of exoplanet-exomoon systems

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Astronomy & Astrophysics, published (2025A&A...696A.208M)

We investigated the potential of polarimetric observations in the optical wavelength range for the detection of exomoons and the characterization of exoplanet-exomoon systems. Using the three-dimensional Monte Carlo radiative transfer code POLARIS, we calculated flux and polarization phase curves of Earth-like exoplanets with a satellite similar to Earth's moon. Of particular interest are mutual events, when one of the two bodies casts a shadow on the other or transits in front of it. We find that the signatures of mutual events in the polarization phase curve show significant variations depending on the inclination of the lunar orbit. If the planet-satellite pair is spatially resolved from the star but the satellite is spatially unresolved, the increase in the degree of polarization during a transit of the exomoon in front of the center of the exoplanet reaches 2.7% in our model system near quadrature. However, the change is less than 0.5% if the orbit of the exomoon is inclined such that it transits the planet noncentrally at the same phase angles. The influence of an exomoon on the polarization phase curve of an exoplanet-exomoon system is dependent on the lunar polarization phase curve. Observations of full eclipses and occultations of the exomoon allow the determination of separate polarization phase curves for the two bodies. Information about the lunar orbital inclination can be obtained with polarimetric observations of shadows or transits. Measuring the influence of large satellites not only on the total flux, but also on the polarization of the reflected stellar radiation during mutual events thus facilitates the prediction of future mutual events and the verification of exomoon candidates.

Download/Website: `https://www.aanda.org/articles/aa/full_html/2025/04/aa52870-24/aa52870-24.html`

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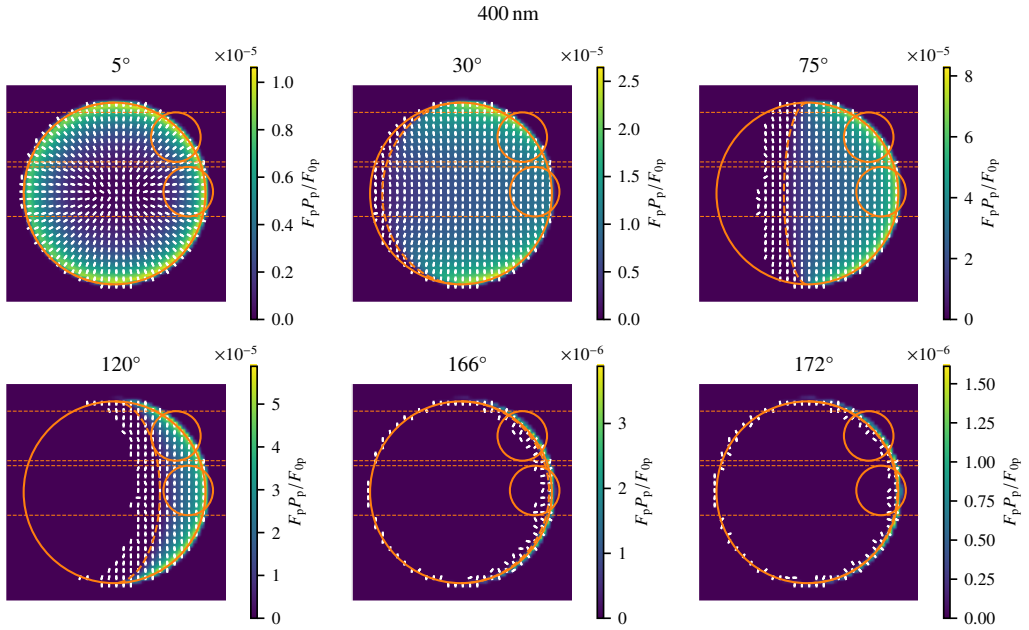

Figure 5: Polarization maps for different phase angles at a wavelength of 400 nm. The polarized flux $F_\mathrm{p}P_\mathrm{p}$ is encoded as a color map. The resolution is 60×60 px, the planet has a diameter of 50 px. Polarization directions are shown as white lines. The larger orange circle marks the planet's circumference. The orange dashed lines between the poles of the planet mark the terminator. The day side of the planet is to the right of it. The horizontal orange lines mark the path of the moon during a central transit (lower pair of lines), or a noncentral transit (upper pair of lines). For two positions on the edge of the planet, the circumference of the moon is shown as an orange circle.

Dust density enhancements and the direct formation of planetary cores in gravitationally unstable discs

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Monthly Notices of the Royal Astronomical Society, in press (arXiv:2505:00363)

Planet formation via core accretion involves the growth of solids that can accumulate to form planetary cores. There are a number of barriers to the collisional growth of solids in protostellar discs, one of which is the drift, or metre, barrier. Solid particles experience a drag force that will tend to cause them to drift towards the central star in smooth, laminar discs, potentially removing particles before they grow large enough to decouple from the disc gas. Here we present 3-dimensional, shearing box simulations that explore the dynamical evolution of solids in a protostellar disc that is massive enough for the gravitational instability to manifest as spiral density waves. We expand on earlier work by considering a range of particle sizes and find that the spirals can still enhance the local solid density by more than an order of magnitude, potentially aiding grain growth. Furthermore, if solid particles have enough mass, and the particle size distribution extends to sufficiently large particle sizes, the solid component of the disc can undergo direct gravitational collapse to form bound clumps with masses typically between 1 and 10 $M_\oplus$. Thus, the concentration of dust in a self-gravitating disc could bypass the size barrier for collisional growth and directly form planetary cores early in the lifetime of the disc.

Download/Website: `https://arxiv.org/abs/2505.00363`

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TOI-6478 b: a cold under-dense Neptune transiting a fully convective M dwarf from the thick disc

M.G. Scott[1], A.H.M.J. Triaud[1], K. Barkaoui[2,3,4], D. Sebastian[1], A.J. Burgasser[5], K.A. Collins[6], G. Dransfield[7,8,1], C. Hellier[9], S.B. Howell[10], A.A.A. Piette[1], B.V. Rackham[3], K.G. Stassun[11], A. Stokholm[1], M. Timmermans[1,2], C.N. Watkins[6], M. Fausnaugh[12], A. Fukui[13,3], J.M. Jenkins[10], N. Narita[13,14,4], G. Ricker[15], E. Softich[5], R.P. Schwarz[6], S. Seager[15,16,17], A. Shporer[18], C. Theissen[5], J. Twicken[19], J.N. Winn[20], D. Watanabe[21]

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Monthly Notices of the Royal Astronomical Society, in press (arXiv:2504.06848)

Growing numbers of exoplanet detections continue to reveal the diverse nature of planetary systems. Planet formation around late-type M dwarfs is of particular interest. These systems provide practical laboratories to measure exoplanet occurrence rates for M dwarfs, thus testing how the outcomes of planet formation scale with host mass, and how they compare to Sun-like stars. Here, we report the discovery of TOI-6478 b, a cold ($T_{\rm eq} = 204\,{\rm K}$) Neptune-like planet orbiting an M5 star ($R_\star = 0.234 \pm 0.012\,{\rm R}_\odot$, $M_\star = 0.230 \pm 0.007\,{\rm M}_\odot$, $T_{\rm eff} = 3230 \pm 75\,{\rm K}$) which is a member of the Milky Way's thick disc. We measure a planet radius of $R_b = 4.6 \pm 0.24\,{\rm R}_\oplus$ on a $P_b = 34.005019 \pm 0.000025\,{\rm d}$ orbit. Using radial velocities, we calculate an upper mass limit of $M_b \leq 9.9\,{\rm M}_\oplus$ ($M_b \leq 0.6\,{\rm M}_{\rm Nep}$), with $3\,\sigma$ confidence. TOI-6478 b is a milestone planet in the study of cold, Neptune-like worlds. Thanks to its large atmospheric scale height, it is amenable to atmospheric characterisation with facilities such as JWST, and will provide an excellent probe of atmospheric chemistry in this cold regime. It is one of very few transiting exoplanets that orbit beyond their system's ice-line whose atmospheric chemical composition can be measured. Based on our current understanding of this planet, we estimate TOI-6478 b's spectroscopic features (in transmission) can be $\sim 2.5\times$ as high as the widely studied planet K2-18 b.

Download/Website: `https://arxiv.org/pdf/2504.06848`

Contact: `mgs947@student.bham.ac.uk`

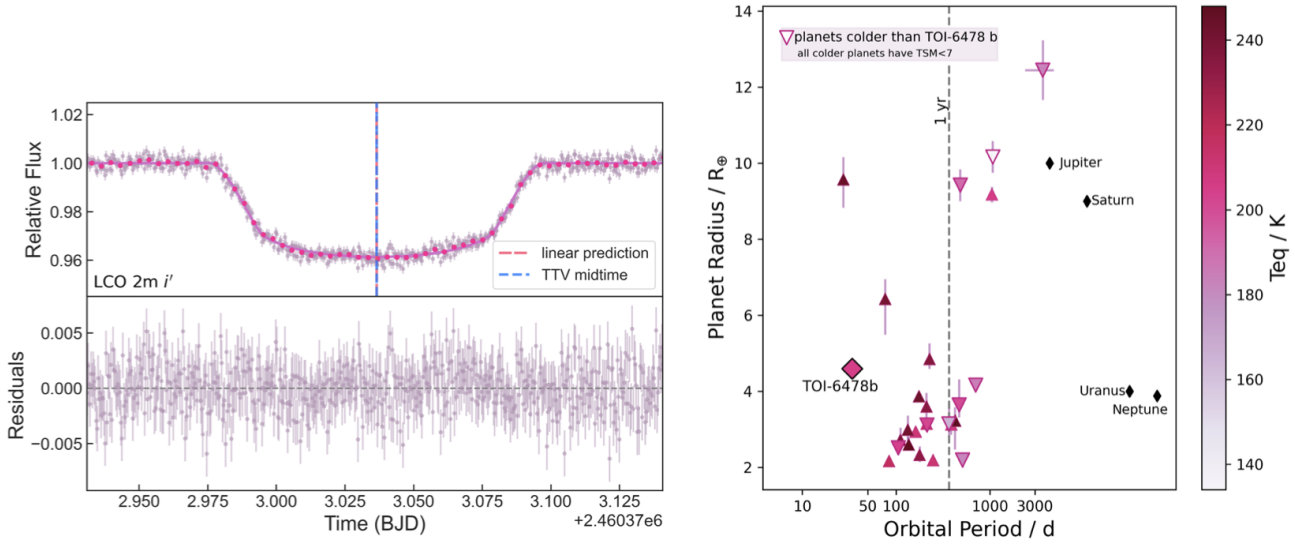

Figure 6: *Left:* transit of TOI-6478 b observed in the i' band from the LCO-2m0 telescopes at the Siding Springs Observatory. *Right:* Planet radius vs orbital period for exoplanets with equilibrium temperatures (color bar) $<$250 K and radii $>$ $2R_{\oplus}$. One year is highlighted by the dashed grey line. Of these 25 exoplanets, only 9 are colder than TOI-6478 b (pink diamond), but all have orbital period at least 3$\times$ larger. Solar system planets are shown as reference.

3 Jobs and Positions

Postdoctoral Research Fellow on tidal flows in planets and stars (Astrophysical Fluid Dynamics)

Prof Adrian J. Barker
University of Leeds, UK

University of Leeds, Leeds, UK, 1st July 2025 (but can be negotiated)

Applications are invited for a Postdoctoral Research Fellow to join a Science and Technology Facilities Council (STFC) funded project for 36 months to investigate tidal flows in planets and stars. The project will involve performing hydrodynamical or magnetohydrodynamical simulations to study tidal flows in spherical or ellipsoidal geometry, using and extending one or more existing codes. The results from these calculations will be applied to interpret current observations of extrasolar planets and close binary stars, and to make predictions for future observations.

The successful candidate will work with Prof Adrian Barker in the Department of Applied Mathematics (`https://eps.leeds.ac.uk/maths/staff/4006/prof-adrian-j-barker`), in collaboration with Prof Rainer Hollerbach (`https://eps.leeds.ac.uk/maths/staff/4036/professor-rainer-hollerbach`). They will join the Astrophysical and Geophysical Fluid Dynamics research group (`https://agfd.leeds.ac.uk`), which is one of the largest such groups in the world. This project will strongly complement and benefit from other STFC-funded projects at Leeds, including in magnetic and thermal evolution of magnetars, as well as a Leverhulme Trust Early Career Fellowship on tidal flows in stars and planets. The research will also complement and benefit from The Leeds Institute for Fluid Dynamics (`https://fluids.leeds.ac.uk`), a cross-disciplinary research institute in fluid dynamics at Leeds, which hosts the UK's EPSRC Centre for Doctoral Training in Fluid Dynamics.

The post is available to start as soon as possible after 1st July 2025, but the start date can be negotiated. The funds are available for 3 years and the salary range is Grade 7 (£39,355 to £46,735 p.a.).

Applicants should have a PhD (or have submitted your thesis before taking up the role) in a relevant discipline (e.g. Astrophysics, Applied Mathematics or Planetary Sciences), together with computational experience, and they should be able to demonstrate the ability to conduct independent research and possess a developing track record of publications in international journals. In addition, the applicant must have excellent communication, planning and team working skills.

Applications must be made online (using the link below) before 23.59 (UK time) on the advertised closing date. Applicants must submit a CV and Publication List and provide the names and contact details of 3 people from whom references letters may be requested. Informal enquiries are welcome and should be directed to Adrian Barker (`A.J.Barker@leeds.ac.uk`).

Closing Date: 1st June 2025

Download/Website: `https://jobs.leeds.ac.uk/Vacancy.aspx?ref=EPSMA1127`

Contact: `A.J.Barker@leeds.ac.uk`

Postdoc Fellow Position in Observational Studies on Exoplanets Formation

Centre de Recherche Astrophysique de Lyon (CRAL), France,

The ANR-funded project DDISK (Circumstellar disks: Morphological study and mineralogical properties thanks to advances in data science) is recruiting a post-doctoral fellow to work on the analysis of near infrared and optical high contrast observations of Circumstellar disks aiming at detecting new exoplanets. The recruited researcher will join the group led by Maud Langlois at CRAL and will work with our ANR team including Olivier Flasseur, Antoine Kasczcyc, L. Denneulin and Ferréol Soulez in collaboration with IPAG (Grenoble) and LIRA (Meudon).
This recruitment is funded by the ANR DDISK (https://anr.fr/Projet-ANR-21-CE31-0015), which aims to optimally exploit data from the SPHERE instrument to detect exoplanets and circumstellar disks that can provide insight into planet formation processes. The Research Fellow will lead the analysis of VLT/SPHERE data with state-of-the-art high contrast algorithms. She/he will carry a systematic search of signspost or direct detection of exoplanets using multi-modality (imaging, spectroscopy and polarimetry) and multiple epochs data allowing to characterize new detections, and collaborate with partner institutions on simulations of formation mechanisms (companion/disk interaction,...) and scientific interpretation. Our team has already developed and validated several cutting-edge algorithms (PACO, REXPACO, PACOME and Rhapsodie) together with a framework to automatically optimize the data processing with these algorithms to perform such systematic circumstellar disk survey.
The position is located at the Lyon Astrophysical Research Center in the AIRI team, which is working on this project in collaboration with many French laboratories (LIRA, IPAG, OCA, ENS Lyon, EPITA,). Our team is also involved in the PEPR ORIGINS program, which funds several doctoral and postdoctoral students related to this research topic. A PhD in astronomy or related field is required. Previous experience in observational astronomy in planet formation and/or exoplanet direct detection would be appreciated Experience in numerical simulations of circumstellar environments and/or familiarity with high-contrast imaging would be a plus.
The position is for 18 months, with a possible extension pending successful collaboration within the research group. Remuneration depends on experience and includes full benefits. The starting date is as soon as possible after the 1st June 2025 and no later than the 1st September 2025. To apply send a short research statement summarizing candidate's research interests, skills and experiences along with how this position fits into career goals, a CV including a list of publications. The candidate will also arrange 2 recommendation letters to be sent to maud.langlois@cnrs.fr before May 15th 2025. We consider diversity as an asset within our team, and welcome applicants with diverse backgrounds and experiences.

4 Conferences and Workshops

International Conference on Exoplanets and Planet Formation (EPF)

Dong Lai[1,2]*, Josh Winn*[3]*, Yanqin Wu*[4]*, Fabo Feng*[1] *& Xianyu Tan*[1]
[1] Tsung-Dao Lee Institute
[2] Cornell University
[3] Princeton University
[4] University of Toronto

Conference announcement, in press

We are delighted to announce the International Conference on Exoplanets and Planet Formation (EPF), which will be held in Shanghai, China, from December 8 to 12, 2025. The conference is organized by the Tsung-Dao Lee Institute (TDLI) at Shanghai Jiao Tong University `https://indico-tdli.sjtu.edu.cn/event/4089/`.

Following the success of the first EPF conference in December 2017, this event will cover all aspects of exoplanetary astrophysics, including:

- **Exoplanet detection and characterization** (mass-radius relations, atmospheres, demographics and statistics, etc);
- **Planet formation** and **dynamical evolution**;
- Related topics such as **star formation**, **binaries and multiples**, and **Solar System formation**.

Pre-registration is now open to receive future announcements and information about the conference.

Key dates:

- August 2025: Formal registration opens.
- September 20, 2025: Early registration (reduced fee) deadline
- October 10, 2025: Abstract submission deadline (talks/posters)
- October 20, 2025: Oral talk speakers notified
- November 1, 2025: Regular registration payment deadline
- November 5, 2025: Final oral program announced

Visa Information: 240-hour Visa-Free Policy.

Please save the dates, and we hope to see you in December!

Best regards,
Xianyu Tan, on behalf of the Organizing Committee

Main Organizers:
Dong Lai (TDLI/Cornell), Josh Winn (Princeton), Yanqin Wu (Toronto), Fabo Feng (TDLI), Xianyu Tan (TDLI)

Scientific Organizing Committee (SOC):
Alan Boss (Carnegie Institute)
Aumary Triaud (Birmingham)
Alessandro Morbidelli (OCA)

Anne-Marie Lagrange (Grenoble)
Carsten Dominik (Amsterdam)
David Charbonneau (Harvard)
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Josh Winn (Princeton)
Michael Liu (Hawaii)
Myriam Benisty (MPIA)
Richard Nelson (QMU)
Ruobing Dong (PKU)
Shigeru Ida (Tokyo Tech)
Sara Seager (MIT)
Scott Tremaine (IAS Princeton)
Shude Mao (Westlake)
Thomas Henning (MPIA)
Xuening Bai (Tsinghua)
Yanqin Wu (Toronto)

Download/Website: `https://indico-tdli.sjtu.edu.cn/event/4089/`

Contact: `exoplanetnews@nccr-planets.ch`

BUFFET-5: Building a Unified Framework For Exoplanet Treatments, fifth edition

Thomas Fauchez[1,2] *& Denis Sergeev*[3]
[1] NASA GSFC, USA
[2] American University, USA
[3] University of Bristol, UK

Bordeaux, France & Online, 15–16 September 2025

We are pleased to announce that the free registration for BUFFET-5 **(15th–16th September in Bordeaux, France)** has now opened!

This 2-day workshop will bring together scientists who use a variety of atmospheric models and who are interested in participating in community-driven efforts to compare results across models. These model intercomparisons will lead to a better understanding of planetary environments, processes and observable spectra, as well as improve individual models. The main objectives of this workshop are to discuss the ongoing and future (exo)planet model intercomparison projects (MIPs), promote best scientific practices and maximize scientific output, as well as to enable broad and inclusive community participation.

We are soliciting abstracts for posters, and a few contributed talks. The deadline is **June 13th**. Attendance at the workshop does not require submitting an abstract. However, if you do submit an abstract, please make sure your talk/poster is relevant to model sensitivity tests, physical parameterizations, model validation against observations or lab studies, etc.

Deadline for in-person registration is July 25th. For in-person registrations, food is provided at lunches, breaks and one workshop dinner. Online attendance option will also be available.

Details on the workshop programme, registration and abstract submission can be found via the link below.

See you in Bordeaux, or virtually,

Thomas and Denis on behalf of the SOC & LOC

Website: `https://nexss.info/buffet-5-in-september-15th-and-16th-2025-registration-opened/`

5 Exoplanet Archives

April 2025 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, May 11, 2025

Note: Unless otherwise noted, all planetary and stellar data mentioned in the news are in the Planetary Systems Table, which provides a single location for all self-consistent planetary solutions, and its companion table the Planetary Systems Composite Parameters, which offers a more complete table of parameters combined from multiple references and calculations. Links to other tables and System Overview pages are embedded in the text.

April 24, 2025, Data for 15 Planets and Spectra for 6, including K2-18 b

This week's release features new spectra from JWST for temperate sub-Neptune K2-18 b, which made news headlines this week (as well as in October 2023). Read the discovery paper and then head to our Atmospheric Spectroscopy Table to look at the data and compare with your own models!

The other planets with new spectra are GJ 504 b, HR 8799 c, d, & e, and HR 2562 b.

The nine new planets are WASP-102 b (TOI-6170), WASP-116 b (TOI-4672), WASP-149 b (TOI-6101), WASP-154 b (TOI-5288), WASP-155 b (TOI-6135), WASP-188 b (TOI-5190), WASP-194 b (TOI-3791), WASP-195 b (TOI-4056), and WASP-197 b (TOI-5385). There are also new parameters for GJ 504 b and HR 2562 b.

April 17, 2025, Seven New Planets, Including a Neighboring sub-Neptune

This week's seven new planets bump our planet count to 5,876 and feature sub-Neptune Gl 410 b, located only 40 light-years away.

The other planets are G 192-15 b & c, G 261-6 b, G 268-110 b, Kepler-279 e, and Kepler-289 e. There are new parameters for 55 Cnc e, TOI-2202 b, WASP-106 b, and WASP-131 b, and additional 145 planets from Ofir et al. 2025.

April 10, 2025, Two New Microlensing Planets and Water in the Atmosphere of Hot Jupiter WASP-52 b!

This week's release includes KMT-2019-BLG-0578L b and KMT-2021-BLG-0736L b discovered through reanalysis of archival microlensing data, and a JWST spectrum of WASP-52 b showing water and helium in the atmosphere after careful consideration of stellar contamination. Learn more about the microlensing planets in the discovery paper; details on WASP-52 b are described in this paper.

We've also added Spitzer transmission and eclipse spectroscopy measurements of WASP-19 b and HAT-P-7 b to the Atmospheric Spectroscopy Table.

Download/Website: `https://exoplanetarchive.ipac.caltech.edu`
Contact: `mharbut@caltech.edu`

6 As seen on astro-ph

The following list contains exoplanet related entries appearing on astro-ph in April 2025.
Disclaimer: The hyperlinks to the astro-ph articles are provided for the convenience of the reader, but the ExoPlanet News cannot be responsible for their accuracy and perpetuity.

April 2025

astro-ph/2504.00296: **Dependence of Planet populations on Stellar Mass and Metallicity: A Pebble Accretion-based Planet Population Synthesis** *by Mengrui Pan et al.*
astro-ph/2504.00295: **Review and prospects of hot exozodiacal dust research for future exo-Earth direct imaging missions** *by Steve Ertel et al.*
astro-ph/2504.00419: **Asymmetry and Dynamical Constraints in 2-Limbs Retrieval of WASP-39 b Inferring from JWST Data** *by Zixin Chen et al.*
astro-ph/2504.01182: **The Receding Cosmic Shoreline of Mid-to-Late M Dwarfs: Measurements of Active Lifetimes Worsen Challenges for Atmosphere Retention by Rocky Exoplanets** *by Emily K Pass et al.*
astro-ph/2504.00978: **The climates and thermal emission spectra of prime nearby temperate rocky exoplanet targets** *by Tobi Hammond et al.*
astro-ph/2504.00709: **Science Autonomy using Machine Learning for Astrobiology** *by Victoria Da Poian et al.*
astro-ph/2504.00495: **Early Planet Formation in Embedded Disks (eDisk) XXI: Limited role of streamers in mass supply to the disk in the Class 0 protostar IRAS 16544-1604** *by Miyu Kido et al.*
astro-ph/2504.00841: **XUE. Thermochemical Modeling Suggests a Compact and Gas-Depleted Structure for a Distant, Irradiated Protoplanetary Disk** *by Bayron Portilla-Revelo et al.*
astro-ph/2504.01825: **How the microphysical properties of external photoevaporation influence the global evolution of protoplanetary discs** *by Gavin A. L. Coleman et al.*
astro-ph/2504.01768: **Updating the Ephemeris and Physical Properties of Five Long-period Transiting Exoplanets Using TESS and CHEOPS** *by Suman Saha*
astro-ph/2504.01263: **Planets in Globular Clusters?** *by Steinn Sigurdsson*
astro-ph/2504.02990: **Disk-Star Alignment I: Pre-Main-Sequence Stellar Parameters and the Statistical Alignment Between Disks and Stellar Rotation** *by Matthew J. Fields et al.*
astro-ph/2504.02578: **Helium escape signatures are generally strongest during younger ages but this age dependence is lost in the diversity of observed exoplanets** *by Andrew P. Allan, Aline A. Vidotto*
astro-ph/2504.02469: **An MHD Simulation of the Possible Modulations of Stellar CMEs Radio Observations by an Exoplanetary Magnetosphere** *by Soumitra Hazra et al.*
astro-ph/2504.02499: **The Gradient of Mean Molecular Weight Across the Radius Valley** *by Kevin Heng et al.*
astro-ph/2504.03364: **The CARMENES search for exoplanets around M dwarfs. Occurrence rates of Earth-like planets around very low-mass stars** *by A. Kaminski et al.*
astro-ph/2504.03813: **Community need for an Astrobiology Sample Repository and Sample Reference Suite** *by A. Pontefract et al.*
astro-ph/2504.03572: **Characterizing planetary systems with SPIRou: Detection of a sub-Neptune in a 6 day period orbit around the M dwarf Gl 410** *by A. Carmona et al.*
astro-ph/2504.03820: **Planetary World Coordinate System in Astropy** *by Chiara Marmo, Stéphane Érard*
astro-ph/2504.03833: **Radial variations in nitrogen, carbon, and hydrogen fractionation in the PDS 70 planet-hosting disk** *by L. Rampinelli et al.*
astro-ph/2504.03974: **Doppler Shifted Transient Sodium Detection by KECK/HIRES** *by Athira Unni et al.*
astro-ph/2504.04261: **Bioverse: Potentially Observable Exoplanet Biosignature Patterns Under the UV Threshold Hypothesis for the Origin of Life** *by Martin Schlecker et al.*
astro-ph/2504.04090: **Formation of Giant Planets** *by Masahiro Ikoma, Hiroshi Kobayashi*
astro-ph/2504.04439: **The enigmatic magnetic field of the planet hosting Herbig Ae/Be star HD169142** *by S. Hubrig et al.*

astro-ph/2504.05480: **Investigating the eccentricity distribution of transiting, long-period giant planets** *by Ahlam Alqasim et al.*

astro-ph/2504.05446: **The UV Legacy Library of Young Stars as Essential Standards (ULLYSES) Large Director's Discretionary Program with Hubble. I. Goals, Design, and Initial Results** *by Julia Roman-Duval et al.*

astro-ph/2504.05388: **A Particle-based Approach to Dust Dynamics in External Photoevaporative Winds** *by S. Paine et al.*

astro-ph/2504.05233: **Formation of Near-surface Atmospheric Inversion and Surface Inversion in Hothouse Climates** *by Jiachen Liu et al.*

astro-ph/2504.05095: **Dust Growth in ALMA Rings: II. Dusty Rossby Wave Instability** *by Can Cui et al.*

astro-ph/2504.05055: **Detecting relevant dependencies under measurement error with applications to the analysis of planetary system evolution** *by Patrick Bastian, Nicolai Bissantz*

astro-ph/2504.05399: **Asymmetric Signatures of Warps in Edge-on Disks** *by Carolin N. Kimmig, Marion Villenave*

astro-ph/2504.06347: **MOA-2010-BLG-328: Keck and HST Expose the Limits of Occams Razor in Microlensing** *by Aikaterini Vandorou et al.*

astro-ph/2504.06337: **The likelihood of not detecting cavity-carving companions in transition discs – A statistical approach** *by Enrico Ragusa et al.*

astro-ph/2504.05993: **Strong Evidence That Abiogenesis Is a Rapid Process on Earth Analogs** *by David Kipping*

astro-ph/2504.06005: **A deep search for Complex Organic Molecules toward the protoplanetary disk of V883 Ori** *by Abubakar M. A. Fadul et al.*

astro-ph/2504.06332: **Positive Feedback II: How Dust Coagulation inside Vortices Can Form Planetesimals at Low Metallicity** *by Daniel Carrera et al.*

astro-ph/2504.05667: **Oligarchic growth of protoplanets in planetesimal rings** *by Yuki Kambara, Eiichiro Kokubo*

astro-ph/2504.06779: **What if we find nothing? Bayesian analysis of the statistical information of null results in future exoplanet habitability and biosignature surveys** *by Daniel Angerhausen et al.*

astro-ph/2504.07275: **Revealing a main-sequence star that consumed a planet with JWST** *by Ryan M. Lau et al.*

astro-ph/2504.07235: **Earth-like planet predictor: A machine learning approach** *by Jeanne Davoult et al.*

astro-ph/2504.07182: **Disc-planet misalignment from an unstable triple system: IRAS04125** *by Rebecca Nealon et al.*

astro-ph/2504.06776: **Photobombing for the Large Interferometer For Exoplanets (LIFE). A new criterion for target confusion and application to a MIR rotating nulling interferometer** *by Drinor Cacaj et al.*

astro-ph/2504.06890: **Combining high-contrast imaging with high-resolution spectroscopy: Actual on-sky MIRI/MRS results compared to expectations** *by S. Martos et al.*

astro-ph/2504.06848: **TOI-6478 b: a cold under-dense Neptune transiting a fully convective M dwarf from the thick disc** *by Madison G. Scott et al.*

astro-ph/2504.07161: **The Minimum Mass of Planets, Dwarf Planets, and Planetary-scale Satellites** *by David G. Russell*

astro-ph/2504.08091: **A Swarm of WASP Planets: Nine giant planets identified by the WASP survey** *by Nicole Schanche et al.*

astro-ph/2504.08029: **Coordinated Space and Ground-Based Monitoring of Accretion Bursts in a Protoplanetary Disk: Establishing Mid-Infrared Hydrogen Lines as Accretion Diagnostics for JWST-MIRI** *by Benjamin M. Tofflemire et al.*

astro-ph/2504.07823: **A new look into the atmospheric composition of WASP-39 b** *by Sushuang Ma et al.*

astro-ph/2504.08042: **Long-term evolution of the temperature structure in magnetized protoplanetary disks and its implication for the dichotomy of planetary composition** *by Shoji Mori et al.*

astro-ph/2504.08363: **The CARMENES search for exoplanets around M dwarfs. Cluster analysis of signals from spectral activity indicators to search for shared periods** *by J. Kemmer et al.*

astro-ph/2504.08436: **Bifurcated Evolutionary Pathways in Multi-planet Systems Driven by Misaligned Protoplanetary Disks** *by Tao Fu et al.*

astro-ph/2504.08731: **ExoMolHR: A Relational Database of Empirical High-Resolution Molecular Spectra** *by Jingxin Zhang et al.*

astro-ph/2504.08903: **Unveiling the atmosphere of the super-Jupiter HAT-P-14 b with JWST NIRISS and NIRSpec** *by Rongrong Liu et al.*

astro-ph/2504.09015: **Cultivating Long-Term Planning, Collaboration, and Mission Continuity in Astrobiology Through Support of Early Career Researchers** *by Elizabeth Spiers et al.*

astro-ph/2504.09087: **Precise radial velocities of giant stars – XVII. Distinguishing planets from intrinsically induced radial velocity signals in evolved stars** *by Dane Spaeth et al.*

astro-ph/2504.09166: **Thermally driven spontaneous dust accumulation in the inner regions of protoplanetary disks** *by Ryo Kato et al.*

astro-ph/2504.09390: **Numerical simulations of the interaction between the stellar magnetic field and a planet** *by Fabio De Colle et al.*

astro-ph/2504.09752: **Deciphering Sub-Neptune Atmospheres: New Insights from Geochemical Models of TOI-270 d** *by Christopher R. Glein et al.*

astro-ph/2504.10683: **PALACE v1.0: Paranal Airglow Line And Continuum Emission model** *by Stefan Noll et al.*

astro-ph/2504.10220: **Modeling the Thermal Structure of a Protoplanetary Disk Using Multiband Flux-Limited Diffusion Approximation** *by Ya. N. Pavlyuchenkov, V. V. Akimkin*

astro-ph/2504.10126: **Polarimetry of exoplanet-exomoon systems** *by M. B. Michaelis et al.*

astro-ph/2504.10550: **LCDC: Bridging Science and Machine Learning for Light Curve Analysis** *by Daniel Kyselica et al.*

astro-ph/2504.10279: **Elastic Planetoids** *by Bartosz Żbik, Andrzej Odrzywołek*

astro-ph/2504.11659: **Probing the Outskirts of M Dwarf Planetary Systems with a Cycle 1 JWST NIRCam Coronagraphy Survey** *by Ellis Bogat et al.*

astro-ph/2504.11577: **CAMPOS II. The onset of protostellar disk substructures and planet formation** *by Cheng-Han Hsieh et al.*

astro-ph/2504.11425: **MINDS: The very low-mass star and brown dwarf sample – Hidden water in carbon-dominated protoplanetary disks** *by Aditya M. Arabhavi et al.*

astro-ph/2504.11424: **MINDS. Anatomy of a water-rich, inclined, brown dwarf disk: lack of abundant hydrocarbons** *by Giulia Perotti et al.*

astro-ph/2504.11210: **Differentiating Formation Models with New Dynamical Masses for the PDS 70 Protoplanets** *by David Trevascus et al.*

astro-ph/2504.11127: **Keplerian motion of a compact source orbiting the inner disc of PDS 70: a third protoplanet in resonance with b and c?** *by Iain Hammond et al.*

astro-ph/2504.10941: **Tidal interactions in stellar and planetary systems** *by Adrian J. Barker*

astro-ph/2504.10926: **RedDots: Planetary masses in the GJ1061 system from planet-planet interaction** *by S. Dreizler et al.*

astro-ph/2504.11679: **Radiative Flux from a High-Resolution Atmospheric Dynamics Simulation of a Hot-Jupiter for JWST and Ariel** *by Jagat Kafle et al.*

astro-ph/2504.12030: **Planetary albedo is limited by the above-cloud atmosphere: Implications for sub-Neptune climate** *by Sean Jordan et al.*

astro-ph/2504.12046: **The Dynamic Inner Disk of a Planet Forming Star** *by Benjamin R. Setterholm et al.*

astro-ph/2504.12118: **Unraveling the origin of giant exoplanets – Observational implications of convective mixing** *by Henrik Knierim, Ravit Helled*

astro-ph/2504.12267: **New Constraints on DMS and DMDS in the Atmosphere of K2-18 b from JWST MIRI**

by Nikku Madhusudhan et al.

astro-ph/2504.12209: **Evidence for a polar circumbinary exoplanet orbiting a pair of eclipsing brown dwarfs** *by Thomas A. Baycroft et al.*

astro-ph/2504.12596: **Higher-Order Mean-Motion Resonances Can Form in Type-I Disk Migration** *by Finnegan Keller et al.*

astro-ph/2504.12541: **Evolving Atmospheric Ion Escape from Kepler-1649 b and c: Power-Law Trends in Atmospheric Loss** *by Haitao Li et al.*

astro-ph/2504.13246: **Turbulence Inhibits Planetesimal Formation in Class 0/I Disks Subject to Infall** *by Daniel Carrera et al.*

astro-ph/2504.13160: **Discovery and Dynamics of the Nontransiting Planet Kepler-139f** *by Caleb Lammers, Joshua N. Winn*

astro-ph/2504.13130: **General Analytic Solutions for Circumplanetary Disks during the Late Stages of Giant Planet Formation** *by Fred C. Adams, Konstantin Batygin*

astro-ph/2504.13377: **JWST's sharper view of EX Lup: cold water from ice sublimation during accretion outbursts** *by Sarah A. Smith et al.*

astro-ph/2504.13039: **Evidence for sulfur chemistry in the atmosphere of the warm sub-Neptune TOI-270 d** *by Lukas Felix et al.*

astro-ph/2504.12645: **High-Time-Cadence Spectroscopy and Photometry of Stellar Flares on M-dwarf YZ Canis Minoris with Seimei Telescope and TESS. II. Statistical Properties of Blue/Red Asymmetries in the Hα Line** *by Yuto Kajikiya et al.*

astro-ph/2504.13262: **Quantifying the Limits of TESS Stellar Rotation Measurements with the K2-TESS Overlap** *by Andrew W. Boyle et al.*

astro-ph/2504.12907: **De-jittering Ariel: an optimized algorithm** *by Andrea Bocchieri et al.*

astro-ph/2504.12946: **Prospects for Detecting Signs of Life on Exoplanets in the JWST Era** *by Sara Seager et al.*

astro-ph/2504.12884: **TOI-3493 b: A planet with a Neptune-like density transiting a bright G0-type star** *by P. Chaturvedi et al.*

astro-ph/2504.13679: **MIRI-JWST mid-infrared direct imaging of the debris disk of HD106906** *by Daniel Rouan et al.*

astro-ph/2504.13810: **Disentangling the Effects of Temperature, Clouds, and Gravity on K I doublet in L dwarfs** *by Alexandra J. Baldelli et al.*

astro-ph/2504.13997: **A Revised Density Estimate for the Largest Known Exoplanet, HAT-P-67 b** *by Gavin Wang et al.*

astro-ph/2504.14010: **H2S ice sublimation dynamics: experimentally constrained binding energies, entrapment efficiencies, and snowlines** *by Julia C. Santos et al.*

astro-ph/2504.14023: **Ice sublimation in the dynamic HD 100453 disk reveals a rich reservoir of inherited complex organics** *by Alice S. Booth et al.*

astro-ph/2504.14060: **Out on a Limb: The Signatures of East-West Asymmetries in Transmission Spectra from General Circulation Models** *by Kenneth E. Arnold et al.*

astro-ph/2504.13999: **Multidimensional half-moment multigroup radiative transfer. Improving moment-based thermal models of circumstellar disks** *by David Melon Fuksman et al.*

astro-ph/2504.14228: **Refractory phosphorus in the HD 100546 protoplanetary disk** *by Mihkel Kama et al.*

astro-ph/2504.14299: **Upper limits on CN from exocomets transiting β Pictoris** *by M. A. Kenworthy et al.*

astro-ph/2504.14318: **The Ophiuchus DIsk Survey Employing ALMA (ODISEA): A Unified Evolutionary Sequence of Planet-Driven Substructures Explaining the Diversity of Disk Morphologies** *by Santiago Orcajo et al.*

astro-ph/2504.15393: **Stringent Limits on H_3^+ Emission from the Hot Jupiters WASP-80b and WASP-69b** *by Tyler Richey-Yowell et al.*

astro-ph/2504.15352: **Dust populations from 30 to 1000 au in the debris disk of HD 120326** *by C. Desgrange et*

al.

astro-ph/2504.15277: **A Short History of (Orbital) Decay: Roman's Prospects for Detecting Dying Planets** *by Kylee Carden et al.*

astro-ph/2504.16201: **Uncertainties in the Inference of Internal Structure: The Case of TRAPPIST-1 f** *by David R. Rice et al.*

astro-ph/2504.16164: **Exploring the Neptunian Desert: Insights from a Homogeneous Planetary Sample** *by Lauren Doyle et al.*

astro-ph/2504.16050: **The jet and circumstellar environment of the young binary DF Tau** *by A. V. Dodin et al.*

astro-ph/2504.15916: **Are there Spectral Features in the MIRI/LRS Transmission Spectrum of K2-18b?** *by Jake Taylor*

astro-ph/2504.15787: **Plasma Mechanism of Radio Emission Generation at the Bow Shock of the Exoplanet HD 189733b** *by A. A. Kuznetsov, V. V. Zaitsev*

astro-ph/2504.15757: **Retrieving day- and nightside atmospheric properties of the ultra-hot Jupiter TOI-2109b. Detection of Fe and CO emission lines and evidence for inefficient heat transport** *by D. Cont et al.*

astro-ph/2504.15982: **The effects of transport processes on the bulk composition of the first generation of planetesimals interior to the water iceline** *by Mark Oosterloo et al.*

astro-ph/2504.17011: **Towards understanding stellar variability at the sub m/s level: Isolating granulation signals in synthetic spectral lines** *by Ginger Frame et al.*

astro-ph/2504.16982: **Thermal Emission and Confirmation of the Frigid White Dwarf Exoplanet WD 1856+534b** *by Mary Anne Limbach et al.*

astro-ph/2504.16772: **Thermal Evolution and Mass Loss on Short-Period, Low-Mass Planets During FU Orionis Outbursts** *by Juliette Becker, Konstantin Batygin*

astro-ph/2504.16662: **MHD Simulations Preliminarily Predict The Habitability and Radio Emission of TRAPPIST-1e** *by BoRui Wang et al.*

astro-ph/2504.17978: **Confirmation of a ring structure in the disk around MP Mus (PDS 66) with ALMA Band 7 observations** *by Aurora Aguayo et al.*

astro-ph/2504.17849: **First detections of PN, PO and PO+ toward a shocked low-mass starless core** *by Samantha Scibelli et al.*

astro-ph/2504.17658: **Insights from Analytical Theory of Eccentric Circumbinary Disks** *by Marcela Grcic et al.*

astro-ph/2504.17361: **Stellar Physics Across the HR Diagram with Gaia** *by Orlagh L. Creevey*

astro-ph/2504.17585: **The tidal heating of the exoplanet 55 Cnc e. The role of the orbital eccentricity** *by Sylvio Ferraz-Mello, Cristian Beaugé*

astro-ph/2504.18726: **exoALMA XII: Weighing and sizing exoALMA disks with rotation curve modelling** *by Cristiano Longarini et al.*

astro-ph/2504.18717: **exoALMA. X. channel maps reveal complex ^{12}CO abundance distributions and a variety of kinematic structures with evidence for embedded planets** *by Christophe Pinte et al.*

astro-ph/2504.18706: **A Search for Exoplanet Candidates in TESS 2-min Light Curves using Joint Bayesian Detection** *by Jamila S. Taaki et al.*

astro-ph/2504.18688: **exoALMA I. Science Goals, Project Design and Data Products** *by Richard Teague et al.*

astro-ph/2504.18643: **exoALMA VII: Benchmarking Hydrodynamics and Radiative Transfer Codes** *by Jaehan Bae et al.*

astro-ph/2504.18485: **Validation of the ESPRESSO Wavelength Calibration Using Iodine Absorption Cell Spectra** *by Tobias M. Schmidt et al.*

astro-ph/2504.18725: **exoALMA IV: Substructures, Asymmetries, and the Faint Outer Disk in Continuum Emission** *by Pietro Curone et al.*

astro-ph/2504.18299: **Dust-driven vortex cascades originating at water snow region: A pathway to planetesimal formation** *by Kundan Kadam, Zsolt Regály*

astro-ph/2504.18223: **A transiting rocky super-Earth and a non-transiting sub-Neptune orbiting the M dwarf TOI-771** *by G. Lacedelli et al.*

astro-ph/2504.18431: **Life on the Edge: Using Planetary Context to Enhance Biosignatures and Avoid False Positives** *by Rudy Arthur et al.*

astro-ph/2504.18751: **Global Simulations of Gravitational Instability in Protostellar Disks with Full Radiation Transport II. Locality of Gravitoturbulence, Clumpy Spirals, and Implications for Observable Substructure** *by Wenrui Xu et al.*

astro-ph/2504.18815: **A Next-Generation Exoplanet Atmospheric Retrieval Framework for Transmission Spectroscopy (NEXOTRANS): Comparative Characterization for WASP-39 b Using JWST NIRISS, NIRSpec PRISM, and MIRI Observations** *by Tonmoy Deka et al.*

astro-ph/2504.19371: **ExoALMA XIII. gas masses from N2H+ and C18O: a comparison of protoplanetary gas disk mass measurement techniques** *by Leon Trapman et al.*

astro-ph/2504.19369: **Thermodynamic constraints on the citric acid cycle and related reactions in ocean world interiors** *by Seda Işık et al.*

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