ExoPlanet News
An Electronic Newsletter

No. 177, 12 March 2024

Editors: H. Wang, L. Schlarmann, J. Davoult, D. Angerhausen & T.-E. Riesen
NCCR PlanetS, Gesellschaftsstrasse 6, CH-3012 Bern, Switzerland

exoplanetnews@nccr-planets.ch
http://nccr-planets.ch/exoplanetnews

Contents

1 Editorial

Welcome to Edition 177 of the ExoPlanet News!

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 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 (v2.0) 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 April 9, 2024.

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

Daniel Angerhausen
Jeanne Davoult
Haiyang Wang
Leander Schlarmann
Timm-Emanuel Riesen

2 Abstracts of refereed papers

TIaRA TESS 1: Estimating exoplanet yields from Year 1 and Year 3 SPOC lightcurves

T. Rodel[1,2,3]*, D. Bayliss*[1,2]*, S. Gill*[1,2]*, F. Hawthorn*[1,2]

[1] Department of Physics, University of Warwick, Gibbet Hill Road, Coventry, CV4 7AL, UK
[2] Centre for Exoplanets and Habitability, University of Warwick, Gibbet Hill Road, Coventry CV4 7AL, UK
[3] Astrophysics Research Centre, School of Mathematics and Physics, Queen's University Belfast, Belfast, BT7 1NN, UK

Monthly Notices of the Royal Astronomical Society, Accepted (2024arXiv240207800R)

We present a study of the detection efficiency for the TESS mission, focusing on the yield of longer-period transiting exoplanets ($P > 25$ days). We created the Transit Investigation and Recoverability Application (`TIaRA`) pipeline to use real TESS data with injected transits to create sensitivity maps which we combine with occurrence rates derived from Kepler. This allows us to predict longer-period exoplanet yields, which will help design follow-up photometric and spectroscopic programs, such as the NGTS Monotransit Program. For the TESS Year 1 and Year 3 SPOC FFI lightcurves, we find 2271^{+241}_{-138} exoplanets should be detectable around AFGKM dwarf host stars. We find 215^{+37}_{-23} exoplanets should be detected from single-transit events or "monotransits". An additional 113^{+22}_{-13} detections should result from "biennial duotransit" events with one transit in Year 1 and a second in Year 3. We also find that K dwarf stars yield the most detections by TESS per star observed. When comparing our results to the TOI catalogue we find our predictions agree within 1σ of the number of discovered systems with periods between 0.78 and 6.25 days and agree to 2σ for periods between 6.25 and 25 days. Beyond periods of 25 days we predict 403^{+64}_{-38} detections, which is 3 times as many detections as there are in the TOI catalogue with $> 3\sigma$ confidence. This indicates a significant number of long-period planets yet to be discovered from TESS data as monotransits or biennial duotransits.

Download/Website: `https://ui.adsabs.harvard.edu/abs/2024arXiv240207800R/abstract`

Contact: `trodel01@qub.ac.uk`

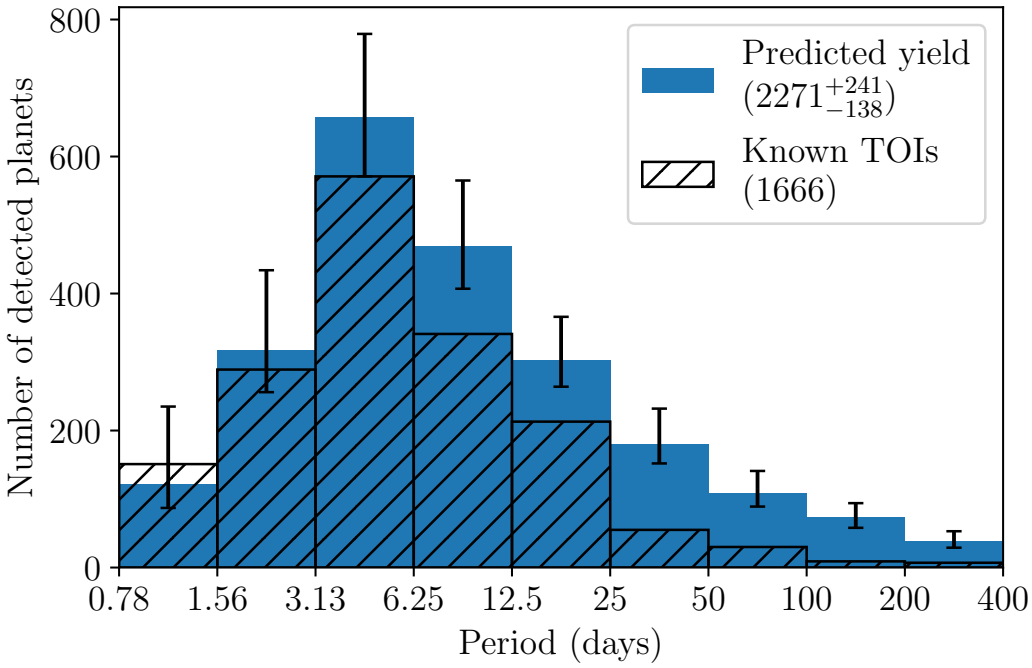

Figure 1: Distribution in orbital period of predicted `TIaRA` transiting exoplanet yields from the TESS Year 1 and Year 3 SPOC FFI lightcurves (solid blue bars). Also displayed are actual TESS discoveries (transparent black outlined bars) calculated using TOI catalogue downloaded from the NASA exoplanet archive on 2023-06-15 (excluding flagged false positives) and matched to TIC IDs of southern ecliptic SPOC FFI sample

The effect of cloudy atmospheres on the thermal evolution of warm giant planets from an interior modelling perspective

Anna Julia Poser[1], *Ronald Redmer*[1]

[1] University of Rostock, Institute of Physics, D-18059 Rostock, Germany

Monthly Notices of the Royal Astronomical Society, in press (arXiv: https://doi.org/10.48550/arXiv.2402.19466)

We are interested in the influence of cloudy atmospheres on the thermal radius evolution of warm exoplanets from an interior modelling perspective. By applying a physically motivated but simple parameterized cloud model, we obtain the atmospheric P-T structure that is connected to the adiabatic interior at the self-consistently calculated radiative-convective boundary. We investigate the impact of cloud gradients, with the possibility of inhibiting superadiabatic clouds. Furthermore, we explore the impact on the radius evolution for a cloud base fixed at a certain pressure versus a subsiding cloud base during the planets' thermal evolution. We find that deep clouds clearly alter the evolution tracks of warm giants, leading to either slower/faster cooling than in the cloudless case (depending on the cloud model used). When comparing the fixed versus dynamic cloud base during evolution, we see an enhanced behaviour resulting in a faster or slower cooling in the case of the dynamic cloud base. We show that atmospheric models including deep clouds can lead to degeneracy in predicting the bulk metallicity of planets, Z_P. For WASP-10b, we find a possible span of $\approx Z_\mathrm{P}{}^{+0.10}_{-0.06}$. For TOI-1268b, it is $\approx Z_\mathrm{P}{}^{+0.10}_{-0.05}$. Further work on cloud properties during the long-term evolution of gas giants is needed to better estimate the influence on the radius evolution.

Download/Website: `https://doi.org/10.48550/arXiv.2402.19466`

Contact: `anna.poser@uni-rostock.de`

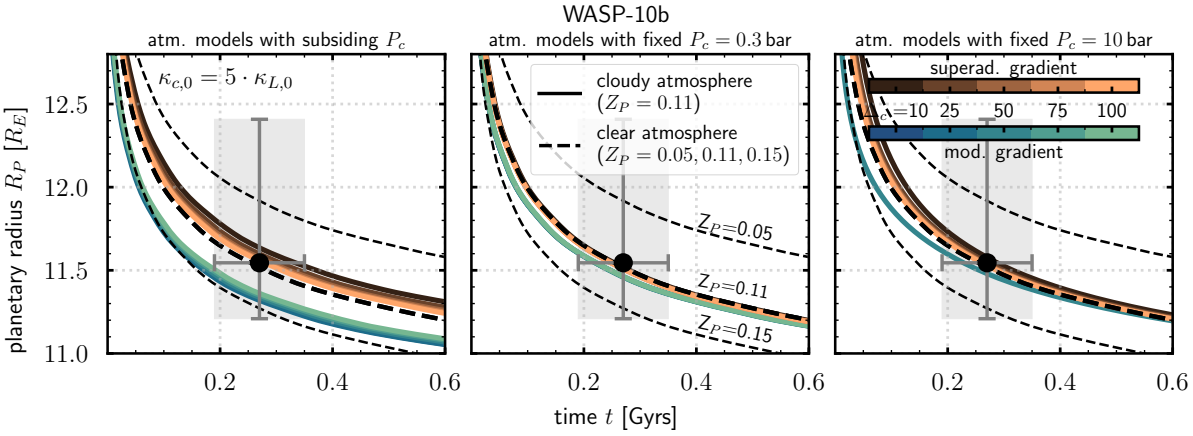

Figure 2: Evolution curves for the non-inflated warm Jupiter WASP-10b ($T_\mathrm{eq} = 950\,\mathrm{K}$) for different atmosphere models. The first column shows the results that include the dynamic model to calculate P_c using $MgSiO_3$ as the possible condensate, while the second/third uses the fixed location at $P_\mathrm{c} = 0.3/10\,\mathrm{bar}$. The cloudy evolution curves have been calculated for $Z_\mathrm{P} = 0.11$, the corresponding clear model is shown in thick dashed black. Additionally, we show in thin dashed black the results with a clear atmosphere for $Z_\mathrm{P} = 0.05, 0.15$.

The EBLM project – XIII. The absolute dynamical masses of the circumbinary planet host TOI-1338/BEBOP-1, and applications to the study of exoplanet atmospheres.

D. Sebastian[1], *A. H.M.J. Triaud*[1], *M. Brogi*[2,3,4], *T. A. Baycroft*[1], *M. R. Standing*[5,6], *P. F.L. Maxted*[7], *D. V. Martin*[8], *L. Sairam*[1,9], *M. B. Nielsen*[1]

[1] School of Physics & Astronomy, University of Birmingham, Edgbaston, Birmimgham, B15 2TT, UK
[2] Dipartimento di Fisica, Università degli Studi di Torino, via Pietro Giuria 1, I-10125 Torino, Italy
[3] Department of Physics, University of Warwick, Coventry CV4 7AL, UK
[4] INAF-Osservatorio Astrofisico di Torino, Via Osservatorio 20, I-10025 Pino Torinese, Italy
[5] School of Physical Sciences, The Open University, Walton Hall, Milton Keynes. MK7 6AA. UK
[6] European Space Agency (ESA), European Space Astronomy Centre (ESAC), Camino Bajo del Castillo s/n, 28692 Villanueva de la Cañada, Madrid, Spain
[7] Astrophysics Group, Keele University, ST5 5BG, UK
[8] Department of Physics & Astronomy, Tufts University, MA 02155, USA
[9] Institute of Astronomy, University of Cambridge, Madingley road, Cambridge CB3 0HA, UK

Monthly Notices of the Royal Astronomical Society, in press (arxiv:2402.06449)

High-contrast eclipsing binaries with low mass M-dwarf secondaries are precise benchmark stars to build empirical mass-radius relationships for fully convective low-mass ($\mathrm{M_{star}} < 0.35\,\mathrm{M_{sun}}$) dwarf stars. The contributed light of the M-dwarf in such binaries is usually much less than one per cent at optical wavelengths. This enables the detection of circumbinary planets from precise radial velocity measurements. High-resolution cross-correlation techniques are typically used to detect exoplanet atmospheres. One key aspect of these techniques is the post-processing, which includes the removal of telluric and spectral lines of the host star. We introduce the application of such techniques to optical high-resolution spectra of the circumbinary planet-host TOI-1338/BEBOP-1, turning it effectively into a double-lined eclipsing binary. By using simulations, we further explore the impact of post-processing techniques for high-contrast systems. We detect the M-dwarf secondary with a significance of 11-σ and measure absolute dynamical masses for both components. Compared to previous model-dependent mass measurements, we obtain a four times better precision. We further find that the post-processing results in negligible systematic impact on the radial velocity precision for TOI-1338/BEBOP-1 with more than 96.6 per cent (1-σ) of the M-dwarf's signal being conserved. We show that these methods can be used to robustly measure dynamical masses of high-contrast single-lined binaries providing important benchmark stars for stellar evolution particularly near the bottom of the main sequence. We also demonstrate how to retrieve the phase curve of an exoplanet with high-resolution spectroscopy using our data.

Download/Website: `https://arxiv.org/abs/2402.06449`

Contact: `D.Sebastian.1@bham.ac.uk`

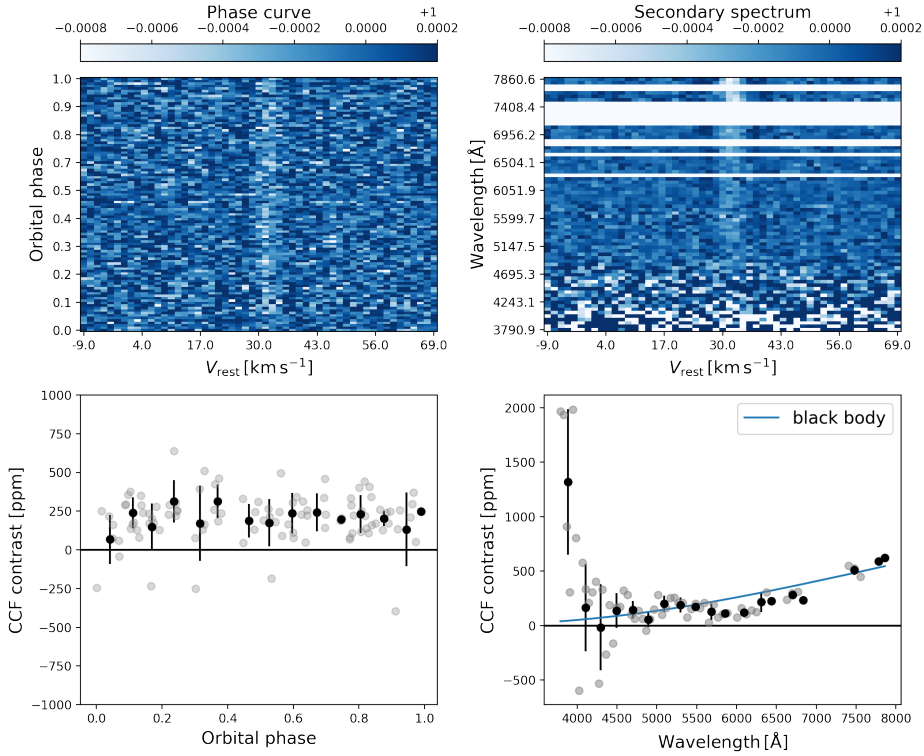

Figure 3: Phase- and wavelength resolved cross-correlation signal of the detected M-dwarf spectrum in its rest-frame. Upper panels, Left: as a function of the orbital phase, Right: as a function of the Wavelength. Lower panels, measurements of the cross-correlation contrast of individual spectra (grey dots) and binned data (black dots). Left: Phase curve of the M-dwarf secondary, Right: residual flux as a function of wavelength, showing a low resolution spectrum of the M-dwarf. Blue line: residual flux of the secondary, assuming blackbody spectra, scaled to the average CCF contrast with ESPRESSO (10 per cent).

The TESS SPOC FFI Target Sample Explored with Gaia

L. Doyle[1,2]*, D. J. Armstrong*[1,2]*, D. Bayliss*[1,2]*, T. Rodel*[1,2,3]*, V. Kunovac*[1,2]

[1] Centre for Exoplanets and Habitability, University of Warwick, Coventry, CV4 7AL, UK
[2] Department of Physics, University of Warwick, Coventry, CV4 7AL, UK
[3] Astrophysics Research Centre, School of Mathematics and Physics, Queen's University Belfast, Belfast, BT7 1NN, UK

Monthly Notices of the Royal Astronomical Society, published (arXiv:2403.02407)

The TESS mission has provided the community with high-precision times series photometry for ∼2.8 million stars across the entire sky via the Full Frame Image (FFI) light curves produced by the TESS Science Processing Operations Centre (SPOC). This set of light curves is an extremely valuable resource for the discovery of transiting exoplanets and other stellar science. However, due to the sample selection, this set of light curves does not constitute a magnitude limited sample. In order to understand the effects of this sample selection, we use Gaia DR2 and DR3 to study the properties of the stars in the TESS-SPOC FFI light curve set, with the aim of providing vital context for further research using the sample. We report on the properties of the TESS-SPOC FFI Targets in Sectors 1 – 55 (covering Cycles 1 – 4). We cross-match the TESS-SPOC FFI Targets with the Gaia DR2 and DR3 catalogues of all targets brighter than Gaia magnitude 14 to understand the effects of sample selection on the overall stellar properties. This includes Gaia magnitude, parallax, radius, temperature, non-single star flags, luminosity, radial velocity and stellar surface gravity. In total, there are ∼16.7 million Gaia targets brighter than G=14, which when cross-matched with the TESS-SPOC FFI Targets leaves ∼2.75 million. We investigate the binarity of each TESS-SPOC FFI Target and calculate the radius detection limit from two detected TESS transits which could be detected around each target. Finally, we create a comprehensive main sequence TESS-SPOC FFI Target sample which can be utilised in future studies.

Download/Website: `https://arxiv.org/abs/2403.02407/`

Contact: `lauren.doyle@warwick.ac.uk`

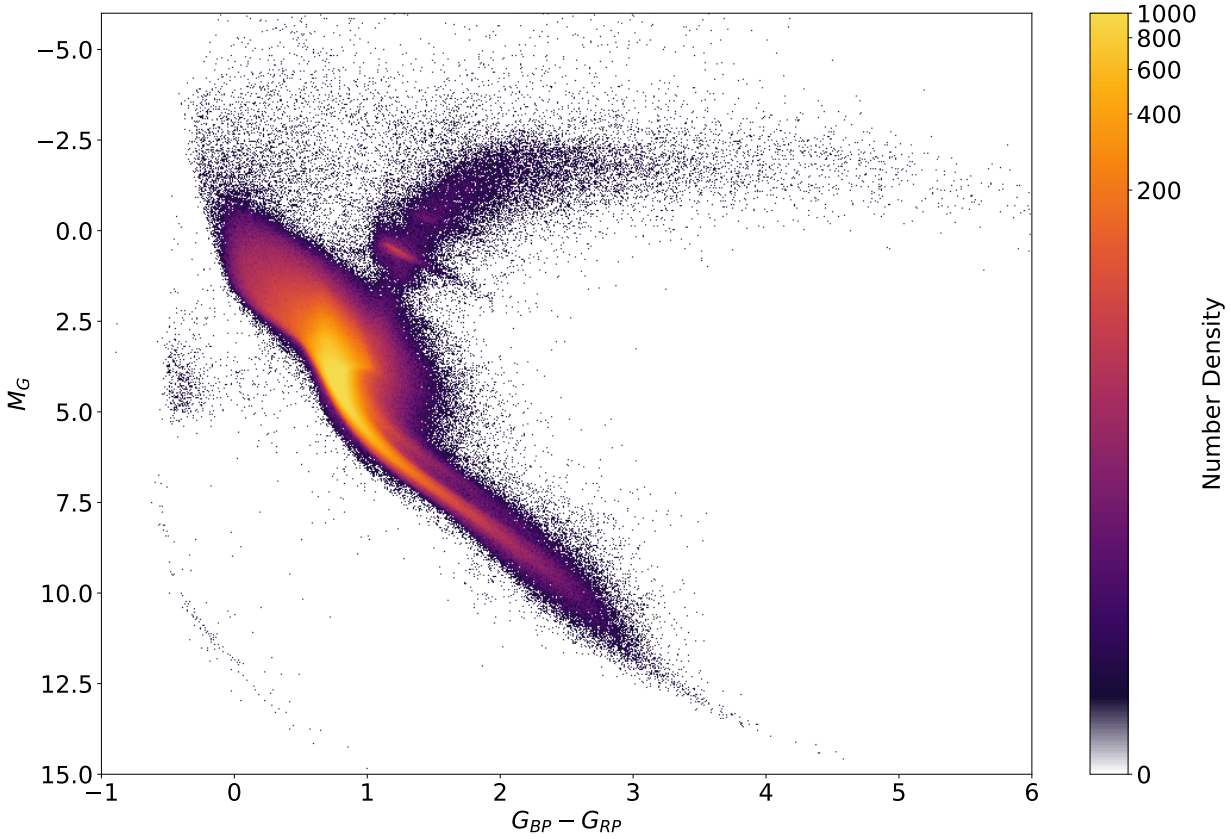

Figure 4: The colour-magnitude diagram of all TESS-SPOC FFI Targets from TESS Sectors 1 – 55. All colours along with the parallax, used to determine the absolute Gaia magnitude, were taken from the Gaia DR3 catalogue. The colour scale represents the log of the density of stars.

The GAPS Programme at TNG LIV. Multiple molecular species in the atmosphere of HAT-P-11 b and review of the HAT-P-11 planetary system

M. Basilicata[1,2], P. Giacobbe[2], A. S. Bonomo[2], G. Scandariato[3], M. Brogi[4,2], V. Singh[3], A. Di Paola[4], L. Mancini[1,2,5], A. Sozzetti[2], A. F. Lanza[3], P. E. Cubillos[2,14], M. Damasso[2], S. Desidera[13], K. Biazzo[3], A. Bignamini[10], F. Borsa[6], L. Cabona[13], I. Carleo[11,2], A. Ghedina[7], G. Guilluy[2], A. Maggio[8], G. Mainella[7], G. Micela[8], E. Molinari[6], M. Molinaro[10], D. Nardiello[13], M. Pedani[7], L. Pino[12], E. Poretti[6,7], J. Southworth[9], M. Stangret[13], D. Turrini[2]

[1] Department of Physics, University of Rome "Tor Vergata", Via della Ricerca Scientifica 1, I-00133 Rome, Italy
[2] INAF – Osservatorio Astrofisico di Torino, Via Osservatorio 20, I-10025, Pino Torinese, Italy
[3] INAF – Osservatorio Astrofisico di Catania, Via S. Sofia 78, I-95123, Catania, Italy
[4] Department of Physics, University of Turin, Via Pietro Giuria 1, I-10125 Torino, Italy
[5] Max Planck Institute for Astronomy, Königstuhl 17, 69117 – Heidelberg, Germany
[6] INAF – Osservatorio Astronomico di Brera, Via E. Bianchi 46, 23807 Merate (LC), Italy
[7] Fundación Galileo Galilei – INAF, Rambla José Ana Fernandez Pérez 7, 38712 – Breña Baja, Spain
[8] INAF – Osservatorio Astronomico di Palermo, Piazza del Parlamento, 1, I-90134 Palermo, Italy
[9] Astrophysics Group, Keele University, Keele ST5 5BG, UK
[10] INAF – Osservatorio Astronomico di Trieste, via Tiepolo 11, 34143 Trieste, Italy
[11] Instituto de Astrofísica de Canarias (IAC), 38205 La Laguna, Tenerife, Spain
[12] INAF – Osservatorio Astrofisico di Arcetri, Largo Enrico Fermi 5, I-50125 Firenze, Italy
[13] INAF – Osservatorio Astronomico di Padova, Vicolo dell'Osservatorio 5, 35122 Padova, Italy
[14] Space Research Institute, Austrian Academy of Sciences, Schmiedlßtrasse 6, 8042 Graz, Austria

Astronomy & Astrophysics, in press (arXiv:2403.01527)

The atmospheric characterisation of hot and warm Neptune-size exoplanets is challenging mainly due to their relatively small radius and atmospheric scale height that reduce the amplitude of atmospheric spectral features. The warm-Neptune HAT-P-11 b is a remarkable target for atmospheric characterisation due to the large brightness of its host star ($V = 9.46$ mag; $H = 7.13$ mag). This work aims at: (i) reviewing the main physical and architectural properties of the HAT-P-11 planetary system; (ii) probing the presence of eight molecular species in the atmosphere of HAT-P-11 b through near-Infrared (NIR) high-resolution transmission spectroscopy. The physical and architectural properties of the HAT-P-11 planetary system were reviewed by analysing transits and occultations of HAT-P-11 b from the *Kepler* data set as well as HIRES at Keck archival radial-velocity data. The latter were modelled with Gaussian-Process regression and a combined quasi-periodic and squared-exponential kernel to account for stellar variations on both (short-term) rotation and (long-term) activity-cycle timescales. To probe the atmospheric composition of HAT-P-11 b, four transits of this target were observed with the NIR GIANO-B at TNG spectrograph and data were cross-correlated with template atmospheric transmission spectra. We find that the long-period radial-velocity signal previously attributed to the HAT-P-11 c planet ($P \sim 9.3$ years; $M_{\rm p} \sin i \sim 1.6\,M_{\rm J}$; $e \sim 0.6$) is more likely due to the stellar magnetic activity cycle. Nonetheless, the Hipparcos-Gaia difference in proper motion anomaly suggests that an outer-bound companion might still exist. For HAT-P-11 b, we measure a radius of $R_{\rm p} = 0.4466 \pm 0.0059\,R_{\rm J}$, a mass of $M_{\rm p} = 0.0787 \pm 0.0048\,M_{\rm J}$, a bulk density of $\rho_{\rm p} = 1.172 \pm 0.085\,{\rm g\,cm^{-3}}$, and an eccentricity of $e = 0.2577^{+0.0033}_{-0.0025}$. These values are compatible with those from the literature. Probing its atmosphere, we detect the presence of two molecular species: H_2O and NH_3, with a S/N of 5.1 and 5.3, and a significance of $3.4\,\sigma$ and $5.0\,\sigma$, respectively. We also tentatively detect the presence of CO_2 and CH_4, with a S/N of 3.0 and 4.8, and a significance of $3.2\,\sigma$ and $2.6\,\sigma$, respectively. In conclusion, we revisit the HAT-P-11 planetary system, confirm the presence of water vapour, and report the detection of NH_3 in the atmosphere of HAT-P-11 b, finding also hints for the presence of CO_2 and CH_4 that need to be confirmed by further observations.

Download/Website: `https://arxiv.org/abs/2403.01527`

Contact: `mario.basilicata@inaf.it`

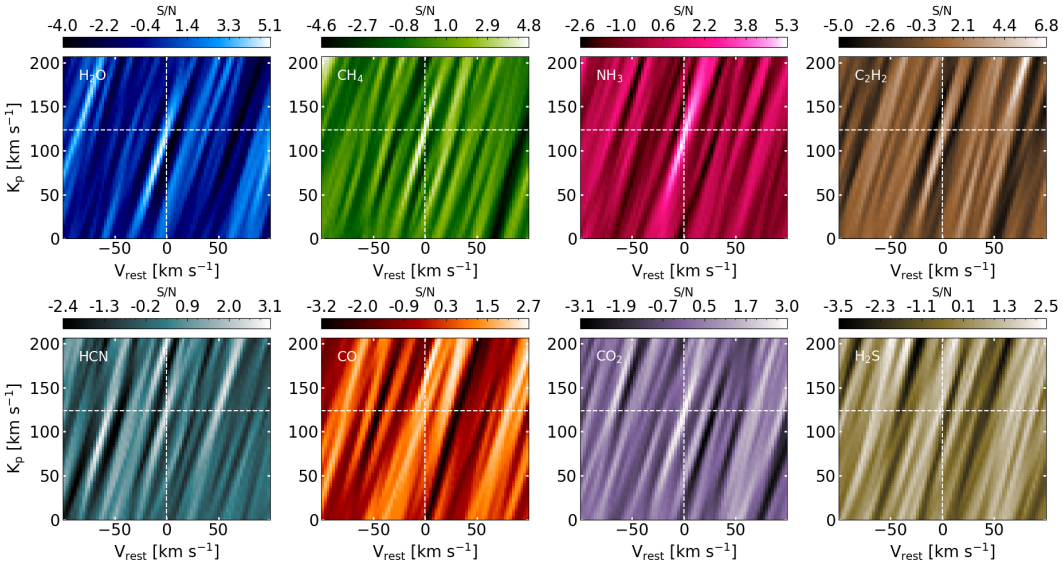

Figure 5: Signal-to-noise ratio (S/N) $K_{\rm p} - V_{\rm rest}$ maps for the probed chemical species: H_2O, CH_4, NH_3, C_2H_2, HCN, CO, CO_2, and H_2S. Each $K_{\rm p} - V_{\rm rest}$ map shows the S/N of the cross-correlation of the GIANO-B spectra (4 transits combined) with isothermal single-species atmospheric models, as a function of the planet's radial-velocity semi-amplitude ($K_{\rm p}$) and the planet's rest-frame velocity ($V_{\rm rest}$). The S/N is computed by dividing the peak value of the cross-correlation function at each $K_{\rm p}$ by the standard deviation of the noise far from the peak ($|V_{\rm rest}| > 25\,{\rm km\,s^{-1}}$). The vertical and horizontal white dashed lines correspond to $V_{\rm rest} = 0\,{\rm km\,s^{-1}}$ and the expected $K_{\rm p}$ value ($\hat{K}_{\rm p} = 123.4 \pm 9.9\,{\rm km\,s^{-1}}$), respectively, and the point where these 2 lines cross each other represent the expected radial velocity of a signal with planetary origin.

Confronting compositional confusion through the characterisation of the sub-Neptune orbiting HD 77946

L. Palethorpe[1,2], A. Anna John[3,4], A. Mortier[5], J. Davoult[6], T. G. Wilson[3,4], K. Rice[1,2], A. C. Cameron[3,4], Y. Alibert[6,7], L. A. Buchhave[8], L. Malavolta[9], J. Cadman[1,2], M. López-Morales[10], X. Dumusque[11], A. M. Silva[12,13], S. N. Quinn[10], V. Van Eylen[14], S. Vissapragada[10], L. Affer[15], D. Charbonneau[10], R. Cosentino[16], A. Ghedina[16], R. D. Haywood[17,18], D. W. Latham[10], F. Lienhard[19], A. F. Martínez Fiorenzano[16], M. Pedani[16], F. Pepe[11], M. Pinamonti[20], A. Sozzetti[20], M. Stalport[12], S. Udry[13], A. Vanderburg[21]

[1] Institute for Astronomy, University of Edinburgh, Royal Observatory, Blackford Hill, Edinburgh, EH9 3HJ, UK
[2] Centre for Exoplanet Science, University of Edinburgh, Edinburgh, EH9 3HJ, UK
[3] SUPA School of Physics and Astronomy, University of St Andrews, North Haugh, St Andrews, KY16 9SS, UK
[4] Centre for Exoplanet Science, University of St Andrews, North Haugh, St Andrews, KY169SS, UK
[5] School of Physics & Astronomy, University of Birmingham, Edgbaston, Birmingham, B15 2TT, UK
[6] Physics Institute, University of Bern, Gesellsschaftstrasse 6, 3012 Bern, Switzerland
[7] Center for Space and Habitability, University of Bern, Gesellsschaftstrasse 6, 3012 Bern, Switzerland
[8] DTU Space, National Space Institute, Technical University of Denmark, Elektrovej 328, DK-2800 Kgs. Lyngby, Denmark
[9] Dipartimento di Fisica e Astronomia "Galileo Galilei," Universitá di Padova, Vicolo del l'Osservatorio 3, I-35122 Padova, Italy
[10] Center for Astrophysics — Harvard & Smithsonian, 60 Garden Street, Cambridge, MA 02138, USA
[11] Département d'astronomie de l'Université de Genève, Chemin Pegasi 51, CH-1290 Versoix, Switzerland
[12] Space sciences, Technologies and Astrophysics Research (STAR) Institute, University of Liège, Allée du 6 Août 19C, 4000 Liège, Belgium
[13] Observatoire de Genève, University of Geneva, Chemin Pegasi 51, 1290 Versoix, Switzerland
[14] Mullard Space Science Laboratory, University College London, Holmbury St Mary, Dorking, Surrey, RH5 6NT, UK
[15] INAF - Osservatorio Astronomico di Palermo, Piazza Del Parlamento 1, 90134 Palermo
[16] Fundación Galileo Galilei - INAF, Rambla J. A. F. Perez, 7, E-38712 S.C. Tenerife, Spain
[17] Astrophysics Group, University of Exeter, Exeter EX4 2QL, UK
[18] STFC Ernest Rutherford Fellow
[19] Astrophysics Group, Cavendish Laboratory, University of Cambridge, J.J. Thomson Avenue, Cambridge CB3 0HE, UK
[20] INAF - Osservatorio Astrofisico di Torino, Via Osservatorio 20, I-10025 Pino Torinese, Italy
[21] Department of Physics and Kavli Institute for Astrophysics and Space Research, Massachusetts Institute of Technology, Cambridge, MA 02139, USA

Monthly Notices of the Royal Astronomical Society, published (arXiv:2403.04464)

We report on the detailed characterization of the HD 77946 planetary system. HD 77946 is an F5 (M_* = 1.17 $M_\odot$, R_* = 1.31 $R_\odot$) star, which hosts a transiting planet recently discovered by NASA's Transiting Exoplanet Survey Satellite (*TESS*), classified as TOI-1778 b. Using *TESS* photometry, high-resolution spectroscopic data from HARPS-N, and photometry from *CHEOPS*, we measure the radius and mass from the transit and RV observations, and find that the planet, HD 77946 b, orbits with period $P_{\rm b}$ = $6.527282^{+0.000015}_{-0.000020}$ d, has a mass of $M_{\rm b} = 8.38 \pm 1.32 M_\oplus$, and a radius of $R_{\rm b} = 2.705^{+0.086}_{-0.081} R_\oplus$. From the combination of mass and radius measurements, and the stellar chemical composition, the planet properties suggest that HD 77946 b is a sub-Neptune with a $\sim$1% H/He atmosphere. However, a degeneracy still exists between water-world and silicate/iron-hydrogen models, and even though interior structure modelling of this planet favours a sub-Neptune with a H/He layer that makes up a significant fraction of its radius, a water-world composition cannot be ruled out, as with $T_{\rm eq} = 1248^{+40}_{-38}$ K, water may be in a supercritical state. The characterisation of HD 77946 b, adding to the small sample of well-characterised sub-Neptunes, is an important step forwards on our journey to understanding planetary formation and evolution pathways. Furthermore, HD 77946 b has one of the highest transmission spectroscopic metrics for small planets orbiting hot stars, thus transmission spectroscopy of this key planet could prove vital for constraining the compositional confusion that currently surrounds small exoplanets.

Download/Website: `https://arxiv.org/abs/2403.04464`

Contact: `larissa.palethorpe@ed.ac.uk`

3 Conferences and Workshops

2024 Sagan Summer Hybrid Workshop
Advances in Direct Imaging: From Young Jupiters to Habitable Earths

T. Chen, D. Gelino
NASA Exoplanet Science Institute, California Institute of Technology, Pasadena, CA, USA

Hybrid Workshop, July 22-26, 2024

Direct imaging and spectroscopy has become a standard tool for studying the atmospheres and orbits of young, self-luminous giant planets in wide orbits. Advances in starlight suppression and spectroscopy technologies and techniques have gradually improved sensitivity to lower-mass and closer-in young planets. Going forward, ground- and space-based observatories will have complementary roles to play in the study of mature planetary systems, whether the search for biosignatures on Earth-like planets or the characterization of the variety of planetary system architectures.

The agenda with confirmed speakers, as well as descriptions of the hands-on sessions, is available on the workshop website. This workshop will cover the scientific questions in exoplanets motivating direct imaging. Sessions will explore basic optical principles of high-contrast imaging and the fundamentals of coronagraph and wavefront sensing technologies and high-contrast instrument design. Presentations and group exercises will cover approaches to starlight/PSF subtraction and to planet and disk recovery, determination of orbits from imaging observations, and other topics. The workshop will conclude with a look toward future facilities.

As has been the case for the past few years, the 2024 workshop will be hybrid with both in-person attendance and on-line attendance via Zoom webinar. Registration is free for everyone.

The Sagan Summer Workshops are aimed at advanced undergraduates, grad students, and postdocs, however all are welcome to attend. Attendees will also participate in hands-on tutorials and have the chance to meet in smaller groups with our speakers.

There is no registration fee for this workshop. Registration and the application for financial assistance to attend in person are now available. The applications and the required recommendation letters are due by March 21 at 5 pm Pacific and are submitted through the workshop website. Note that we are only able to support the local costs (hotel and per diem) of successful applicants; we are not able to provide any support for airfare. Please contact us with any questions or to be added to the email list.

Download/Website: `http://nexsci.caltech.edu/workshop/2024`
Contact: `sagan_workshop@ipac.caltech.edu`

4 Jobs and Positions

Postdoctoral Position in Exoplanets and/or Substellar Objects

Professor Ray Jayawardhana

Baltimore, Maryland, United States of America, July–December 2024

Applications are invited for a Postdoctoral Fellow position at the Center for Astrophysical Sciences of Johns Hopkins University. The successful candidate will work with Professor Ray Jayawardhana and his collaborators on observational studies of extra-solar planets and/or sub-stellar objects. Candidates with expertise and interests in ground-based high-resolution exoplanet spectroscopy and/or low-resolution spectroscopy of exoplanets and planetary-mass brown dwarfs with the James Webb Space Telescope (JWST) are particularly encouraged to apply.

Group members lead the on-going ExoGemS Large Program at the Gemini Observatory targeting 30+ planets that span a wide range of properties. Prof. Jayawardhana is also a member of the JWST/NIRISS science team, with 200 hours of GTO dedicated to exoplanet characterization. In addition, with Drs. Aleks Scholz and Koraljka Muzic, he co-leads a 20-hour JWST/NIRISS GTO program focused on the lowest-mass free-floating sub-stellar objects. Group members also use data from TESS, Kepler, CHEOPS, Subaru, Keck, VLT, CFHT, and other major observatories.

The position is for two years, with extension to a third year possible, and comes with a competitive salary and funds for research expenses. Start date is flexible, ideally between July-December 2024. The JHU Center for Astrophysical Sciences and the adjacent Space Telescope Science Institute form a large and lively astrophysical community.

Applicants should send their curriculum vitae, a description of research interests and plans and a list of publications, and should arrange for three letters of recommendation to be sent electronically to `https://academicjobsonline.org/ajo/jobs/27145`. Applications are accepted until the position is filled, and those received before April 1, 2024 will receive full consideration. Early expressions of interest and inquiries are encouraged, and should be made to rayjay@jhu.edu.

The Johns Hopkins University is committed to equal opportunity for its faculty, staff, and students. To that end, the university does not discriminate on the basis of sex, gender, marital status, pregnancy, race, color, ethnicity, national origin, age, disability, religion, sexual orientation, gender identity or expression, veteran status or other legally protected characteristic. The university is committed to providing qualified individuals access to all academic and employment programs, benefits and activities on the basis of demonstrated ability, performance and merit without regard to personal factors that are irrelevant to the program involved.

Related URLs:
JHU Dept of Physics and Astronomy `https://physics-astronomy.jhu.edu/`
Postdoc Benefits `https://provost.jhu.edu/education/postdoctoral-affairs/postdoc-wellness-benefits-and-policies/`

Application Deadline: Monday April 1, 2024
Selection Deadline: Monday April 15, 2024

Download/Website: `https://academicjobsonline.org/ajo/jobs/27145`

Contact: `rayjay@jhu.edu`

Tenure Track Assistant or Associate Professor on Astronomical Data Science

Kapteyn Astronomical Institute, University of Groningen

We are seeking an enthusiastic and highly motivated colleague who will enhance our capabilities in the development and application of astronomical data science methods within both observational and theoretical research domains. We are looking for a candidate with a background in astronomy/astrophysics and a strong track record in cutting-edge data science research fields, including managing and analysing large scientific datasets, applying machine learning and artificial intelligence techniques, engaging in innovative modelling and software development. We are particularly interested in a candidate who will exploit data/results from existing (e.g., JWST, Gaia, VLT, LOFAR, ALMA, WEAVE, Euclid) as well as upcoming facilities (e.g., 4MOST, ELT, SKA, CTA) or other instruments with involvement of the Institute, and/or datasets from state-of-the-art numerical simulations. The successful candidate will be expected to contribute to one of the Institute's current research areas, fostering collaborations within the Institute, across NOVA institutes, ASTRON, SRON, and with Computer Science, both at the University of Groningen (Bernoulli Institute) and elsewhere.

The position we offer will be embedded in the Kapteyn Astronomical Institute, whose mission is to perform front-line research in astronomy, astrophysics, and related fields, aided by the presence of NWO-institutes ASTRON and SRON and NOVA labs, and to provide an excellent educational environment for both graduate and undergraduate studies. The Institute's mission and its policy and strategy are closely linked to and partly define the mission of the Netherlands Research School for Astronomy, NOVA, of which it is one of four member institutes. The excellent reputation of the Kapteyn Institute has made it possible to attract top-quality astronomers to the University of Groningen. The facilities the Institute offers, such as access to world-class observing facilities, make the Kapteyn Institute a very attractive environment for astronomical research.

The successful candidate will possess the following qualifications: a PhD degree in Astronomy/Astrophysics or related fields; excellent research qualities, as shown by a publication record in international peer-reviewed journals and proceedings of renowned conferences; a proven track record in developing and applying novel data-science methods to observations and/or simulations; a great affinity with and a good track record in teaching, appropriate for the career stage; at least two years of postdoctoral experience outside of the Netherlands, preferably in a different country than where you received your PhD; a relevant international network; the potential to acquire substantial research grants from external sources; demonstrable communicative and organisational competences; the ambition and the potential to develop academically; the ability to work well with others in international and diverse teams; good command of spoken and written English. Additionally, the candidate should be willing to obtain a University Teaching Qualification within three years, and able to speak Dutch or motivated to acquire proficiency within five years.

The level of the appointment that will be offered depends on the candidate's track record and career stage. As an Assistant or Associate Professor, you will set up and develop your own research line and research group; teach bachelor and master courses and contribute to the development of degree programs in Astronomy; supervise PhD students and postdocs; acquire external funding; promote the societal relevance of your research; contribute to the organisation of the institute and faculty, for example, by participating in working groups and committees in the domains of teaching, research, and management. At the stage of Assistant Professor, 60% of your time is for research, 30% for teaching activities and 10% for organisational tasks. As an Associate Professor, 40-50% of your time is dedicated to research, 40% to teaching activities, and 20-10% to organisational tasks.

To apply please go to https://www.rug.nl/about-ug/work-with-us/job-opportunities/?details=00347-02S000AMGP where you can also find more details concerning the description of the position, working conditions and pre-requisites. Please also arrange for three letters of reference to be sent directly by your referees to vacancykapteyn@astro.rug.nl by the indicated deadline.

Applications received by Sunday, March 24, 2024, at 23.59 (CET) will be given full consideration. The on-site selection interviews will take place between April 29 and June 5, 2024.

The University of Groningen is an equal opportunity employer, and we value diversity at our organisation. We do not discriminate based on ethnicity, religion, national origin, gender, sexual orientation, age, marital status, or disability

status. Our selection procedure follows the guidelines of the NVP Recruitment Code and the European Code of Conduct for recruitment of researchers from the European Commission.

Download/Website: *https://www.rug.nl/about-ug/work-with-us/job-opportunities/?details=00347-02S000AMGP*

Contact: vacancykapteyn@astro.rug.nl

Postdoctoral contract on exoplanet atmospheres

Jorge Lillo-Box

CAB at ESA premises in Madrid (ESAC), May-June 2024

We offer a 2-year postdoctoral contract to work in the Remote Worlds Lab group (PI: Jorge Lillo-Box, `https://remote-worlds-lab.cab.inta-csic.es/index.html`) at the Center for Astrobiology in the campus of Villafranca del Castillo, located inside ESA premises in Madrid (ESAC). This contract is part of the actions related to the TEMPO project (Temporal Evolution and Metamorphosis of exoPlanets and their atmOspheres, `https://remote-worlds-lab.cab.inta-csic.es/project_TEMPO.html`), recently granted by the Spanish Ministry of Science and Innovation. See all the details of this position in the link below.
The overall goal of TEMPO is the study of how exoplanets and their gaseous envelopes evolve over time, focused on two aspects, 1) their evolution as the star ages and 2) the imprints on the atmospheric properties caused by the architectural evolution of planetary systems (e.g., migration). The successful postdoc will be involved in the actions planned for this project (50% of their time) and develop their own projects (50%). Hence, we encourage creative and independent researchers to apply.
The candidate must have a PhD in Physics/Astrophysics or, alternatively, be in the position of obtaining it within the coming months. Experience in exoplanet detection and characterization wis required to pursue the tasks of the project. Also, experience with transmission spectroscopy data for exoplanet atmospheric characterization will be highly valued
All the details of this position and how to apply can be found in this page of the Remote Worlds Lab website. The deadline for application is March 25th (at 23:59 CET). Any questions and inquiries about this position should be addressed to Jorge Lillo-Box (see email below).

Download/Website: *`https://remote-worlds-lab.cab.inta-csic.es/postdoc_tempo.html`*

Contact: `jlillo@cab.inta-csic.es`

Exoplanet research fellow at Birmingham

Amaury Triaud
Sun, Stars & Exoplanets research group, School of Physics & Astronomy

Deadline, 15 April 2024

The *Sun, Stars and Exoplanets* research group at the University of Birmingham invites inventive and talented individuals to apply for a postdoctoral research position for an STFC-funded project entitled Temperate exoplanets from Chile & Antarctica.

The successful candidates will join a vibrant group of astronomers. The *Sun, Stars and Exoplanets* group consist of six permanent researchers: Amaury Triaud, Guy Davies, Annelies Mortier, Anjali Piette, Bill Chaplin and Yvonne Ellsworth, along two main research themes: exoplanets and asteroseismology. Members of the group have responsibilities in SPECULOOS, ASTEP, BiSON, TESS, Kepler and the PLATO mission. The group benefits from newly refurbished offices at the heart of a beautiful campus.

The successful applicant will work primarily with Amaury Triaud as part of the ASTEP consortium (operating one telescope at Concordia Station, on Dome C in Antarctica), and of the SPECULOOS consortium (operating four telescopes in Cerro Paranal, one (soon two) on El Teide, and one at San Pedro Mártir, in Mexico). We particularly welcome applicants with expertise in transit photometry, with modelling transit timing variations, with modelling radial-velocities, and where possible, with some experience with technical/manual labour on a telescope. Candidates might be asked to go on technical missions to the Atacama and/or to Antarctica that can last several weeks to several months.

Mirroring the fact that exoplanets are diverse, we welcome applications from all backgrounds to enrich our research group.

The appointment will be for a fixed three-year term starting on 01 June 2024. The position comes with an allowance to cover international travel and computing. Starting salary is between $£34,980$ and $£37,099$ annually, with yearly increments. The full details can be found at this url:
`https://edzz.fa.em3.oraclecloud.com/hcmUI/CandidateExperience/en/sites/CX_6001/job/4200`.

Applications should include a CV (max 2 pages) with a list of publications (as long as necessary), and a two-page statement describing your research interests and plans, and what expertise and skills you bring to the project, but also to the wider research group. Applicants should also provide contact details for 3 referees. Complete applications should be received by 15 April 2024 for full consideration.

We anticipate interviews will take place on 29 April 2024.

Download/Website: `www.birmingham.ac.uk/sasp/`

Download/Website: `https://edzz.fa.em3.oraclecloud.com/hcmUI/CandidateExperience/en/sites/CX_6001/job/4200`

Contact: `a.triaud@bham.ac.uk`

5 Others

Exoplanet Imaging Data Challenge - Deadline 31/05/2024

F. Cantalloube[1]*, Exoplanet Imaging Data Challenge WG*
[1] Univ. Grenoble Alpes, CNRS, IPAG, F-38000 Grenoble, France

Exoplanet Imaging Data Challenge, 31st of May 2024

The deadline for the second phase of the *Exoplanet Imaging Data Challenge*, focused on the characterization of exoplanet signals within multispectral high-contrast images from ground-based telescope, is set to **May 31st, 2024 (11:59 pm CEST)**.

Key information about this second phase of the *Exoplanet Imaging Data Challenge*:

- **Dataset**: 4 VLT/SPHERE-IFS + 4 Gemini-S/GPI-IFU data cubes, available on a Zenodo repository `https://zenodo.org/records/6902628`. Each data cube contains injected synthetic planet signals at different locations, and with different spectra.
- **Tasks**: (1) Extract the *astrometry* of each injected planetary signal, and (2) extract the *spectrophotometry* for each injected planetary signal.
- **Submission platform**: The challenge is hosted on the EvalAI plateform `https://eval.ai/web/challenges/challenge-page/1717`.
- **Prize**: A little surprise for the author(s) of the three best algorithms (and of course eternal glory and a place in the high-contrast imaging hall of fame!)
- **Publication**: Proceeding SPIE Astronomical Telescope + Instrumentation, Yokohama, June 2024.
  All participants will be co-authors.
- **Website:** More information on `https://exoplanet-imaging-challenge.github.io/`
- **Contact:** For any further question, please contact us `exoimg.datachallenge@gmail.com`

For more details about this community-led initiative, please check our previous publications:
-SPIE 2020 proceeding: `https://arxiv.org/pdf/2101.05080.pdf`
-SPIE 2022 proceeding: `https://arxiv.org/pdf/2209.08120.pdf`

Faustine Cantalloube, on behalf of the *Exoplanet Imaging Data Challenge Working Group*:
Olivier Absil, Valentin Christiaens, Markus Bonse, Carles Cantero, Anthony Cioppa, Sandrine Juillard, Johan Mazoyer, Evert Nasedkin, Rakesh Nath, J.-B. Ruffio, Matthias Samland, Marc Van Droogenbroeck.

Download/Website: `https://exoplanet-imaging-challenge.github.io/`

Contact: `exoimg.datachallenge@gmail.com`

5th Announcement of Opportunity for the CHEOPS Guest Observers Programme

European Space Agency (ESA)

Invitation
ESA's Director of Science has the pleasure of inviting you to respond to the 5th Announcement of Opportunity (AO-5) to submit proposals for observations to be performed with CHEOPS (Characterising ExOPlanet Satellite) through the ESA Guest Observers (GO) Programme.
The AO-5 Call is foreseen to open on 12 March 2024 at 12:00 (noon) CET and **close on 25 April 2024 at 12:00 (noon) CEST**.
This announcement solicits proposals for observations during CHEOPS' first mission extension period to be performed between 1 October 2024 and 30 September 2025. Scientists from institutes worldwide are invited to participate. All proposals shall be subject to double-anonymous peer-review by the CHEOPS Time Allocation Committee. The detailed schedule of milestones for this announcement, together with the software tools and documentation needed to prepare proposals, are available on the website (see below).
We should appreciate it if you would distribute this invitation to interested colleagues.
ESA's Director of Science wishes you every success with your CHEOPS observing proposals.

Novelties
The CHEOPS AO-5 Call provides several modernised tools to further enhance the community access and GO experience:

- **Brand-new Visibility Checker** available via Python scripts and Jupyter notebooks for Phase 1
- **Now optional** Scheduling Feasibility Checker (SFC) for Phase 1 (now also more lightweight & faster, and only needed for Phase 2)
- **Streamlined Proposal Submission** and a new Proposal Handling Tool for Phase 1

It also repeats the successful novelties introduced with the first extended mission:

- **More targets:** only 50 Guaranteed Time Observation (GTO) Programme reserved targets, with all the rest being open to the entire community
- **More time:** up to 30% science observing time dedicated to the GO Programme
- **Modern approach:** double-anonymous peer-review of proposals

Why CHEOPS?
ESA's CHEOPS is the first space mission designed for searching for exoplanetary transits and occultations on bright stars already known to host planets by performing ultrahigh precision photometry.
CHEOPS offers the GO observers space-based ultra-high precision photometry for the observation of exoplanet transits, eclipses, occultations, phase-curves, and more. Science cases may range from exoplanets to exomoons, ring structures, stellar activity, trans-Neptunian objects, and beyond. The timely overlap of several space- and ground-based missions can provide opportunities for synergies with NASA/ESA/CSA JWST, NASA/ESA HST, NASA TESS, ESO facilities, and more.

Happy proposing!

Download/Website: `https://www.cosmos.esa.int/web/cheops-guest-observers-programme/ao-5`
Contact: `cheops-support@cosmos.esa.int`

6 Exoplanet Archives

February 2024 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, March 12, 2024

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. Data may also be found in the (Microlensing Planets Table and the Direct Imaging Planets Table. Emission and transmission spectra are served from the Atmospheric Spectroscopy Table.

February 29, 2024

Know Thy Star: Introducing the New Stellar Hosts Table

Our newest interactive table, Stellar Hosts, provides a single access point to all stellar parameters of stars in systems with confirmed planets that are in the Exoplanet Archive. With this interface, you may browse stellar parameters of planetary systems that are in our Planetary Systems and Planetary Systems Composite tables, as well as stellar parameters that were previously only available on some System Overview pages (for example, the alf Cen page).

The Planetary Systems tables contain stellar parameters that correspond to planetary solutions, or planetary parameters published together as a set. But, many host stars, and their stellar companions, have stellar parameters determined separately from planetary solutions. Previously, these stellar solutions have only been available on the System Overview pages, so the new Stellar Hosts Table provides a consolidated view to these data. Note that the table does not yet include stellar parameters for stars hosting planetary candidates.

Stellar Hosts is similar to our other web-based, interactive tables, and includes our newest plotting feature for instant histogram and scatter plots (see our Jan. 18, 2024 news item for details). It's also supported by our Table Access Protocol (TAP) service. To set up a new query, consult our TAP User Guide and the table's data column definitions.

Once you've had a chance to try out the new table, let us know what you think!

February 23, 2024

Exoplanet Data by the Numbers

This week's release has some impressive numbers, specifically:

- **14**: New planets!
- **449**: Planets with updated ephemerides from ExoClock III!
- **165**: New parameter sets for confirmed planets!
- **1**: New JWST transmission spectrum for WASP-96 b!

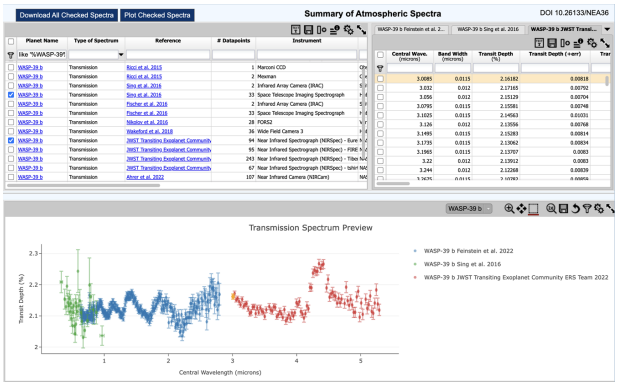

Figure 6: In this screen capture, the Atmospheric Spectroscopy Table demonstrates how the table plots multiple spectra.

The new planets are HD 134606 b, c, d, e, & f, TOI-238 b & c, TOI-1386 b & c, TOI-1751 b, Kepler-48 f, Kepler-100 e, and Kepler-139 d & e. Click on their names to go directly to their System Overview pages, or browse all system parameters in the archive (including this week's new sets) with the Planetary Systems and Planetary Systems Composite tables.

The new ephemerides, consisting of orbital periods and mid-transit times, have been integrated into our Planetary Systems tables, System Overview pages, and the Transit and Ephemeris Service.

To view and work with the new WASP-96 b spectrum, check out the Atmospheric Spectroscopy Table.

February 8, 2024

Two New Planets and Multi-spectra Plotting

We've updated the Atmospheric Spectroscopy Table to enable users to overplot multiple spectra. Users may now plot spectra of the same planet taken with multiple instruments at the same time, or compare spectra of different planets to identify key similarities or differences. Try it out and let us know what you think!

We've also added two new planets, both of which are TOI confirmations of super-Earths around M dwarf stars: Wolf-327 b and TOI-2266 b. The new planet parameters can be accessed from their System Overview pages, the Planetary Systems Table, and the Planetary Systems Composite Table.

Finally, we have added a new parameter set for HIP 75056 A b, which sets its mass to 30 M_J and above our mass cut-off. HIP 75056 A b parameters can still be seen on its System Overview page, but it no longer appears in the Planetary Systems tables and now has a status of False Positive Planet.

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

7 As seen on astro-ph

The following list contains exoplanet related entries appearing on astro-ph in February 2024.
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.

0224

astro-ph/2402.00073: **The Effects of a Stably Stratified Region with radially varying Electrical Conductivity on the Formation of Zonal Winds on Gas Planets** *by Paula N. Wulff et al.*
astro-ph/2402.00214: **A Uniform Analysis of Debris Disks with the Gemini Planet Imager II: Constraints on Dust Density Distribution Using Empirically-Informed Scattering Phase Functions** *by Justin Hom et al.*
astro-ph/2402.00115: **Quantifying the Effect of Short-timescale Stellar Activity Upon Transit Detection in M Dwarfs** *by Dana Clarice Yaptangco et al.*
astro-ph/2402.00125: **Migration of low-mass planets in inviscid disks: the effect of radiation transport on the dynamical corotation torque** *by Alexandros Ziampras et al.*
astro-ph/2402.01063: **Dracula's Chivito: discovery of a large edge-on protoplanetary disk with Pan-STARRS** *by Ciprian T. Berghea et al.*
astro-ph/2402.00984: **Exoplanet Analog Observations of Earth from Galileo Disk-integrated Photometry** *by Ryder H. Strauss et al.*
astro-ph/2402.00860: **JWST-MIRI Spectroscopy of Warm Molecular Emission and Variability in the AS 209 Disk** *by Carlos E. Muñoz-Romero et al.*
astro-ph/2402.00923: **Teegarden's Star revisited: A nearby planetary system with at least three planets** *by S. Dreizler et al.*
astro-ph/2402.00796: **Analytical methods in Celestial Mechanics: satellites' stability and galactic billiards** *by Irene De Blasi*
astro-ph/2402.00266: **Can Neptune's Distant Mean-Motion Resonances Constrain Undiscovered Planets in the Solar System? Lessons from a Case Study of the 9:1** *by Matthew W. Porter et al.*
astro-ph/2402.00756: **The Sonora Substellar Atmosphere Models. IV. Elf Owl: Atmospheric Mixing and Chemical Disequilibrium with Varying Metallicity and C/O Ratios** *by Sagnick Mukherjee et al.*
astro-ph/2402.00758: **The Sonora Substellar Atmosphere Models. III. Diamondback: Atmospheric Properties, Spectra, and Evolution for Warm Cloudy Substellar Objects** *by Caroline V. Morley et al.*
astro-ph/2402.01941: **High-resolution Pan-STARRS and SMA observations of IRAS 23077+6707: A giant edge-on protoplanetary disk** *by Kristina Monsch et al.*
astro-ph/2402.01903: **High-resolution ALMA observations of compact discs in the wide-binary system Sz 65 and Sz 66** *by J. M. Miley et al.*
astro-ph/2402.01432: **The 3D structure of disc-instability protoplanets** *by Adam Fenton, Dimitris Stamatellos*
astro-ph/2402.01405: **Gas Phase Ions in Protoplanetary Disks from Collisions of Solids** *by Jakob Penner et al.*
astro-ph/2402.01486: **Eclipse timing study of new hierarchical triple star candidates in the Northern Continuous Viewing Zone of TESS** *by T. Mitnyan et al.*
astro-ph/2402.01315: **The evolution of lithium in FGK dwarf stars. Influence of planets and Galactic migration** *by F. Llorente de Andrés et al.*
astro-ph/2402.02148: **Stellar companions and Jupiter-like planets in young associations** *by R. Gratton et al.*
astro-ph/2402.01971: **Octofitter: Fast, Flexible, and Accurate Orbit Modelling to Detect Exoplanets** *by William Thompson et al.*
astro-ph/2402.02614: **Lunar ore geology and feasibility of ore mineral detection using a far-IR spectrometer** *by Jakub Ciazela et al.*
astro-ph/2402.02900: **Forming localized dust concentrations in a dust ring: DM Tau case study** *by Hauyu Baobab Liu et al.*

astro-ph/2402.02908: **Transition to chaos and magnetic field generation in rotating Rayleigh-Bénard convection** *by Dalton N. Oliveira et al.*

astro-ph/2402.03441: **Eccentricity Distribution Beyond the Snow Line and Implications for Planetary Habitability** *by Stephen R. Kane, Robert A. Wittenmyer*

astro-ph/2402.03498: **The TESS-Keck Survey. XIX. A Warm Transiting Sub-Saturn Mass Planet and a non-Transiting Saturn Mass Planet Orbiting a Solar Analog** *by Michelle L. Hill et al.*

astro-ph/2402.03581: **Density discrepancy between transit-timing variations and radial velocity: Insights from the host star composition** *by V. Adibekyan et al.*

astro-ph/2402.04343: **JWST Observations of Young protoStars (JOYS): Linked accretion and ejection in a Class I protobinary system** *by Łukasz Tychoniec et al.*

astro-ph/2402.04329: **Modeling Atmospheric Lines By the Exoplanet Community (MALBEC) version 1.0: A CUISINES radiative transfer intercomparison project** *by Geronimo L. Villanueva et al.*

astro-ph/2402.04230: **Medium Resolution 0.97-5.3 micron spectra of Very Young Benchmark Brown Dwarfs with NIRSpec onboard the James Webb Space Telescope** *by Elena Manjavacas et al.*

astro-ph/2402.04113: **TESS and ESPRESSO discover a super-Earth and a mini-Neptune orbiting the K-dwarf TOI-238** *by A. Suárez Mascareño et al.*

astro-ph/2402.04060: **iSLAT: the Interactive Spectral-Line Analysis Tool for JWST and beyond** *by Evan Jellison et al.*

astro-ph/2402.04002: **An ALMA molecular inventory of warm Herbig Ae disks: II. Abundant complex organics and volatile sulphur in the IRS 48 disk** *by Alice S. Booth et al.*

astro-ph/2402.04001: **An ALMA molecular inventory of warm Herbig Ae disks: I. Molecular rings, asymmetries and complexity in the HD 100546 disk** *by Alice S. Booth et al.*

astro-ph/2402.03926: **A model of scattered thermal radiation for Venus from 3 to 5** mu **m** *by A. García Muñoz et al.*

astro-ph/2402.03595: **The orbit of HD 142527 B is too compact to explain many of the disc features** *by M. Nowak et al.*

astro-ph/2402.05269: **Rotational Study of 5:3 and 7:4 Resonant Objects within the Main Classical Trans-Neptunian Belt** *by Audrey Thirouin, Scott S. Sheppard*

astro-ph/2402.05183: **Resonant Chains and the Convergent Migration of Planets in Protoplanetary Disks** *by Ka Ho Wong, Man Hoi Lee*

astro-ph/2402.04990: **The possibility of panspermia in the deep cosmos by means of the planetary dust grains** *by Z. N. Osmanov*

astro-ph/2402.04946: **Searching for Giant Exoplanets around M-dwarf Stars (GEMS) I: Survey Motivation** *by Shubham Kanodia et al.*

astro-ph/2402.05207: **Search for Brown Dwarfs in IC 1396 with Subaru HSC: Interpreting the Impact of Environmental Factors on Sub-stellar Population** *by Saumya Gupta et al.*

astro-ph/2402.04919: **Modeling and Calibration of Gaia, Hipparcos, and Tycho-2 astrometric data for the detection of dark companions** *by Fabo Feng et al.*

astro-ph/2402.04574: **Predicting the Dominant Formation Mechanism of Multi-Planetary Systems** *by Cheyanne Shariat et al.*

astro-ph/2402.04688: **Signatures of X-ray dominated chemistry in the spectra of exoplanetary atmospheres** *by Daniele Locci et al.*

astro-ph/2402.05176: **cecilia: A Machine Learning-Based Pipeline for Measuring Metal Abundances of Helium-rich Polluted White Dwarfs** *by M. Badenas-Agusti et al.*

astro-ph/2402.04900: **Clouds and Seasonality on Terrestrial Planets with Varying Rotation Rates** *by Daniel A. Williams et al.*

astro-ph/2402.06084: **Automated eccentricity measurement from raw eclipsing binary light curves with intrinsic variability** *by Luc W. IJspeert et al.*

astro-ph/2402.05900: **High-precision atmospheric characterization of a Y dwarf with JWST NIRSpec G395H**

spectroscopy: isotopologue, C/O ratio, metallicity, and the abundances of six molecular species *by Ben W. P. Lew et al.*

astro-ph/2402.05991: **Using JWST transits and occultations to determine $\sim 1\%$ stellar radii and temperatures of low-mass stars** *by Alexandra S. Mahajan et al.*

astro-ph/2402.05760: **On the growth and evolution of low-mass planets in pressure bumps** *by Arnaud Pierens, Sean N. Raymond*

astro-ph/2402.05671: **Representation of the Terrestrial Carbon Cycle in CMIP6** *by Bettina K. Gier et al.*

astro-ph/2402.05509: **The Impact of Cometary 'impacts' on the Chemistry, Climate, and Spectra of Hot Jupiter Atmospheres** *by Felix Sainsbury-Martinez, Catherine Walsh*

astro-ph/2402.05345: **High-Precision Atmospheric Constraints for a Cool T Dwarf from JWST Spectroscopy** *by Callie E. Hood et al.*

astro-ph/2402.05338: **Tidal Dissipation in Giant Planets** *by Jim Fuller et al.*

astro-ph/2402.05988: **Absence of Small Dust Cloud Particles Transiting the White Dwarf J0328-1219** *by Bruce L. Gary, Thomas G. Kaye*

astro-ph/2402.06835: **nuance: Efficient detection of planets transiting active stars** *by Lionel Garcia et al.*

astro-ph/2402.06109: **Constructing Wavefunctions for One-Body and Two-Body Gravitational Orbits in Classical Mechanics** *by Jixin Chen*

astro-ph/2402.06476: **Devolatilization of extrasolar planetesimals by 60Fe and 26Al heating** *by Joseph W. Eatson et al.*

astro-ph/2402.06488: **Cool Gaseous Exoplanets: surveying the new frontier with Twinkle** *by Luke Booth et al.*

astro-ph/2402.06540: **Polarization of circumstellar debris disk light echoes** *by Austin J. King et al.*

astro-ph/2402.06449: **The EBLM project – XIII. The absolute dynamical masses of the circumbinary planet host TOI-1338/BEBOP-1** *by D. Sebastian et al.*

astro-ph/2402.07047: **cortecs: A Python package for compressing opacities** *by Arjun B. Savel et al.*

astro-ph/2402.06933: **The Diffusion Limit of Photoevaporation in Primordial Planetary Atmospheres** *by Darius Modirrousta-Galian, Jun Korenaga*

astro-ph/2402.07110: **The TESS-Keck Survey. XVIII. A sub-Neptune and spurious long-period signal in the TOI-1751 system** *by Anmol Desai et al.*

astro-ph/2402.08116: **OGLE-2023-BLG-0836L: The sixth microlensing planet in a binary stellar system** *by Cheongho Han et al.*

astro-ph/2402.07893: **The TESS-Keck Survey XXI: 13 New Planets and Homogeneous Properties for 21 Subgiant Systems** *by Ashley Chontos et al.*

astro-ph/2402.08038: **HPIC: The Habitable Worlds Observatory Preliminary Input Catalog** *by Noah Tuchow et al.*

astro-ph/2402.08029: **Populating The Milky Way: Characterising Planet Demographics by Combining Galaxy Formation Simulations and Planet Population Synthesis Models** *by C. Boettner et al.*

astro-ph/2402.07903: **Ephemeris Matching Reveals False Positive Validated and Candidate Planets from the K2 Mission** *by Drake A. Lehmann, Andrew Vanderburg*

astro-ph/2402.07861: **TOI-1199 b and TOI-1273 b: Two new transiting hot Saturns detected and characterized with SOPHIE and TESS** *by J. Serrano Bell et al.*

astro-ph/2402.07387: **Magnetic field of gas giant exoplanets and its influence on the retention of their exomoons** *by Xing Wei, D. N. C. Lin*

astro-ph/2402.07803: **Protoplanet collisions: new scaling laws from SPH simulations** *by Samuele Crespi et al.*

astro-ph/2402.07800: **TIaRA TESS 1: Estimating exoplanet yields from Year 1 and Year 3 SPOC lightcurves** *by Toby Rodel et al.*

astro-ph/2402.07517: **The spectroastrometric detectability of nearby Solar System-like exomoons** *by Quirijn B. van Woerkom, Evangelia Kleisioti*

astro-ph/2402.07468: **Dynamics of Saturn's Polar Regions** *by A. Antuñano et al.*

astro-ph/2402.07451: **The TESS-Keck Survey. XII. A Dense 1.8 $R_\oplus$ Ultra-Short-Period Planet Possibly Cling-**

ing to a High-Mean-Molecular-Weight Atmosphere After the First Gyr *by Ryan A. Rubenzahl et al.*

astro-ph/2402.07346: **The PFS view of TOI-677 b: A spin-orbit aligned warm Jupiter in a dynamically hot system** *by Qingru Hu et al.*

astro-ph/2402.08734: **Passing Stars as an Important Driver of Paleoclimate and the Solar System's Orbital Evolution** *by Nathan A. Kaib, Sean N. Raymond*

astro-ph/2402.08311: **A new treatment of telluric and stellar features for medium resolution spectroscopy and molecular mapping. Application to the abundance determination on Beta Pic b** *by F. Kiefer et al.*

astro-ph/2402.08292: **A revisit of the Mass-Metallicity Trends in Transiting Exoplanets** *by Qinghui Sun et al.*

astro-ph/2402.08141: **Thermal processing of primordial pebbles in evolving protoplanetary disks** *by Maria Jose Colmenares et al.*

astro-ph/2402.09067: **Implications of the discovery of AF Lep b: The mass-luminosity relation for planets in the β Pic Moving Group and the L-T transition for young companions and free-floating planets** *by R. Gratton et al.*

astro-ph/2402.09089: **Vapor equilibrium models of accreting rocky planets demonstrate direct core growth by pebble accretion** *by Marie-Luise Steinmeyer, Anders Johansen*

astro-ph/2402.09278: **Disentangling the origin of chemical differences using GHOST** *by C. Saffe et al.*

astro-ph/2402.09533: **Atmospheric Retrievals of the Young Giant Planet ROXs 42B b from Low- and High-Resolution Spectroscopy** *by Julie Inglis et al.*

astro-ph/2402.09322: **A new mass and radius determination of the ultra-short period planet K2-106b and the fluffy planet K2-106c** *by E. W. Guenther et al.*

astro-ph/2402.09342: **Changing disc compositions via internal photoevaporation** *by Julia Lena Lienert et al.*

astro-ph/2402.09783: **Near-infrared spectroscopic characterisation of Gaia ultra-cool dwarf candidates; Spectral types and peculiarities** *by T. Ravinet et al.*

astro-ph/2402.09943: **NGTS-28Ab: A short period transiting brown dwarf** *by Beth A. Henderson et al.*

astro-ph/2402.10042: **Dynamics of cold circumstellar gas in debris disks** *by Can Cui et al.*

astro-ph/2402.10169: **Curves of growth for transiting exocomets: Application to Fe II lines in the Beta Pictoris system** *by T. Vrignaud et al.*

astro-ph/2402.11113: **The multi-wavelength phase curves of small bodies: Phase coloring** *by Alvaro Alvarez-Candal*

astro-ph/2402.10875: **Tidal Evolution and Spin-Orbit Dynamics: The Critical Role of Rheology** *by Clodoaldo Ragazzo, Lucas Ruiz dos Santos*

astro-ph/2402.10880: **Spin-Orbit Synchronization and Singular Perturbation Theory** *by Clodoaldo Ragazzo, Lucas Ruiz dos Santos*

astro-ph/2402.10544: **Accretion of primordial H-He atmospheres in mini-Neptunes: the importance of envelope enrichment** *by Marit Mol Lous et al.*

astro-ph/2402.10523: **Evolution of the relation between the mass accretion rate and the stellar and disk mass from brown dwarfs to stars** *by V. Almendros-Abad et al.*

astro-ph/2402.10486: **The tidal deformation and atmosphere of WASP-12b from its phase curve** *by B. Akinsanmi et al.*

astro-ph/2402.10690: **Strong fractionation of deuterium and helium in sub-Neptune atmospheres along the radius valley** *by Collin Cherubim et al.*

astro-ph/2402.11182: **A uGMRT search for radio emission from planets around evolved stars** *by Mayank Narang et al.*

astro-ph/2402.11584: **Planetesimal and planet formation in transient dust traps** *by Zs. Sándor et al.*

astro-ph/2402.12355: **Signature of the atmospheric asymmetries of hot and ultra-hot Jupiters in lightcurves** *by Aurélien Falco et al.*

astro-ph/2402.12601: **Deep Paβ Imaging of the Candidate Accreting Protoplanet AB Aur b** *by Lauren I. Biddle et al.*

astro-ph/2402.12534: **Chondrule Formation During Low-Speed Collisions of Planetesimals: A Hybrid Splash-**

Flyby Framework *by William Herbst, James P. Greenwood*

astro-ph/2402.12448: **DBNets: A publicly available deep learning tool to measure the masses of young planets in dusty protoplanetary discs** *by Alessandro Ruzza et al.*

astro-ph/2402.12310: **Cosmic dust fertilization of glacial prebiotic chemistry on early Earth** *by Craig R. Walton et al.*

astro-ph/2402.12369: **Short-Period Variables in TESS Full-Frame Image Light Curves Identified via Convolutional Neural Networks** *by Greg Olmschenk et al.*

astro-ph/2402.12330: **On the Ocean Conditions of Hycean Worlds** *by Frances E. Rigby, Nikku Madhusudhan*

astro-ph/2402.12256: **JWST MIRI MRS Images Disk Winds, Water, and CO in an Edge-On Protoplanetary Disk** *by Nicole Arulanantham et al.*

astro-ph/2402.12253: **Water Vapour Transit Ambiguities for Habitable M-Earths** *by Evelyn Macdonald et al.*

astro-ph/2402.12236: **Rotation curves in protoplanetary disks with thermal stratification** *by Paola Martire et al.*

astro-ph/2402.12120: **TASTE V. A new ground-based investigation of orbital decay in the ultra-hot Jupiter WASP-12b** *by P. Leonardi et al.*

astro-ph/2402.12053: **The interplay between forming planets and photoevaporating discs II: Wind-driven gas redistribution** *by Michael L. Weber et al.*

astro-ph/2402.12414: **NASA Exoplanet Exploration Program (ExEP) Mission Star List for the Habitable Worlds Observatory (2023)** *by Eric Mamajek, Karl Stapelfeldt*

astro-ph/2402.12299: **Search for Stellar Companions of Exoplanet Host Stars with AstraLux/CAHA 2.2 m** *by S. Schlagenhauf et al.*

astro-ph/2402.13386: **A Tale of Two Peas-In-A-Pod: The Kepler-323 and Kepler-104 Systems** *by C. Alexander Thomas et al.*

astro-ph/2402.13223: **Metallicities and Refined Stellar Parameters for 52 Cool Dwarfs with Transiting Planets and Planet Candidates** *by Rebecca Gore et al.*

astro-ph/2402.12896: **Evidence of apsidal motion and a possible co-moving companion star detected in the WASP-19 system** *by L. M. Bernabò et al.*

astro-ph/2402.12662: **Turbulent vortex with moderate dust settling probed by scattering-induced polarization in the IRS 48 system** *by Haifeng Yang et al.*

astro-ph/2402.13039: **The Santa Barbara Binary-Disk Code Comparison** *by Paul C. Duffell et al.*

astro-ph/2402.14072: **Fleeting but not Forgotten: the Imprint of Escaping Hydrogen Atmospheres on Super-Earth Interiors** *by James G. Rogers et al.*

astro-ph/2402.14165: **Luminosity Outbursts in Interacting Protoplanetary Systems** *by Aleksandr M. Skliarevskii, Eduard I. Vorobyov*

astro-ph/2402.14121: **The Solar Neighborhood LI: A Variability Survey of Nearby M Dwarfs with Planets from Months to Decades with TESS and the CTIO/SMARTS 0.9 m** *by Aman Kar et al.*

astro-ph/2402.14001: **A formally motivated retrieval framework applied to the high resolution transmission spectrum of HD 189733 b** *by Doriann Blain et al.*

astro-ph/2402.13682: **The effect of lightning on the atmospheric chemistry of exoplanets and potential biosignatures** *by Patrick Barth et al.*

astro-ph/2402.13673: **Computing Transiting Exoplanet Parameters with 1D Convolutional Neural Networks** *by Santiago Iglesias Álvarez et al.*

astro-ph/2402.13931: **Planetary atmospheres Through Time: Effects of Mass Loss and Thermal Evolution** *by Daria Kubyshkina*

astro-ph/2402.15001: **Multiple Patchy Cloud Layers in the Planetary Mass Object SIMP0136+0933** *by Allison M. McCarthy et al.*

astro-ph/2402.14984: **Correlations between Ca II H&K Emission and the Gaia M dwarf Gap** *by Emily M. Boudreaux et al.*

astro-ph/2402.14960: **The Gaia white dwarf revolution** *by Pier-Emmanuel Tremblay et al.*

astro-ph/2402.14954: **Methods for the detection of stellar rotation periods in individual TESS sectors and results from the Prime mission** *by Isabel L. Colman et al.*

astro-ph/2402.14784: **Automated chemical reaction network generation and its application to exoplanet atmospheres** *by Jeehyun Yang, Renyu Hu*

astro-ph/2402.14653: **PRODIGE – Planet-forming disks in Taurus with NOEMA. I. Overview and first results for 12CO, 13CO, and C18O** *by D. Semenov et al.*

astro-ph/2402.14638: **A thermodynamic criterion for the formation of Circumplanetary Disks** *by Leonardo Krapp et al.*

astro-ph/2402.14535: **Quenching-driven equatorial depletion and limb asymmetries in hot Jupiter atmospheres: WASP-96b example** *by Maria Zamyatina et al.*

astro-ph/2402.14463: **Dust Accumulation near the Magnetospheric Truncation of Protoplanetary Discs. II. The Effects of Opacity and Thermal Evolution** *by Rixin Li et al.*

astro-ph/2402.14312: **The Jiao Tong University Spectroscopic Telescope Project** *by JUST Team et al.*

astro-ph/2402.14639: **Cool and Data-Driven: An Exploration of Optical Cool Dwarf Chemistry with Both Data-Driven and Physical Models** *by Adam D. Rains et al.*

astro-ph/2402.15168: **Trojan Exoplanets** *by Philippe Robutel, Adrien Leleu*

astro-ph/2402.15204: **How do wavelength correlations affect transmission spectra? Application of a new fast and flexible 2D Gaussian process framework to transiting exoplanet spectroscopy** *by Mark Fortune et al.*

astro-ph/2402.15541: **Stars of the Lower Part of the Main Sequence with Discovered Exoplanets and Candidates. Periods of Rotations or Revolutions?** *by Aleksey A. Shlyapnikov*

astro-ph/2402.15438: **Abundant sub-micron grains revealed in newly discovered extreme debris discs** *by A. Moór et al.*

astro-ph/2402.15475: **Length and Velocity Scales in Protoplanetary Disk Turbulence** *by Debanjan Sengupta et al.*

astro-ph/2402.15874: **Evaluating Classification Algorithms: Exoplanet Detection using Kepler Time Series Data** *by Fatemeh Fazel Hesar, Bernard Foing*

astro-ph/2402.15935: **Pulsation in TESS Objects of Interest** *by R. L. Gomes et al.*

astro-ph/2402.15803: **Comparing transit spectroscopy pipelines at the catalogue level: evidence for systematic differences** *by Lorenzo V. Mugnai et al.*

astro-ph/2402.16971: **The Gasing Pangkah Collaboration: I. Asteroseismic Identification and Characterisation of a Rapidly-Rotating Engulfment Candidate** *by J. M. Joel Ong et al.*

astro-ph/2402.16959: **An Eccentric Planet Orbiting the Polar V808 Aurigae** *by McKenna Leichty et al.*

astro-ph/2402.16954: **The Sun Remains Relatively Refractory Depleted: Elemental Abundances for 17,412 Gaia RVS Solar Analogs and 50 Planet Hosts** *by Rayna Rampalli et al.*

astro-ph/2402.16802: **Spectral characterization of young LT dwarfs** *by L. Piscarreta et al.*

astro-ph/2402.16715: **Numerical performance of correlated-k distribution method in atmospheric escape simulation** *by Yuichi Ito et al.*

astro-ph/2402.16698: **Multi-band reflectance and shadowing of RX J1604.3-2130 protoplanetary disk in scattered light** *by Huisheng Zhong et al.*

astro-ph/2402.16687: **Tropical cyclones on tidally locked rocky planets: Dependence on rotation period** *by Valeria Garcia et al.*

astro-ph/2402.16526: **Discovery of magnetically guided metal accretion onto a polluted white dwarf** *by S. Bagnulo et al.*

astro-ph/2402.17592: **Three Warm Jupiters around Solar-analog stars detected with TESS** *by Jan Eberhardt et al.*

astro-ph/2402.17898: **Exoplanets Prediction in Multi-Planetary Systems and Determining the Correlation Between the Parameters of Planets and Host Stars Using Artificial Intelligence** *by Mahdiyar Mousavi-Sadr*

astro-ph/2402.17734: **Automated Scheduling of Doppler Exoplanet Observations at Keck Observatory** *by Luke B. Handley et al.*

astro-ph/2402.17697: **Testing approximate infrared scattering radiative-transfer methods for hot Jupiter atmospheres** *by Elspeth K. H. Lee*

astro-ph/2402.17448: **TOI-1135 b: A young hot Saturn-size planet orbiting a solar-type star** *by M. Mallorquín et al.*

astro-ph/2402.17384: **Ultraviolet and Chromospheric activity and Habitability of M stars** *by Xue Li et al.*

astro-ph/2402.17325: **Nodal precession of a hot Jupiter transiting the edge of a late A-type star TOI-1518** *by Noriharu Watanabe et al.*

astro-ph/2402.17324: **On the Impact and Utility of Single-Exomoon Modeling for Multi-Moon Systems** *by Alex Teachey, Garvit Agarwal*

astro-ph/2402.17212: **Constraining Planetary Formation Models Using Conditional Occurrences of Various Planet Types** *by Sridhar Gajendran et al.*

astro-ph/2402.17439: **Aeolian erosion in protoplanetary discs: How impactful it is on dust evolution?** *by Stéphane Michoulier et al.*

astro-ph/2402.18720: **Small and Large Dust Cavities in Disks around mid-M Stars in Taurus** *by Yangfan Shi et al.*

astro-ph/2402.18644: **The frequency of metal-enrichment of cool helium-atmosphere white dwarfs using the DESI Early Data Release** *by Christopher J. Manser et al.*

astro-ph/2402.18631: **ALMA view of the L1448-mm protostellar system on disk scales: CH_3OH and $H^{13}CN$ as new disk wind tracers** *by P. Nazari et al.*

astro-ph/2402.18574: **Measuring Tracers of Planet Formation in the Atmosphere of WASP-77A b: Sub-stellar O/H and C/H ratios, with a stellar C/O ratio and a potentially Super-stellar Ti/H ratio** *by Billy Edwards, Quentin Changeat*

astro-ph/2402.18471: **Introducing cuDisc: a 2D code for protoplanetary disc structure and evolution calculations** *by Alfie Robinson et al.*

astro-ph/2402.18641: **The DESI Early Data Release White Dwarf Catalogue** *by Christopher J. Manser et al.*

astro-ph/2402.19075: **Hunting for exocomet transits in the TESS database using the Random Forest method** *by D. V. Dobrycheva et al.*

astro-ph/2402.19099: **The Reservoir of the Per-emb-2 Streamer** *by Kotomi Taniguchi et al.*

astro-ph/2402.19112: **The effect of nonlocal disk processes on the volatile CHNOS budgets of planetesimal-forming material** *by Mark Oosterloo et al.*

astro-ph/2402.19277: **The impact of the explicit representation of convection on the climate of a tidally locked planet in global stretched-mesh simulations** *by Denis E. Sergeev et al.*

astro-ph/2402.19321: **Connections between Planetary Populations and the Chemical Characteristics of their Host Stars** *by Sol Yun et al.*

astro-ph/2402.19352: **Searching for NLTE effects in the high-resolution transmission spectrum of WASP-121 b with Cloudy for Exoplanets** *by M. E. Young et al.*

astro-ph/2402.19466: **The effect of cloudy atmospheres on the thermal evolution of warm giant planets from an interior modelling perspective** *by Anna Julia Poser, Ronald Redmer*