ExoPlanet News
An Electronic Newsletter

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Contents

1 Editorial

Welcome to Edition 166 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 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 May 9, 2023.

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

Jeanne Davoult
Eleonora Alei
Haiyang Wang
Daniel Angerhausen
Timm-Emanuel Riesen

2 Abstracts of refereed papers

JWST/NIRCam discovery of the first Y+Y brown dwarf binary: WISE J033605.05−014350.4

P. Calissendorff[1], *M. De Furio*[1], *M. Meyer*[1], *L. Albert*[2,3], *C. Aganze*[4], *M. Ali-Dib*[3,5], *D.C. Bardalez Gagliuffi*[6], *F. Baron*[2,3], *C.A. Beichman*[7], *A.J. Burgasser*[4], *M.C. Cushing*[8], *J.K. Faherty*[9], *C. Fontanive*[2,3], *C.R. Gelino*[10], *J.E. Gizis*[11], *A.Z. Greenbaum*[12], *J.D. Kirkpatrick*[10], *S.K. Leggett*[13], *F. Martinache*[14], *D. Mary*[14], *M. N'Diaye*[14], *B.J.S. Pope*[15,16], *T.L. Roellig*[17], *J. Sahlmann*[18], *A. Sivaramakrishnan*[9,19,20], *D.P. Thorngren*[21], *M. Ygouf*[7], *T. Vandal*[2,3]

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Astrophysical Journal Letters, in press (arXiv:2303.16923)

We report the discovery of the first brown dwarf binary system with a Y dwarf primary, WISE J033605.05−014350.4, observed with NIRCam on JWST with the F150W and F480M filters. We employed an empirical point spread function binary model to identify the companion, located at a projected separation of 84 mas, position angle of 295°, and with contrasts of 2.8 and 1.8 mag in F150W and F480M, respectively. At a distance of 10 pc based on its Spitzer parallax, and assuming a random inclination distribution, the physical separation is approximately 1 au. Evolutionary models predict for that an age of 1-5 Gyr, the companion mass is about 4-12.5 Jupiter masses around the 7.5-20 Jupiter mass primary, corresponding to a companion-to-host mass fraction of $q = 0.61 \pm 0.05$. Under the assumption of a Keplerian orbit the period for this extreme binary is in the range of 5-9 years. The system joins a small but growing sample of ultracool dwarf binaries with effective temperatures of a few hundreds of Kelvin. Brown dwarf binaries lie at the nexus of importance for understanding the formation mechanisms of these elusive objects, as they allow us to investigate whether the companions formed as stars or as planets in a disk around the primary.

Download/Website: `https://arxiv.org/pdf/2303.16923.pdf`

Contact: `percal@umich.edu`

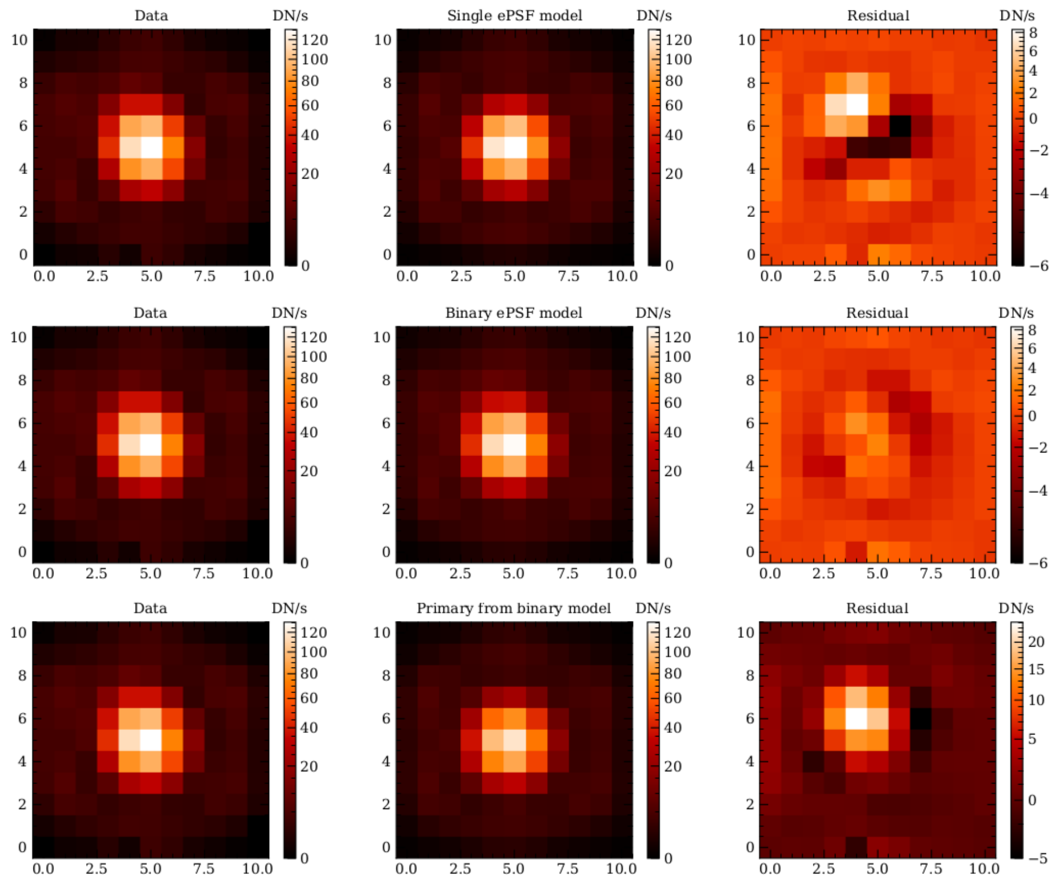

Figure 2: Images displaying the pipeline calibrated data of W0336 in the F480M band are in the left column, models are in the middle column, and their corresponding residuals when the models have been subtracted from the data are in the right column. The top row shows a single model fitted to the data, and the middle row shows a binary double ePSF model. The bottom row depicts the same binary model as the middle row, but only showing the primary component from that fit to better highlight the companion seen in the residuals after subtracting the primary component from the data. The units are in DN/s. The color scheme in the images are scaled to a power law with an exponent of 0.5, and the color bar for the binary model residual image has been scaled to match the single model residual image to better highlight the smaller residual and improved fit.

Stirred but not shaken: a multi-wavelength view of HD 16743's debris disc

J. P. Marshall[1,2], *J. Milli*[3], *E. Choquet*[4], *C. del Burgo*[5], *G. M. Kennedy*[6,7], *F. Kemper*[8,9,10], *M. C. Wyatt*[11], *Q. Kral*[12], *R. Soummer*[13]

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MNRAS, in press (arXiv:2303.17128)

Planetesimals – asteroids and comets – are the building blocks of planets in protoplanetary discs and the source of dust, ice and gas in debris discs. Along with planets they comprise the left-over material after star formation that constitutes a planetary system. Planets influence the dynamics of planetesimals, sculpting the orbits of debris belts to produce asymmetries or gaps. We can constrain the architecture of planetary systems, and infer the presence of unseen planetary companions, by high spatial resolution imaging of debris discs. HD 16743 is a relatively young F-type star that hosts a bright edge-on debris disc. Based on far-infrared *Herschel* observations its disc was thought to be stirred by a planetary companion. Here we present the first spatially resolved observations at near-infrared and millimetre wavelengths with *HST* and ALMA, revealing the disc to be highly inclined at $87^{\circ}3\ ^{+1^{\circ}9}_{-2^{\circ}5}$ with a radial extent of $157.7^{+2.6}_{-1.5}$ au and a FWHM of $79.4^{+8.1}_{-7.8}$ au ($\Delta R/R = 0.5$). The vertical scale height of the disc is 0.13 ± 0.02, significantly greater than typically assumed unstirred value of 0.05, and could be indicative of stirring of the dust-producing planetesimals within the disc by bodies at least a few times the mass of Pluto up to 18.3 $M_{\oplus}$ in the single object limit.

Download/Website: `https://arxiv.org/abs/2303.17128`

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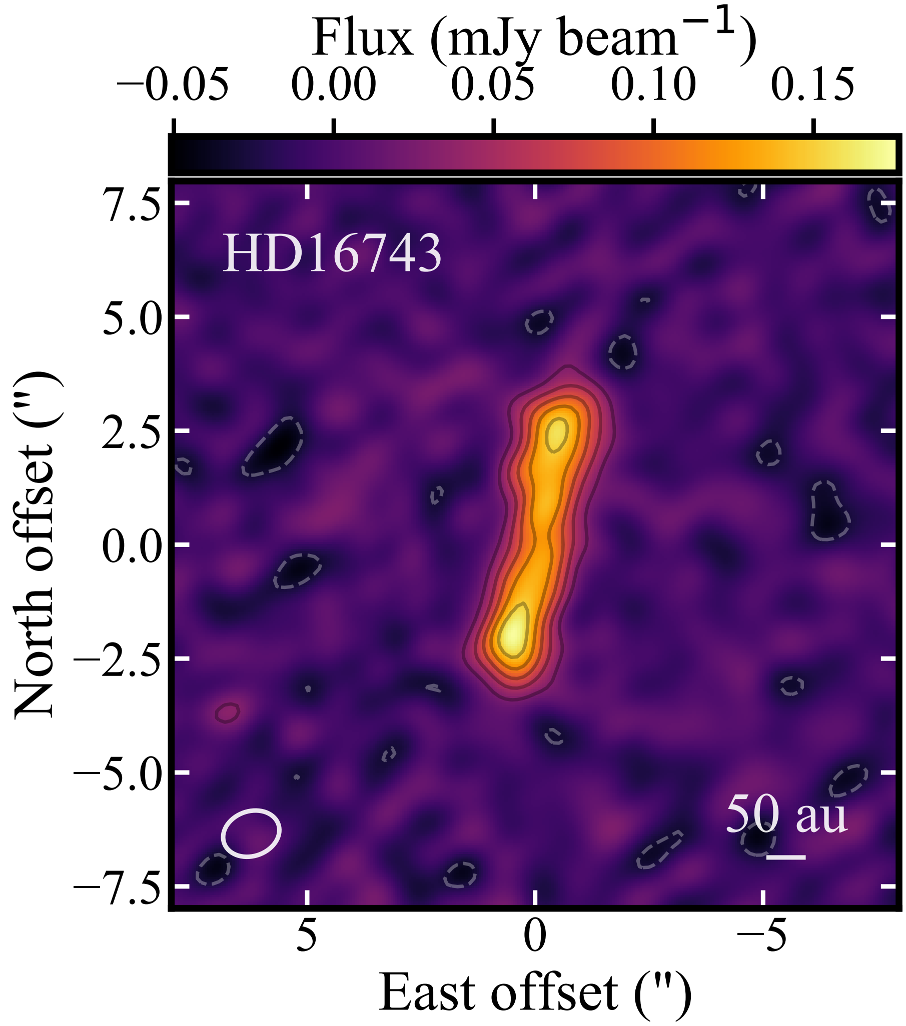

Figure 1: ALMA Band 6 continuum image of HD 16743. The image has been *clean*ed and reconstructed with a Briggs weight of 0.5. The disc architecture is well modelled by a single Gaussian annulus. There is no evidence for a star-disc offset, or a second component to the disc, from fitting the visibilities. However, the modelling reveals a large scaleheight for the disc ($z/R \simeq 0.13$) indicative of stirring by massive bodies within, or adjacent to, the debris belt. The instrument beam ($0''95 \times 0''67$, $\phi = 88°$) is denoted by the white ellipse in the bottom left corner. Contours are in steps of 2-σ from $\pm$2-sigma, with broken contours denoting negative values. Orientation is north up, east left.

Thermal emission from the Earth-sized exoplanet TRAPPIST-1 b using JWST

T. Greene[1], *T. Bell*[1,2], *E. Ducrot*[3,4], *A. Dyrek*[3], *P.O. Lagage*[3], *J. Fortney*[5]

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Nature, published (2023arXiv230314849G)

The TRAPPIST-1 system is remarkable for its seven planets that are similar in size, mass, density, and stellar heating to the rocky planets Venus, Earth, and Mars in our own Solar System. All TRAPPIST-1 planets have been observed with the transmission spectroscopy technique using the Hubble or Spitzer Space Telescopes, but no atmospheric features have been detected or strongly constrained. TRAPPIST-1 b is the closest planet to the system's M dwarf star, and it receives 4 times as much irradiation as Earth receives from the Sun. This relatively large amount of stellar heating suggests that its thermal emission may be measurable. Here we present photometric secondary eclipse observations of the Earth-sized TRAPPIST-1 b exoplanet using the F1500W filter of the MIRI instrument on JWST. We detect the secondary eclipse in each of five separate observations with 8.7-sigma confidence when all data are combined. We measure a secondary eclipse depth of 861 ± 99 ppm which corresponds to a blackbody brightness temperature $T_{\rm B} = 503^{+26}_{-27}$ K. These measurements are most consistent with re-radiation of the TRAPPIST-1 star's incident flux from only the dayside hemisphere of the planet. The most straightforward interpretation is that there is little or no planetary atmosphere redistributing radiation from the host star and also no detectable atmospheric absorption from carbon dioxide (CO_2) or other species.

Download/Website: `https://www.nature.com/articles/s41586-023-05951-7`

Download/Website: `https://arxiv.org/abs/2303.14849`

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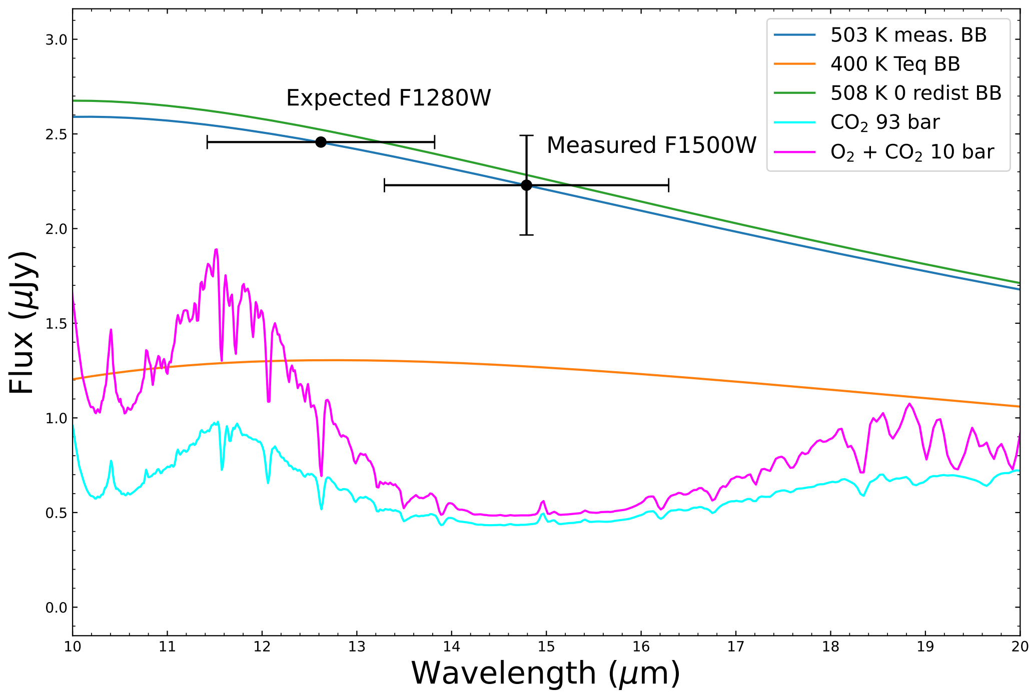

Figure 2: TRAPPIST-1 b F1500W measured flux and spectral models. The blackbody curves represent the measured T_B = 503 K dayside temperature, the 508 K apparent dayside temperature predicted for zero heat redistribution and no internal heating, and T_{eq} = 400 K temperature for isotropic redistribution of stellar heating. The flux expected in the upcoming observations in the MIRI F1280W filter is also shown assuming the planet emits like a T_B = 503 K blackbody. The widths of the F1280W and F1500W markers represent their transmission half-amplitude bandpasses, and the vertical error bar of the F1500W point represents its 1σ uncertainty. Emergent spectra from 93 bar CO_2 and 10 bar outgassed O_2 with 0.5 bar CO_2 atmospheres are also plotted (from Lincowski et al. 2018).

The clumpy structure of ϵ Eridani's debris disc revisited by ALMA

M. Booth[1], T. D. Pearce[1], A. V. Krivov[1], M. C. Wyatt[2], W. R. F. Dent[3], A. S. Hales[3,4], J.-F. Lestrade[5], F. Cruz-Sáenz de Miera[6], V. C. Faramaz[7], T. Löhne[1] and M. Chavez-Dagostino[8]

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MNRAS, in press (2023MNRAS.tmp..918B)

ϵ Eridani is the closest star to our Sun known to host a debris disc. Prior observations in the (sub-)millimetre regime have potentially detected clumpy structure in the disc and attributed this to interactions with an (as yet) undetected planet. However, the prior observations were unable to distinguish between structure in the disc and background confusion. Here we present the first ALMA image of the entire disc, which has a resolution of 1.6"$\times$1.2". We clearly detect the star, the main belt and two point sources. The resolution and sensitivity of this data allow us to clearly distinguish background galaxies (that show up as point sources) from the disc emission. We show that the two point sources are consistent with background galaxies. After taking account of these, we find that resolved residuals are still present in the main belt, including two clumps with a $> 3\sigma$ significance – one to the east of the star and the other to the northwest. We perform n-body simulations to demonstrate that a migrating planet can form structures similar to those observed by trapping planetesimals in resonances. We find that the observed features can be reproduced by a migrating planet trapping planetesimals in the 2:1 mean motion resonance and the symmetry of the most prominent clumps means that the planet should have a position angle of either $\sim 10^\circ$ or $\sim 190^\circ$. Observations over multiple epochs are necessary to test whether the observed features rotate around the star.

Download/Website: `https://doi.org/10.1093/mnras/stad938`

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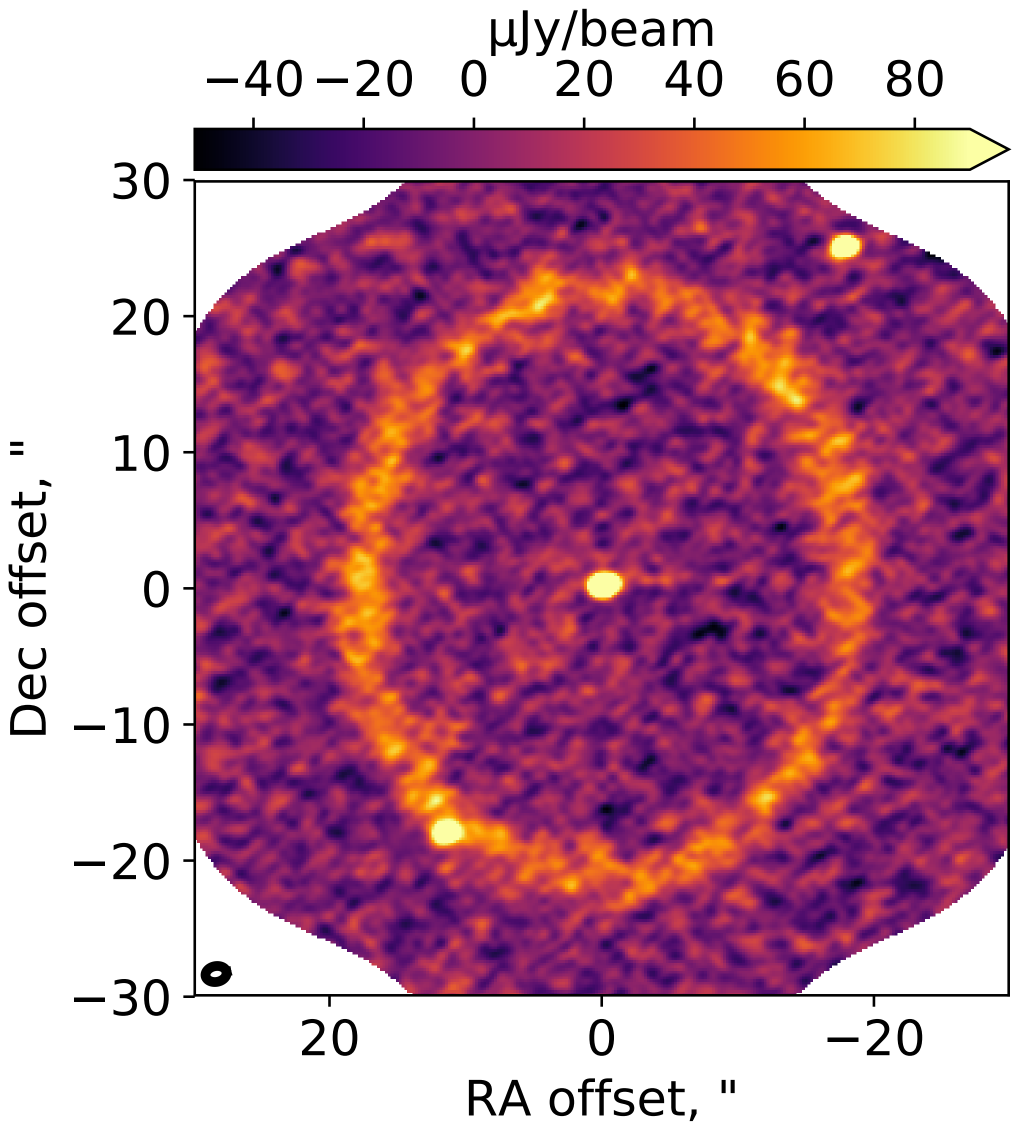

Figure 3: `clean` image of ϵ Eridani observed with ALMA at 1.3 mm. In this image we can clearly see the star at the centre, two point sources (determined to be background galaxies) and the main belt at 70 au.

High-Resolution Transmission Spectroscopy of the Terrestrial Exoplanet GJ 486b

A. Ridden-Harper[1,2], S. K. Nugroho[3,4], L. Flagg[1], R. Jayawardhana[5], J. D. Turner[1,6], E. de Mooij[7], R. MacDonald[1], E. Deibert[8,9,10], M. Tamura[11,3,4], T. Kotani[3,4,12], T. Hirano[3,4,12], M. Kuzuhara[3,4], M. Omiya[3,4], N. Kusakabe[3,4]

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The Astronomical Journal, published (2023AJ....165..170R)

Terrestrial exoplanets orbiting M-dwarf stars are promising targets for transmission spectroscopy with existing or near-future instrumentation. The atmospheric composition of such rocky planets remains an open question, especially given the high X-ray and ultraviolet flux from their host M dwarfs that can drive atmospheric escape. The 1.3 $R_\oplus$ exoplanet GJ 486b ($T_\mathrm{eq} \sim 700\,\mathrm{K}$), orbiting an M3.5 star, is expected to have one of the strongest transmission spectroscopy signals among known terrestrial exoplanets. We observed three transits of GJ 486b using three different high-resolution spectrographs: IRD on Subaru, IGRINS on Gemini-South, and SPIRou on the Canada-France-Hawai'i Telescope. We searched for atmospheric absorption from a wide variety of molecular species via the cross-correlation method, but did not detect any robust atmospheric signals. Nevertheless, our observations are sufficiently sensitive to rule out several clear atmospheric scenarios via injection and recovery tests, and extend comparative exoplanetology into the terrestrial regime. Our results suggest that GJ 486b does not possess a clear H_2/He-dominated atmosphere, nor a clear 100% water-vapor atmosphere. Other secondary atmospheres with high mean molecular weights or H_2/He-dominated atmospheres with clouds remain possible. Our findings provide further evidence suggesting that terrestrial planets orbiting M-dwarf stars may experience significant atmospheric loss.

Download/Website: `https://iopscience.iop.org/article/10.3847/1538-3881/acbd39/pdf`

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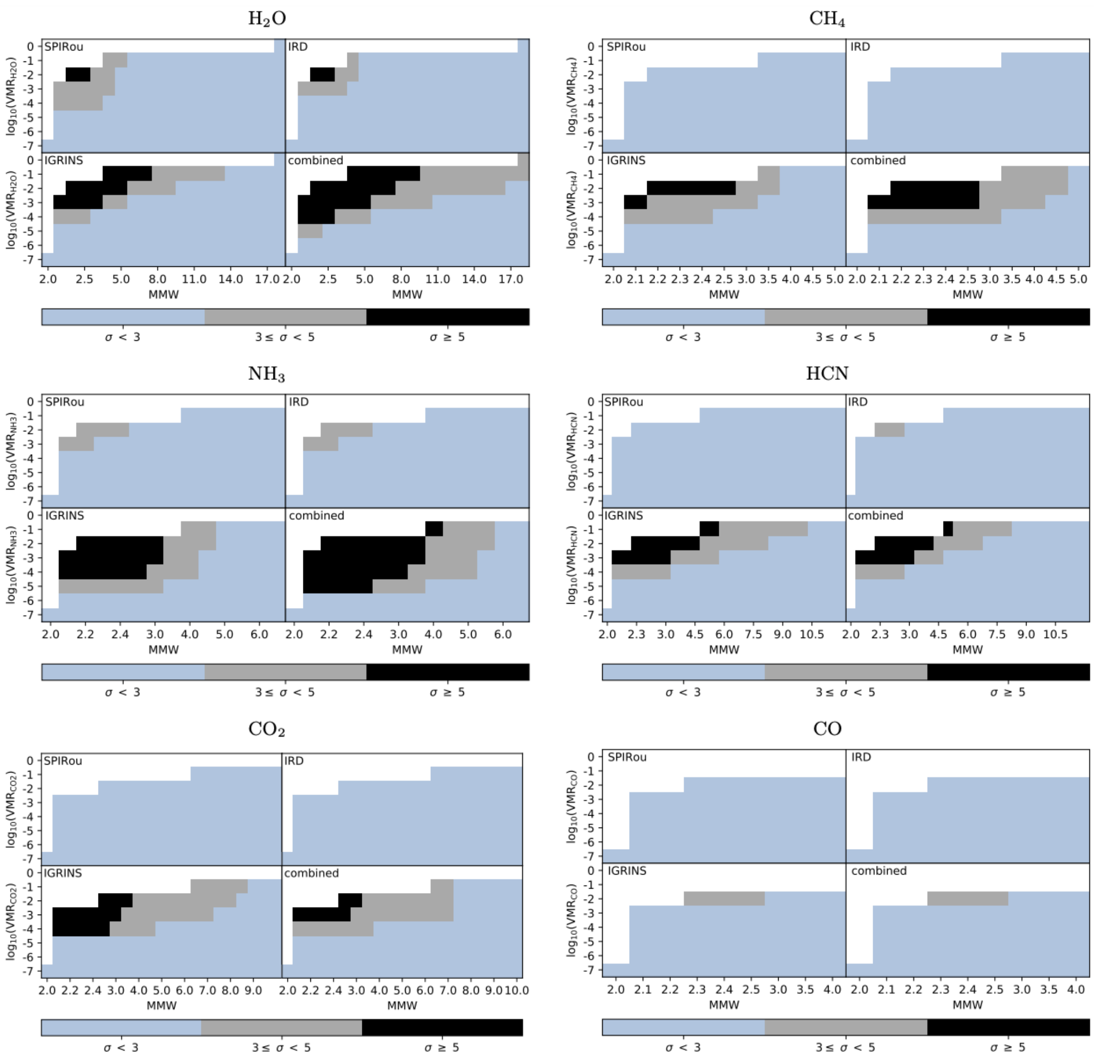

Figure 4: Constraints on the presence of H_2O (top left), CH_4 (top right), NH_3 (middle left), CH_4 (middle right), CO_2 (lower left), CO (lower right) in GJ 486b's atmosphere. Shown within each large panel are the limits from SPIRou (top left), IRD (top right), IGRINS (bottom left), and all data sets combined (lower right). The vertical axis shows the $\log_{10}$ of the VMR of the given species, while the horizontal axis shows the atmosphere's MMW. The black and gray regions indicate the VMR-MMW parameter space that can be ruled out to 5σ and 3σ, respectively. The light blue regions are allowed by our observations.

High-resolution Emission Spectroscopy of the Ultrahot Jupiter KELT-9b: Little Variation in Day- and Nightside Emission Line Contrasts

A. Ridden-Harper[1,2], *E. de Mooij*[3], *R. Jayawardhana*[4], *N. Gibson*[5], *R. Karjalainen*[6,7,8], *M. Karjalainen*[6]

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The Astronomical Journal, in press (arXiv:2304.03248)

The transmission spectrum of the ultrahot Jupiter KELT-9b ($T_{eq} \sim 4000$ K) exhibits absorption by several metal species. We searched for atomic and molecular lines in its emission spectrum by observing partial phase curves with the CARMENES spectrograph ($R \sim 80{,}000 - 95{,}000$). We find evidence for emission by Si I in the atmosphere of KELT-9b for the first time. Additionally we find evidence for emission by Mg I and Ca II, which were previously detected in transmission, and confirmed earlier detections of Fe I emission. Conversely, we find no evidence for dayside emission from Al I, Ca I, Cr I, FeH, Fe II, K I, Li I, Mg II, Na I, OH, Ti I, TiO, V I, V II, VO, and Y I. By employing likelihood mapping, we find indications of there being little variation in emission line contrast between the day- and nightsides –suggesting that KELT-9b may harbor iron emission on its nightside. Our results demonstrate that high-resolution ground-based emission spectroscopy can provide valuable insights into exoplanet atmospheres.

Download/Website: `https://arxiv.org/pdf/2304.03248.pdf`

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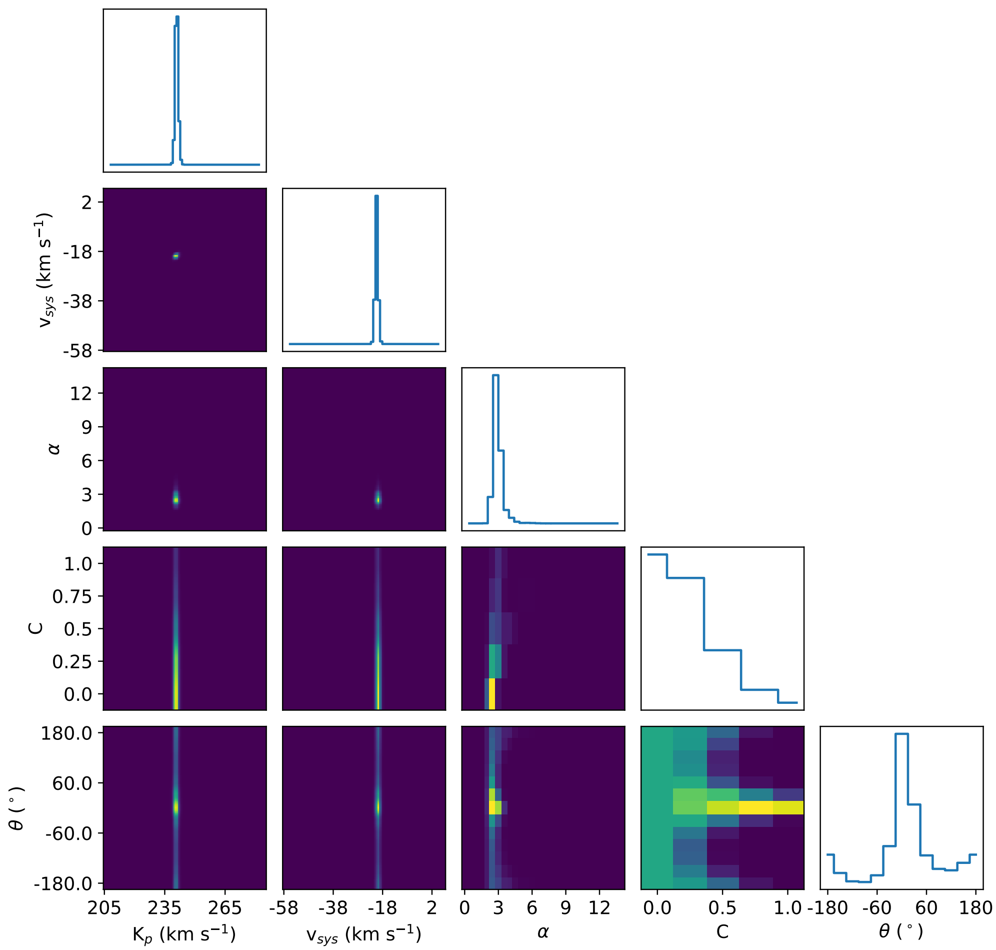

Figure 5: The conditional (2D) and marginalized (1D) likelihood distributions of KELT-9b's Fe I emission derived from our CARMENES observations. K_p is KELT-9b's radial velocity semi-amplitude, v_{sys} is KELT-9's systemic velocity, α is a scaling factor to allow uncertainty in the scale of the model, θ is the phase offset of the peak line contrast, defined so that a positive offset occurs after the secondary eclipse. C is the day-night contrast given by $C = 1 - F_n/F_d$ where F_n and F_d are the planetary line emissions of the day- and nightsides, respectively, measured over the wavelength range of our observations, i.e., C = 0: no variation between day and nightside; C = 1: no emission from the nightside.

3 Jobs and Positions

Postdoctoral position in JWST-MIRI exoplanet spectroscopy

L. Decin[1], *O. Absil*[2]
[1] KU Leuven
[2] University of Liège

Leuven & Liège, Belgium, Summer/Fall 2023,

The Institute of Astronomy (IoA) of KU Leuven and the STAR Institute of University of Liège are inviting applications for a joint postdoctoral position in the field of exoplanet science. The position is open within our "JWST/MIRI Science Exploitation" project funded by the Belgian Science Policy Office PRODEX programme. The appointment is full time (50% at KU Leuven, 50% at ULiège), and is initially funded until 31 December 2024, but could be extended upon the renewal of our PRODEX project. The successful candidate will be mainly involved in the analysis of guaranteed time observations obtained within the MIRI European Consortium. The proposed research will more specifically focus on the analysis of low- to medium-resolution spectra obtained with the MIRI spectrographs on exoplanets and brown dwarfs using state-of-the-art atmospheric retrieval tools.
Informal inquiries are welcome (clio.gielen@kuleuven.be). Applications sent by Friday May 5, 2023 will be fully considered. Candidates must possess a PhD in Physics, Astrophysics, or a similar field. Applicants should submit their CV, letter of motivation and a statement of research interests (up to 3 pages). The candidates should also provide the names of three referees that could be contacted to provide reference letters. The starting date can be as early as June 2023 and should (ideally) be no later than October 2023. Support for travel will be available.

Contact: `leen.decin@kuleuven.be`, `olivier.absil@uliege.be`, `clio.gielen@kuleuven.be`

Assistant or Associate Professor in Exoplanets

Astronomy and Astrophysics Group
Physics Department, University of Warwick, Coventry CV4 7AL, United Kingdom

University of Warwick, Start date TBD

The Department of Physics at the University of Warwick seeks to make an academic appointment at the level of Assistant or Associate Professor in our Astronomy and Astrophysics Group in the field of Exoplanets. The appointment level will be made dependent on the experience of the successful candidate.

The successful candidate will have an outstanding track record in the field of exoplanets and be ready to build their own research team with the support of colleagues at Warwick. All areas of exoplanet research will be considered, but the appointment would particularly suit an applicant experienced in exoplanet atmospheres.

Warwick hosts one of the largest exoplanet research groups in the UK, with 11 academic staff, 13 research staff and 20 PhD students. Our interests include transiting exoplanets, radial velocities, exoplanet atmospheres, planetary dynamics, planet formation, protoplanetary and debris discs, and planets and debris around white dwarf stars. Members of the group have leading roles in WASP, NGTS, HARPS3 and ESA's PLATO mission (the PLATO Science Management Office is based here). We are major contributors to interdisciplinary research at Warwick through our Centre for Exoplanets and Habitability, and we have strong support from the University, which has identified Habitability as one of its Global Research Priorities.

Academic staff at the University of Warwick enjoy an excellent benefits programme and pension scheme, as well as a commitment to work/life balance and personal learning development opportunities. The Department of Physics and the University of Warwick are proud of their diverse community of staff, students, and visitors, and are committed to maintaining an excellent record in teaching and research by ensuring that there is equity of opportunity for all, fostered in an environment of mutual respect and dignity.

Closing Date 23 April 2023

For more details and to apply, please see link below.

Download/Website: `tinyurl.com/Warwick-Exo-Post`

Contact: `Informal enquiries can be addressed to Prof. Don Pollacco (d.pollacco@warwick.ac.uk) and/or Prof. Peter Wheatley (p.j.wheatley@warwick.ac.uk).`

4 Conferences and Workshops

3rd announcement: TOEIII - Planet-Star Connection

Susana Barros[1], *Elisa Delgado Mena*[1], *Olivier Demangeon*[1], *Sergio Sousa*[1]
Instituto de Astrofísica e Ciências do Espaço (IA), Portugal

Porto, Portugal, 17-21 July 2023

Important Information: Some spots are still available for the conference registration. Contact the LOC to get the registration link. The registration will follow the basic rule: first-come, first-served.

Abstract: Planetary systems result from the synergy between the stars and the planets they host. It can be convenient, at first, to consider them in isolation, but the links between them affect all aspects of exoplanetary sciences. Stars can be a hurdle to exoplanetary sciences. The precision and accuracy of our knowledge of stellar parameters is often a major driver for the precision and accuracy of the respective planetary parameters. Stellar activity and its impact on planet detection and characterisation is one of the significant challenges for the next decade. But stars can also be facilitators to exoplanetary sciences. The correlation between stellar metallicity and the frequency of giant planets is well established and the link between stellar and planetary composition is an active topic. In the next few years we also have a lot to learn from the dynamical interactions between stars and planets.
With this new edition of the Towards Other Earth conference series, we aim to gather again scientists from all around the world in Porto (Portugal), to discuss what has been learned from studying stars and planets together. In particular we wish to address:

- The impact of stellar activity on planet detection and characterisation but also on the evolution of planets and their atmospheres;
- The link between the stellar properties and the frequency, bulk and atmospheric composition of planets;
- The implications and different effects of the dynamical interactions between the stars and the planets that they host.

Scientific Organizing Comitte: Andrew Collier Cameron (University of St Andrews, UK), Caroline Dorn (University of Zurich, Switzerland), David Ehrenreich (University of Geneva, Switzerland), Elisa Delgado Mena (Instituto de Astrofísica e Ciências do Espaço, Portugal - *Co-Chair*, Emeline Bolmont (University of Geneva, Switzerland), Eva Villaver (Centro de Astrobiología, Spain), Jacques Laskar (Observatoire de Paris, France), Lisa Kaltenegger (Carl Sagan Institute and Cornell University, USA), Nestor Espinoza (Space Telescope Science Institute, USA), Olivier Demangeon (Instituto de Astrofísica e Ciências do Espaço, Portugal - *Co-Chair*), Rebekah Dawson (Pennsylvania State University, USA), Sérgio Sousa (Instituto de Astrofísica e Ciências do Espaço, Portugal - *Co-Chair*), Susana Barros (Instituto de Astrofísica e Ciências do Espaço, Portugal - *Co-Chair*)

Key Dates:
1 March 2023: Early Registration/Payment begins; Abstract submission begins
30 April 2023: Abstract submission ends; Early Registration/Payment Deadline
1 May 2023: Late Registration
31 May 2023: Full programme released
30 June 2023: Late Registration/Payment Deadline
17 July 2023. Arrival day - Welcome to Porto!

Download/Website: `http://www.iastro.pt/toe3/`

Contact: `toe3-loc@googlegroups.com`

The National Astronomy Meeting 2023 - Parallel session: Observational and theoretical studies of protoplanetary discs

Maria Koutoulaki[1], John Ilee[1], Richard Booth[1], Stefan Kraus[2], Rebecca Nealon[3], Donna Rodgers-Lee[4]
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[3] University of Warwick, UK
[4] Dublin Institute of Advanced Studies, IE

Cardiff University, 3-7 July 2023

A first step towards understanding planetary formation is characterisation of the structure and evolution of protoplanetary discs. Recently, ground-breaking results produced by high angular resolution astronomy with facilities like VLT, VLTI, CHARA and ALMA have completely changed our view of protoplanetary discs. Synergies between different wavelengths have proven fruitful (e.g., the discovery of the PDS 70 planetary system using near-infrared scattered light observations, Ha imaging as well mm observations) and have shown that multiwavelength studies are important and needed. Another example is the study of dust evolution from small grains to pebbles which is crucial for planet formation. Constraining the spatial distribution of both small and large grains can only be done by combining near infrared and mm observations. This session aims at bringing together astronomers with a diverse range of expertise to discuss the latest scientific results related to observations (interferometric and non-interferometric) and simulations of protoplanetary discs. An important aspect of this session is to promote the exchange of knowledge and collaborations on the different observational and numerical techniques and wavelength coverages and discuss about new and future facilities and what they have to offer in the field (e.g., JWST, VLTI/GRAVITY+). The sessions will be opened by an invited speaker in the field and the rest of the time will be filled by contributed talks with an emphasis on early career researchers. The fields explored in this session comprise of (i) The inner region of protoplanetary discs, (ii) The outer regions of protoplanetary discs, and (iii) Simulations of protoplanetary discs.
The innermost regions of the disc, within a few au from the protostar, play a crucial role in the physics of the entire disc, as well as in the formation of planets. Within this region, large amounts of energy are released into the system, influencing the energy balance of the full disc; dust particles evaporate at the dust sublimation point, and terrestrial planets may form. Accretion and ejection processes have an impact on the protostellar evolution. Facilities like VLT (e.g., XSHOOTER, SPHERE) and VLTI (e.g., GRAVITY and MATISSE) have made a lot of progress in detecting the inner gaseous and dusty disc and measuring the accretion and ejection properties of young stars. At mm wavelengths, ALMA completely changed our view on protoplanetary discs where unexpectedly, discs were found to consist of a series of bright symmetric nested rings and a plethora of different disc structures and shapes were present in the discs of young stars. Since then, much work has been done in studying the dust and gas component of the disc as well as looking for planets. Although these ring and spiral structures are present in discs it is still not clear whether all these structures are created from planets or not. Proper modelling is needed in order to understand these structures as well as connect the inner and outer disc observations.

Contact: `M.K.Koutoulaki@leeds.ac.uk`

5 Exoplanet Archives

March 2023 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, April 12, 2023

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

March 31, 2023

Ten New Planets!

This week's ten new planets include K2-415 b, a warm, transiting, Earth-sized planet orbiting a nearby, low-mass M dwarf. Read more about the planet (`http://bit.ly/3Uolk2Y`), and in the discovery paper (`https://bit.ly/3ZVOUOs`).

The nine additional new planets are TOI-2096 b & c, HD 18438 b, TOI-1338 c, TOI-4603 b, KMT-2021-BLG-0712L b, KMT-2021-BLG-0909L b, KMT-2021-BLG-2478L b, and KMT-2021-BLG-1105L b!

March 17, 2023

Thirteen Planets, Including a Protoplanet and a Gas Giant Orbiting an M Dwarf

This week's 13 new planets include TOI-5205 b, a gas giant hosted by an M-dwarf star—an unusual pairing that challenges theories about the formation of gas giants. Read the Carnegie Science newsletter (`http://bit.ly/3ZZa5zf`) and the discovery paper (`https://bit.ly/3Gs8qLt`).

We've also added new protoplanet HD 169142 b, which was recently confirmed by Hammond et al. (`https://bit.ly/3mih5JU`), and TOI-561 f's status has been updated to False Positive Planet.

The other new planets are GJ 463 b, TIC 279401253 b, TIC 279401253 c, TOI-181 b, TOI-1811 b, TOI-2145 b, TOI-2152 b, TOI-2154 b, TOI-2497 b, Kepler-1976 b, and OGLE-2018-BLG-0799L b.

March 7, 2023

A Giant Batch of Giants

This week's release has 28 new planets—and 24 of them have a mass bigger than Neptune's. We've also added Wolf 1069 b, a rocky, Earth-sized planet that orbits in its host's habitable zone. The system is located only 31 light-years from Earth.

The new planets are TOI-1937 A b, TOI-2364 b, TOI-2583 A b, TOI-2587 A b, TOI-2796 b, TOI-2803 A b, TOI-2818 b, TOI-2842 b, TOI-2977 b, TOI-3023 b, TOI-3235 b, TOI-3364 b, TOI-3688 A b, TOI-3807 b, TOI-3819 b, TOI-3912 b, TOI-3976 A b, TOI-4087 b, TOI-4145 A b, TOI-4463 A b, TOI-4791 b, Wolf 1069 b, L 363-38 b, TOI-836 b & c, TOI-2525 b & c, and AF Lep b.

March 1, 2023

New Table: Habitable Worlds Observatory Precursor Science Target List

In support of NASA's search for life, we've launched a new interactive table of the nearby stars that are likely to be targeted by the Habitable Worlds Observatory (HWO). This new table, HWO ExEP Precursor Science Stars (://bit.ly/hwoexep), is intended to help inform the observatory's design and enhance its science return.

The new table hosts the precursor science target list compiled by NASA's Exoplanet Exploration Program office (`https://exoplanets.nasa.gov/exep/`), which may motivate observations and analysis that help mission-enabling precursor science in future surveys for exo-Earths. Further details about the target list and the HWO are explained in Mamajek & Stapelfeldt (2023).

To access the new interactive table, as well as the older Mission Stars and Mission Stars+ExoCat tables, click on the Data/Other drop-down menu and select the table name.

The new HWO table is also supported by our Table Access Protocol (TAP) service (://bit.ly/2Tajkgk); the older Mission Stars tables can be queried through the archive's application programming interface (API) (://bit.ly/2JG8Xy0). Additional information, including data column definitions for all three tables, is available through the Mission Stars documentation page (`https://bit.ly/missionstars`).

Let us know how you like the table and how it helps your research! Contact us through social media or our Help Desk (`http://bit.ly/2uP9N1b`).

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

6 Other

4th Announcement of Opportunity for the CHEOPS Guest Observers Programme

European Space Agency (ESA)

Invitation
ESA's Director of Science is pleased to invite you to respond to the 4th Announcement of Opportunity for the CHEOPS Guest Observers Programme.
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 would appreciate if you could circulate this Announcement to interested colleagues within your institute.

What is the AO-4 Call?
ESA's Characterising Exoplanets Satellite (CHEOPS) 4th Announcement of Opportunity (AO-4) for the submission of proposals to the Guest Observers (GO) Programme has opened on 4 April 2023 (12:00 noon CEST) and will close on 25 May 2023 (12:00 noon CEST). The observing cycle will run from 25 September 2023 until 31 September 2024 and thus mark the beginning of CHEOPS' first mission extension, which was recently approved by ESA's Science Programme Committee.
Importantly, the CHEOPS AO-4 Call is foreseen to come with several novelties to further enhance the community access and GO experience: - only 50 reserved targets, with all the rest being open to the entire community - up to 30- double anonymous peer-review of proposals
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 ground-based facilities, and more.

What is 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 is an ESA mission implemented in partnership with Switzerland, through the Swiss Space Office (SSO). The University of Bern leads a consortium of 11 ESA Member States contributing to the mission and represented in the CHEOPS Science Team. ESA is the mission architect responsible for overall mission definition and procurement of the spacecraft and launch.
ESA is also responsible for the early operations phase executed by the spacecraft contractor, Airbus Defence and Space–Spain (ASE). In addition, ESA is responsible for running the CHEOPS Guest Observers (GO) Programme, a competitive and peer-reviewed process, through which the science community can apply for 30% of science observations time during the first extended mission (20% during the nominal mission).
The science instrument is led by the University of Bern, with important contributions from Austria, Belgium, Germany and Italy. Other contributions to thescience instrument, in the form of hardware or science operations, are provided by Hungary, France, Portugal, Sweden, and the United Kingdom. CHEOPS was launched from Europe's spaceport in Kourou, French Guiana on 18 December 2019 on a Soyuz rocket operated by Arianespace. Following a successful in-orbit commissioning of the spacecraft, responsibility for operations was taken over by the CHEOPS Mission Consortium, with the Mission Operations Centre under the responsibility of INTA, Spain, and the Science Operations Centre led by the University of Geneva, Switzerland.

Download/Website: `https://www.cosmos.esa.int/web/cheops-guest-observers-programme/ao-4`

Contact: `cheops-support@cosmos.esa.int`

7 As seen on astro-ph

The following list contains exoplanet related entries appearing on astro-ph in March 2023.
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.

March 2023

astro-ph/2303.00006: **Self-Consistent Spin, Tidal and Dynamical Equations of Motion in the REBOUNDx Framework** *by Tiger Lu et al.*
astro-ph/2303.00084: **Spin evolution of Venus-like planets subjected to gravitational and thermal tides** *by Alexandre Revol et al.*
astro-ph/2303.00063: **New chondritic bodies identified in eight oxygen-bearing white dwarfs** *by Alexandra E. Doyle et al.*
astro-ph/2303.00012: **Planetary Population Synthesis and the Emergence of Four Classes of Planetary System Architectures** *by Alexandre Emsenhuber et al.*
astro-ph/2303.00011: **Planetary line-to-accretion luminosity scaling relations: Extrapolating to higher-order hydrogen lines** *by Gabriel-Dominique Marleau, Yuhiko Aoyama*
astro-ph/2303.00397: **Dynamical Evolution of Closely Packed Multiple Planetary Systems Subject to Atmospheric Mass-Loss** *by S. Wang, D. N. C. Lin*
astro-ph/2303.00540: **New models of reflection spectra for terrestrial exoplanets: Present and prebiotic Earth orbiting around stars of different spectral types** *by Manika Singla, Sujan Sengupta*
astro-ph/2303.00624: **The TESS Triple-9 Catalog II: a new set of 999 uniformly-vetted exoplanet candidates** *by Christian Magliano et al.*
astro-ph/2303.00659: **The occurrence rate of giant planets orbiting low-mass stars with TESS** *by Edward M Bryant et al.*
astro-ph/2303.00718: **Electric interface condition for sliding and viscous contacts** *by Jérémy Rekier et al.*
astro-ph/2303.00768: **A major asymmetric ice trap in a planet-forming disk IV. Nitric oxide gas and a lack of CN tracing sublimating ices and a C/O ratio** < 1 *by M. Leemker et al.*
astro-ph/2303.00867: **Evolution of the eccentricity and inclination of low-mass planets subjected to thermal forces: a numerical study** *by S. Cornejo et al.*
astro-ph/2303.03119: **Multiverse Predictions for Habitability: Stellar and Atmospheric Habitability** *by McCullen Sandora et al.*
astro-ph/2303.01496: **Robustness Measures for Molecular Detections using High-Resolution Transmission Spectroscopy of Exoplanets** *by Connor J. Cheverall et al.*
astro-ph/2303.01458: **Near-infrared Polarization Charateristics of the Zodiacal Light Observed with DIRBE/COBE** *by Kohji Takimoto et al.*
astro-ph/2303.01138: **Auroral, Ionospheric and Ground Magnetic Signatures of Magnetopause Surface Modes** *by M. O. Archer et al.*
astro-ph/2303.01358: **A Jupiter analogue and a cold Super-Neptune orbiting the solar-twin star HIP 104045** *by Thiago Ferreira et al.*
astro-ph/2303.02167: **An SMA Survey of Chemistry in Disks around Herbig AeBe Stars** *by Jamila Pegues et al.*
astro-ph/2303.02217: **The Influence of Tidal Heating on the Habitability of Planets Orbiting White Dwarfs** *by Juliette Becker et al.*
astro-ph/2303.01821: **Testing GR and alternative theories with planetary ephemerides** *by Agnès Fienga, Olivier Minazzoli*
astro-ph/2303.02002: **The Calar Alto CAFOS Direct Imaging First Data Release** *by Miriam Cortés-Contreras et al.*

astro-ph/2303.02188: **Superhabitability of High-Obliquity and High-Eccentricity Planets** *by Jonathan Jernigan et al.*

astro-ph/2303.03149: **Mid-infrared blends and continuum signatures of dust drift and accretion in protoplanetary disks** *by S. Antonellini et al.*

astro-ph/2303.02355: **Tuning the Legacy Survey of Space and Time (LSST) Observing Strategy for Solar System Science** *by Megan E. Schwamb et al.*

astro-ph/2303.02678: **Multiverse Predictions for Habitability: Origin of Life Scenarios** *by McCullen Sandora et al.*

astro-ph/2303.02766: **Dissipative Capture of Planets Into First-Order Mean-Motion Resonances** *by Konstantin Batygin, Antoine C. Petit*

astro-ph/2303.03469: **On the Origin of Dust Structures in Protoplanetary Disks: Constraints from the Rossby Wave Instability** *by Eonho Chang et al.*

astro-ph/2303.03232: **CO or no CO? Narrowing the CO abundance constraint and recovering the H2O detection in the atmosphere of WASP-127 b using SPIRou** *by Anne Boucher et al.*

astro-ph/2303.02941: **Planetary Orbit Eccentricity Trends (POET). I. The Eccentricity-Metallicity Trend for Small Planets Revealed by the LAMOST-Gaia-Kepler Sample** *by Dong-Sheng An et al.*

astro-ph/2303.03383: **Origin and extent of the opacity challenge for atmospheric retrievals of WASP-39 b** *by Prajwal Niraula et al.*

astro-ph/2303.04043: **Catalog of Ultraviolet Bright Stars (CUBS): Strategies for UV occultation measurements, planetary illumination modeling, and sky map analyses using hybrid IUE-Kurucz spectra** *by M. A. Velez et al.*

astro-ph/2303.04163: **Characterizing fragmentation and sub-Jovian clump properties in magnetized young protoplanetary disks** *by Noah Kubli et al.*

astro-ph/2303.03610: **Revisiting the Transit Timing and Atmosphere Characterization of the Neptune-mass Planet HAT-P-26 b** *by Napaporn A-thano et al.*

astro-ph/2303.03911: **Widespread Hydrogenation of the Moons South Polar Cold Traps** *by Timothy P. McClanahan et al.*

astro-ph/2303.03775: **The young mini-Neptune HD 207496b that is either a naked core or on the verge of becoming one** *by S. C. C. Barros et al.*

astro-ph/2303.03621: **Planetesimal growth in evolving protoplanetary disks: constraints from the pebble supply** *by Tong Fang et al.*

astro-ph/2303.04889: **Effective two-body scatterings around a massive object** *by Yihan Wang et al.*

astro-ph/2303.04770: **Impact of Changing Stellar and Planetary Magnetic Fields on (Exo)planetary Environments and Atmospheric Mass Loss** *by Sakshi Gupta et al.*

astro-ph/2303.04727: **Large Interferometer For Exoplanets (LIFE): IX. Assessing the Impact of Clouds on Atmospheric Retrievals at Mid-Infrared Wavelengths with a Venus-Twin Exoplanet** *by B. S. Konrad et al.*

astro-ph/2303.04610: **Free-floating or wide-orbit? Keck adaptive-optics observations reveal no host stars near free-floating planet candidates** *by P. Mroz et al.*

astro-ph/2303.04424: **Cosmic-ray ionization rate versus Dust fraction: Which plays a crucial role in the early evolution of the circumstellar disk?** *by Yudai Kobayashi et al.*

astro-ph/2303.04652: **Migration of pairs of giant planets in low-viscosity discs** *by P. Griveaud et al.*

astro-ph/2303.04474: **Habitability and sub glacial liquid water on planets of M-dwarf stars** *by Amri Wandel*

astro-ph/2303.05559: **Improved companion mass limits for Sirius A with thermal infrared coronagraphy using a vector-apodizing phase plate and time-domain starlight-subtraction techniques** *by Joseph D. Long et al.*

astro-ph/2303.05544: **Confirmation of Color Dependent Centroid Shift Measured After 1.8 years with HST** *by Aparna Bhattacharya et al.*

astro-ph/2303.05522: **The origin of free-floating planets** *by Núria Miret-Roig*

astro-ph/2303.05253: **Equivalence between simple multilayered and homogeneous laboratory-based rheological models in planetary science** *by Yeva Gevorgyan et al.*
astro-ph/2303.05200: **Capture of the free-floating planets and primordial black holes into protostellar clouds** *by Yury N. Eroshenko*
astro-ph/2303.05064: **Multiple Rings and Asymmetric Structures in the Disk of SR 21** *by Yi Yang et al.*
astro-ph/2303.05379: **Orbital stability of two circumbinary planets around misaligned eccentric binaries** *by Cheng Chen et al.*
astro-ph/2303.06214: **A Catalog of Exoplanets with Equilibrium Temperature less than 600 K** *by David G. Russell*
astro-ph/2303.06157: **TTV Constraints on Additional Planets in the WD 1856+534 system** *by Sarah Kubiak et al.*
astro-ph/2303.05857: **Hot Exoplanet Atmospheres Resolved with Transit Spectroscopy (HEARTS) VIII. Non-detection of sodium in the atmosphere of the aligned planet KELT-10b** *by M. Steiner et al.*
astro-ph/2303.05753: **Exciting spiral arms in protoplanetary discs from flybys** *by Jeremy L. Smallwood et al.*
astro-ph/2303.05645: **Classifying Protoplanetary disks Infrared Spectrum and Analysis by c-C_3H_2 C_5H_5 C_9H_7 $C_{12}H_8$ $C_{23}H_{12}$ and $C_{53}H_{18}$ to be Capable Template for Biological Molecule** *by Norio Ota, Aigen Li*
astro-ph/2303.05635: **Assessing the spin-orbit obliquity of low-mass planets in the breaking the chain formation model: A story of misalignment** *by Leandro Esteves et al.*
astro-ph/2303.06453: **Evidence of a radiation belt around a brown dwarf** *by J. B. Climent et al.*
astro-ph/2303.06479: **A numerical study of fourth- and fifth-order retrograde mean motion resonances in planetary systems** *by Alan Cefali Signor et al.*
astro-ph/2303.06728: **An unlikely survivor: a low-density hot Neptune orbiting a red giant star** *by Samuel Grunblatt et al.*
astro-ph/2303.06592: **Spatially resolving polycyclic aromatic hydrocarbons in Herbig Ae disks with VISIR-NEAR at the VLT** *by Gideon Yoffe et al.*
astro-ph/2303.07058: **The energetic particle environment of a GJ 436 b-like planet** *by D. Rodgers-Lee et al.*
astro-ph/2303.07270: **Spherical harmonics representation of the gravitational phase shift** *by Slava G. Turyshev, Viktor T. Toth*
astro-ph/2303.07297: **Disc population synthesis: decrease of the solid mass reservoir through pebble drift** *by Johan Appelgren et al.*
astro-ph/2303.07381: **LRG-BEASTS: Evidence for clouds in the transmission spectrum of HATS-46 b** *by E. Ahrer et al.*
astro-ph/2303.07420: **Hotter Than Expected: HST/WFC3 Phase-resolved Spectroscopy of a Rare Irradiated Brown Dwarf with Strong Internal Heat Flux** *by Rachael C. Amaro et al.*
astro-ph/2303.08174: **A super-Earth and a mini-Neptune near the 2:1 MMR straddling the radius valley around the nearby mid-M dwarf TOI-2096** *by F. J. Pozuelos et al.*
astro-ph/2303.08077: **RUBIS: a simple tool for calculating the centrifugal deformation of stars and planets** *by Pierre S. Houdayer, Daniel R. Reese*
astro-ph/2303.07981: **Turbulent processing of PAHs in protoplanetary discs – Coagulation and freeze-out leading to depletion of gas-phase PAH** *by K. Lange et al.*
astro-ph/2303.08279: **Terrestrial and Neptune mass free-floating planet candidates from the MOA-II 9-year Galactic Bulge survey** *by Naoki Koshimoto et al.*
astro-ph/2303.08280: **Free-Floating planet Mass Function from MOA-II 9-year survey towards the Galactic Bulge** *by Takahiro Sumi et al.*
astro-ph/2303.08357: **A search for exoplanets around north circumpolar stars. VII. Detection of planetary companion orbiting the largest host star HD 18438** *by Byeong-Cheol Lee et al.*
astro-ph/2303.08487: **A multi-wavelength view of the multiple activity cycles of ε Eridani** *by B. Fuhrmeister et al.*

astro-ph/2303.08876: **OGLE-2016-BLG-1195 AO: Lens, Companion to Lens or Source, or None of the Above?** *by Andrew Gould et al.*

astro-ph/2303.08927: **Azimuthal C/O Variations in a Planet-Forming Disk** *by Luke Keyte et al.*

astro-ph/2303.09134: **Detection and Characterisation of a Coronal Mass Ejection using Interplanetary Scintillation measurements from the Murchison Widefield Array** *by J. Morgan et al.*

astro-ph/2303.09148: **Massive Protostellar Disks as a Hot Laboratory of Silicate Grain Evolution** *by Ryota Yamamuro et al.*

astro-ph/2303.09335: **ExoplANNET: A deep learning algorithm to detect and identify planetary signals in radial velocity data** *by L. A. Nieto, R. F. Díaz*

astro-ph/2303.09376: **Detection of a high-velocity sodium feature on the ultra-hot Jupiter WASP-121 b** *by J. V. Seidel et al.*

astro-ph/2303.09422: **Improved prior for adaptive optics point spread function estimation from science images: Application for deconvolution** *by A. Lau et al.*

astro-ph/2303.09501: **On the origin of the non-detection of metastable HeI in the upper atmosphere of the hot Jupiter WASP-80b** *by L. Fossati et al.*

astro-ph/2303.09653: **Atmospheres as windows into sub-Neptune interiors: coupled chemistry and structure of hydrogen-silane-water envelopes** *by William Misener, Hilke E. Schlichting*

astro-ph/2303.09169: **Solar center-to-limb variation in Rossiter-McLaughlin and exoplanet transmission spectroscopy** *by Ansgar Reiners et al.*

astro-ph/2303.10189: **Giant Impacts and Debris Disk Morphology** *by Joshua W. Jones et al.*

astro-ph/2303.10052: **A Biotic Habitable Zone: Impacts of Adaptation in Biotic Temperature Regulation** *by A. E. Nicholson, N. J. Mayne*

astro-ph/2303.09899: **Global N-body simulations of circumbinary planet formation around Kepler-16 and -34 analogues I: Exploring the pebble accretion scenario** *by Gavin A. L. Coleman et al.*

astro-ph/2303.09959: **Predicting the Yield of Small Transiting Exoplanets around Mid-M and Ultra-Cool Dwarfs in the Nancy Grace Roman Space Telescope Galactic Bulge Time Domain Survey** *by Patrick Tamburo et al.*

astro-ph/2303.10419: **Co-evolution of dust grains and protoplanetary disks** *by Yusuke Tsukamoto et al.*

astro-ph/2303.10604: **Rainy downdrafts in abyssal atmospheres** *by S. Markham et al.*

astro-ph/2303.11393: **Short-lived radioisotope enrichment in star-forming regions from stellar winds and supernovae** *by Richard J. Parker et al.*

astro-ph/2303.11241: **Constraining atmospheric parameters and surface magnetic fields with** $ntexttt\{ZeeTurbo\}$**: an application to SPIRou spectra** *by P. I. Cristofari et al.*

astro-ph/2303.11318: **Collisional evolution of dust and water ice in protoplanetary discs during and after an accretion outburst** *by Adrien Houge, Sebastiaan Krijt*

astro-ph/2303.11544: **A Constraint on the Amount of Hydrogen from the CO Chemistry in Debris Disks** *by Kazunari Iwasaki et al.*

astro-ph/2303.11776: **Optical spectropolarimetry of binary asteroid Didymos-Dimorphos before and after the DART impact** *by S. Bagnulo et al.*

astro-ph/2303.11841: **Discovery of a massive giant planet with extreme density around a sub-giant star TOI-4603** *by Akanksha Khandelwal et al.*

astro-ph/2303.11875: **Recommending Low-Cost Compact Space Environment and Space Weather Effects Sensor Suites for NASA Missions** *by Yihua Zheng et al.*

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