ExoPlanet News
An Electronic Newsletter

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Contents

1 Editorial

Welcome to Edition 164 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!

We remind you that we recently introduced a new feature with clickable urls and hyperlinks (e.g., to astro-ph articles). The new feature is still at the experimental phase, so we are keen to receive any problem report as well as feedback.

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 March 14, 2023.

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

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

2 Abstracts of refereed papers

Forbidden Emission Lines in Protostellar Outflows and Jets with MUSE

L. Flores-Rivera[1,2], M. Flock[1], N. T. Kurtovic[1], B. Husemann[1], A. Banzatti[3], S. C. Ringqvist[4], S. Kamann[5], A. Müller[1], C. Fendt[1], R. Garcia Lopez[6], G.-D. Marleau[7,8,9,1], T. Henning[1], C. Carrasco-Gonzalez[10], R. van Boekel[1], M. Keppler[1], R. Launhardt[1], Y. Aoyama[11]

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A&A (accepted), arXiv:2301.02559

Forbidden emission lines in protoplanetary disks are a key diagnostic in studies of the evolution of the disk and the host star. They signal potential disk accretion or wind, outflow, or jet ejection processes of the material that affects the angular momentum transport of the disk as a result. We report spatially resolved emission lines, namely, [OI] $\lambda\lambda$6300, 6363, [NII] $\lambda\lambda$6548, 6583, Hα, and [SII] $\lambda\lambda$6716, 6730 that are believed to be associated with jets and magnetically driven winds in the inner disks, due to the proximity to the star, as suggested in previous works from the literature. With a resolution of 0.025×0.025 arcsec^2, we aim to derive the position angle of the outflow/jet ($\mathrm{PA_{outflow/jet}}$) that is connected with the inner disk. We then compare it with the position angle of the dust ($\mathrm{PA_{dust}}$) obtained from previous constraints for the outer disk. We also carry out a simple analysis of the kinematics and width of the lines and we estimate the mass-loss rate based on the [OI] λ6300 line for five T Tauri stars. Observations were carried out with the optical integral field spectrograph of the Multi Unit Spectroscopic Explorer (MUSE), at the Very Large Telescope (VLT). The instrument spatially resolves the forbidden lines, providing a unique capability to access the spatial extension of the outflows/jets that make the estimate of the $\mathrm{PA_{outflow/jet}}$ possible from a geometrical point of view. The forbidden emission lines analyzed here have their origin at the inner parts of the protoplanetary disk. From the maximum intensity emission along the outflow/jet in DL Tau, CI Tau, DS Tau, IP Tau, and IM Lup, we were able to reliably measure the $\mathrm{PA_{outflow/jet}}$ for most of the identified lines. We found that our estimates agree with $\mathrm{PA_{dust}}$ for most of the disks. These estimates depend on the signal-to-noise level and the collimation of the outflow (jet). The outflows/jets in CIDA 9, GO Tau, and GW Lup are too compact for a $\mathrm{PA_{outflow/jet}}$ to be estimated. Based on our kinematics analysis, we confirm that DL Tau and CI Tau host a strong outflow/jet with line-of-sight velocities much greater than 100 km s^{-1}, whereas DS Tau, IP Tau, and IM Lup velocities are lower and their structures encompass low-velocity components to be more associated with winds. Our estimates for the mass-loss rate, $\dot{M}_{\rm loss}$, range between (1.1-6.5) $\times10^{-7}$-10^{-8} $M_\odot$ yr^{-1} for the disk-outflow/jet systems analyzed here. The outflow/jet systems analyzed here are aligned within around 1° between the inner and outer disk. Further observations are needed to confirm a potential misalignment in IM Lup.

Download/Website: `https://sites.google.com/view/lizxandraflores/about-me`

Contact: `lizxandra.rivera@sund.ku.dk`

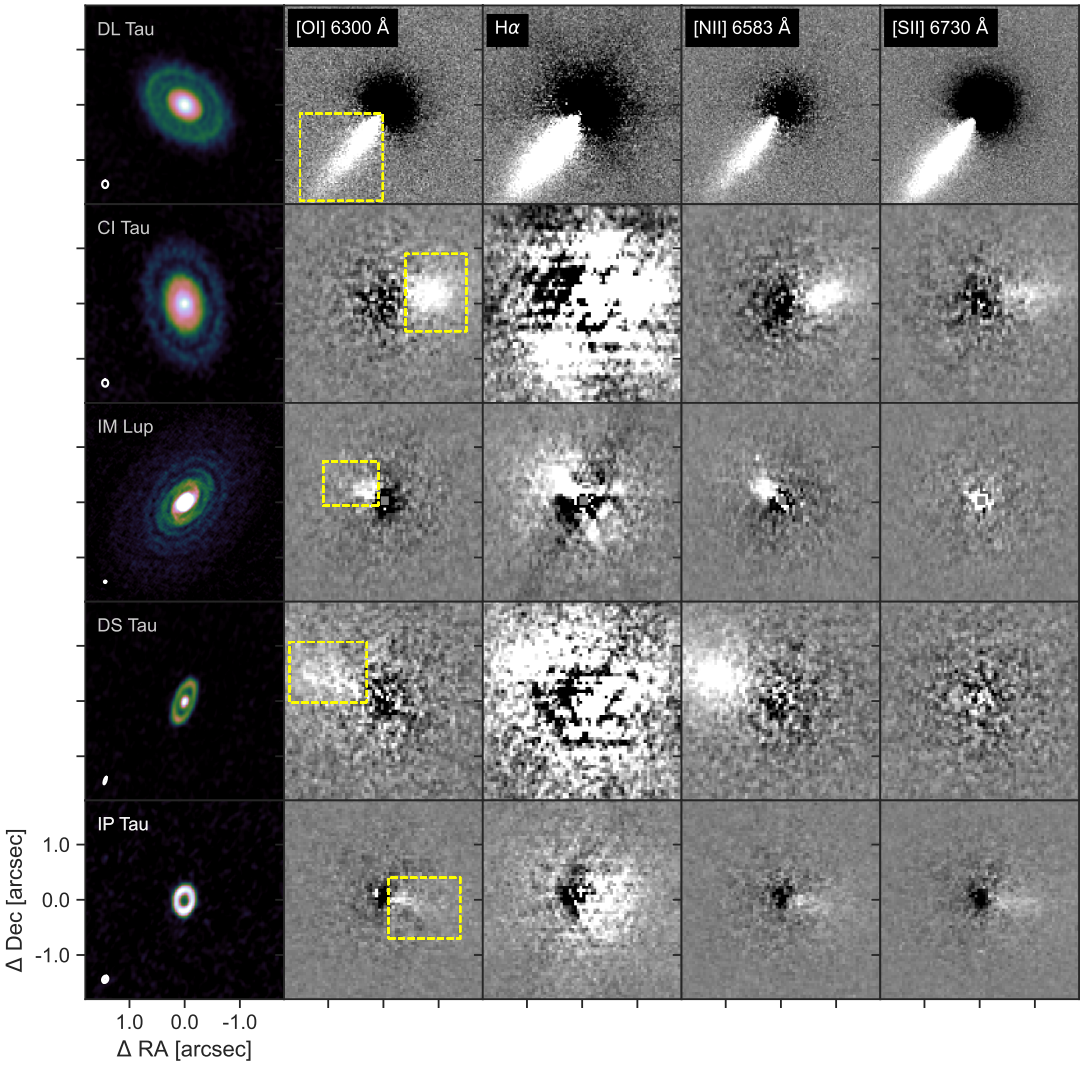

Figure 1: Composite image of different protoplanetary disks at four different forbidden emission lines. First column shows the dust continuum emission at 1.3 mm from ALMA cycle 4 (Long et al. 2018; Long et al. 2019). Other columns show the different forbidden emission lines from MUSE as labeled in the top left of the first row. Dashed yellow rectangles mark the area from where we gather the spectrum of the jet by summing over the spatial axes within the dashed yellow frame of the image.

Update and redesign of the PlanetS catalog of transiting planets with reliable mass and radius measurements

Léna Parc [1] *& François Bouchy* [1]

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Data & Analysis Center for Exoplanets (DACE), last updated on January 10, 2023

The new version of the PlanetS exoplanet catalog is online ! This database is available on the Data & Analysis Center for Exoplanets (DACE) platform, which is a facility based at the University of Geneva dedicated to extrasolar planets data visualisation, exchange and analysis. The catalog was initially built and presented in Otegi et al. 2019 and based on reliable, robust, and, as far as possible, accurate mass and radius measurements of transiting planets. The updated catalogue contains 635 planets selected from the NASA Exoplanet Archive and filtered to consider only exoplanets with relative errors of less than 25% for mass and 8% for radius. All references are also verified to ensure the reliability and robustness of the analysis of the photometric and spectroscopic data.
The goal of this redesign was to upgrade and to complete as much as possible all the parameters of the database, to update with the new exoplanets discovered in 2022 and old planets with new studies.
You can find in this database the 635 transiting exoplanets with more than 40 different parameters, from the NASA Exoplanet Archive but also from Gaia DR3 and TEPCat (for obliquity): planetary, stellar, orbital parameters...
The catalog will be updated every month with new planets and references ! You can visualize the data in the plotting tool of DACE, or download it via API.

Download/Website: `https://dace.unige.ch/exoplanets/`

Contact: `lena.parc@unige.ch`

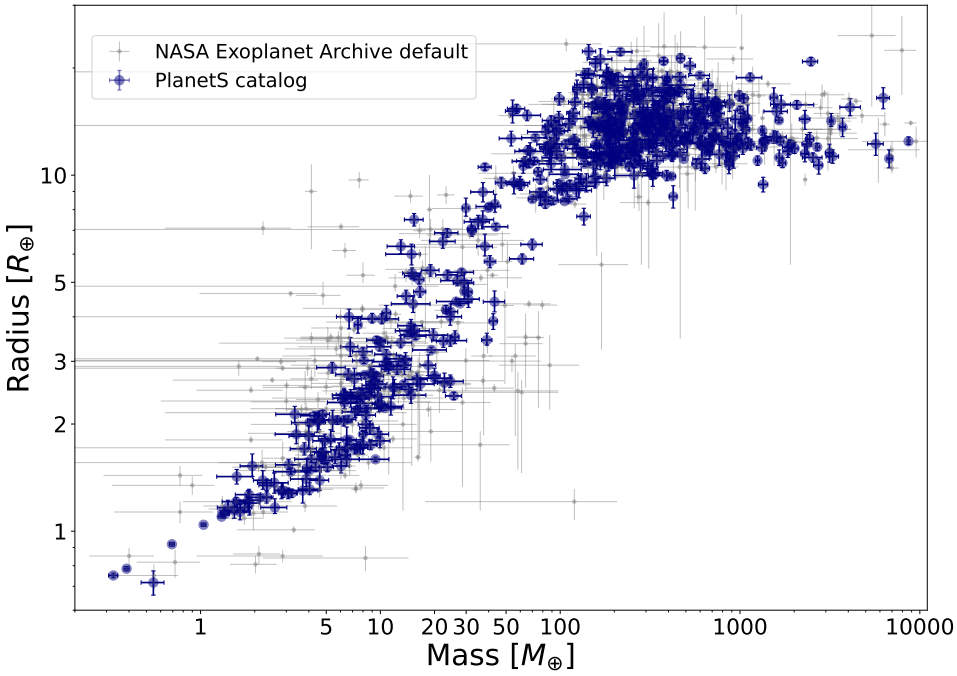

Figure 2: Mass-Radius diagram : comparison between PlanetS catalog and NASA Exoplanet Archive default parameters. We can see that some planets by default of NASA Exoplanet Archive have significant errors in radius and mass that do not allow reliable and robust studies compared to the PlanetS catalog.

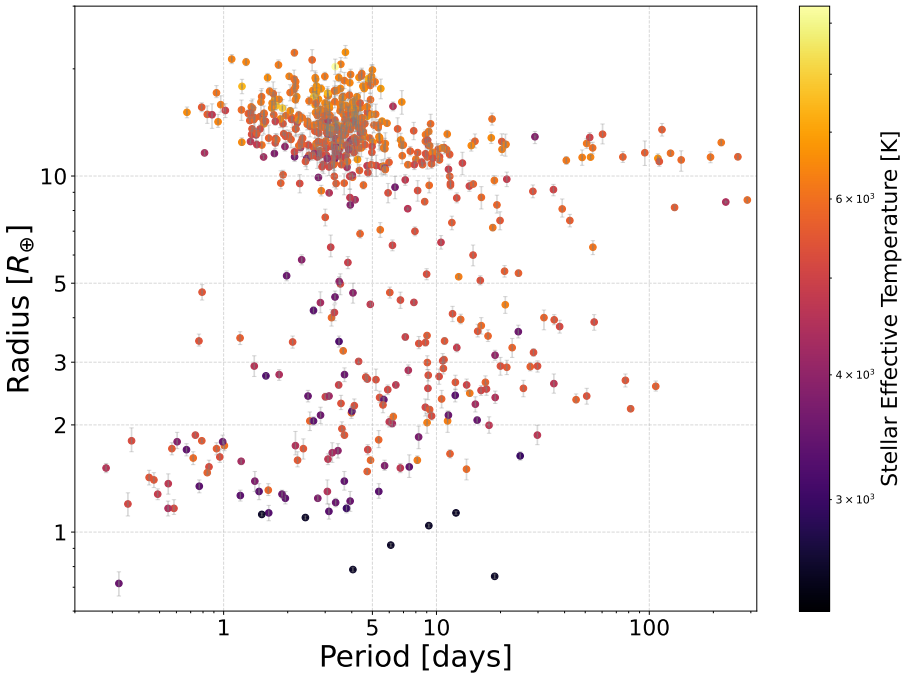

Figure 3: Planet Radius as a function of the Orbital Period colored by the Stellar Effective Temperature.

Projected spin-orbit alignments from Kepler asteroseismology and Gaia astrometry

Warrick H. Ball, Amaury H.M.J. Triaud, Emily Hatt, Martin B. Nielsen and William J. Chaplin
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MNRAS, in press (arXiv:2301.10308)

The angle between the rotation and orbital axes of stars in binary systems—the obliquity—is an important indicator of how these systems form and evolve but few such measurements exist. We combine the sample of astrometric orbital inclinations from Gaia DR3 with a sample of solar-like oscillators in which rotational inclinations have been measured using asteroseismology. We supplement our sample with one binary whose visual orbit has been determined using speckle interferometry and present the projected spin-orbit alignments in five systems. We find that each system, and the overall sample, is consistent with alignment but there are important caveats. First, the asteroseismic rotational inclinations are fundamentally ambiguous and, second, we can only measure the projected (rather than true) obliquity. If rotational and orbital inclinations are independent and isotropically-distributed, however, the likelihood of drawing our data by chance is less than a few per cent. Though small, our data set argues against uniformly random obliquities in binary systems. We speculate that dozens more measurements could be made using data from NASA's TESS mission, mostly in red giants. ESA's PLATO mission will likely produce hundreds more spin-orbit measurements in systems with main-sequence and subgiant stars.

Download/Website: `https://arxiv.org/pdf/2301.10308`

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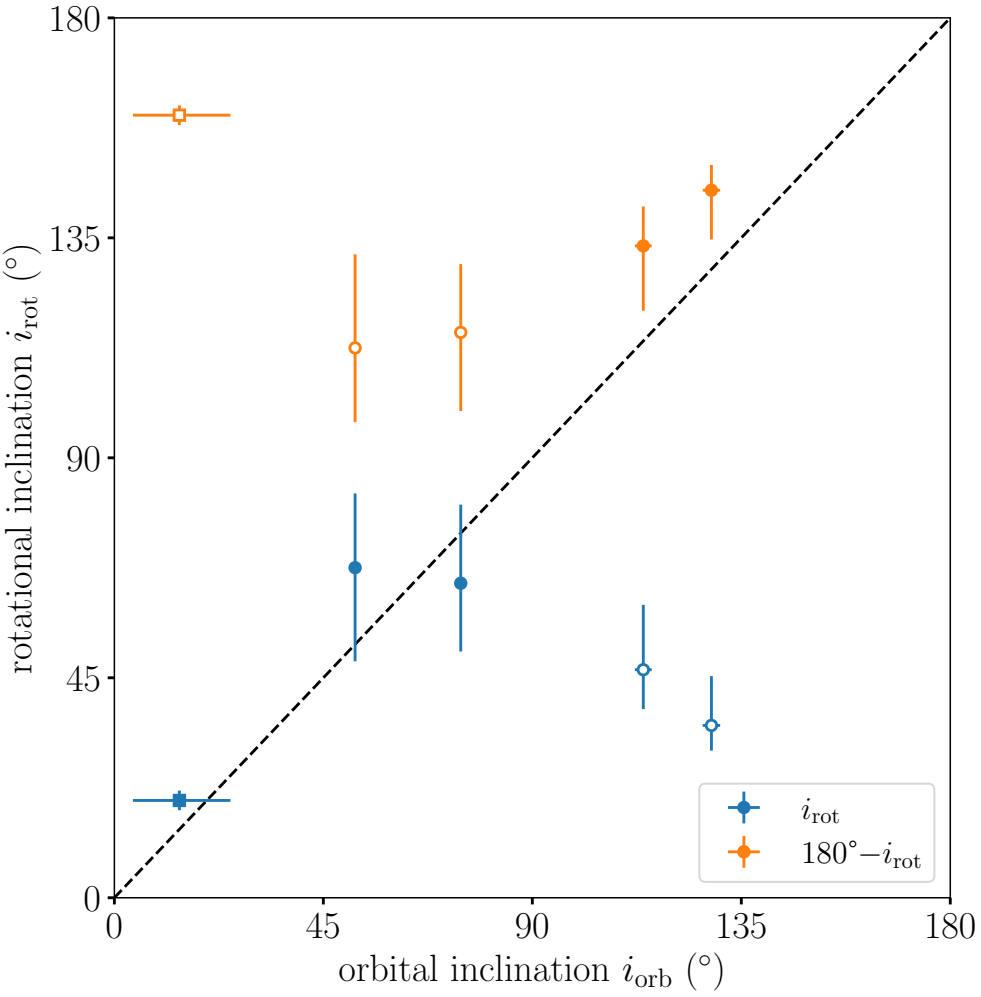

Figure 4: Comparison of rotation inclination angles by Hall et al. (2021) and orbital inclination angles from Gaia (circles) or, for KIC 7510397, Appourchaux et al. (2015, square). The rotation angles $i_{\rm rot}$ are ambiguous, so both $i_{\rm rot}$ and $180 - i_{\rm rot}$ are plotted. The filled points indicate which value of $i_{\rm rot}$ is closer to the one-to-one line.

The First Circumbinary Planet Discovered with Radial Velocities

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Nature Astronomy, in press (arXiv:2301.10794)

We report the detection of a gas-giant planet in orbit around both stars of an eclipsing binary star system that also contains the smaller, inner transiting planet TOI-1338b. The new planet, called TOI-1338/BEBOP-1c, was discovered using radial-velocity data collected with the HARPS and ESPRESSO spectrographs. Our analysis reveals it is a $65.2\ \mathrm{M}_\oplus$ circumbinary planet with a period of 215.5 days. This is the first detection of a circumbinary planet using radial-velocity observations alone, and makes TOI-1338/BEBOP-1 only the second confirmed multiplanet circumbinary system to date. We do not detect the smaller inner transiting planet with radial-velocity data, and can place an upper limit on the inner planet's mass at $21.8\ \mathrm{M}_\oplus$ with 99% confidence. The inner planet is the first circumbinary planet amenable for atmospheric characterisation, using the James Webb Space Telescope.

Download/Website: `https://arxiv.org/abs/2301.10794`

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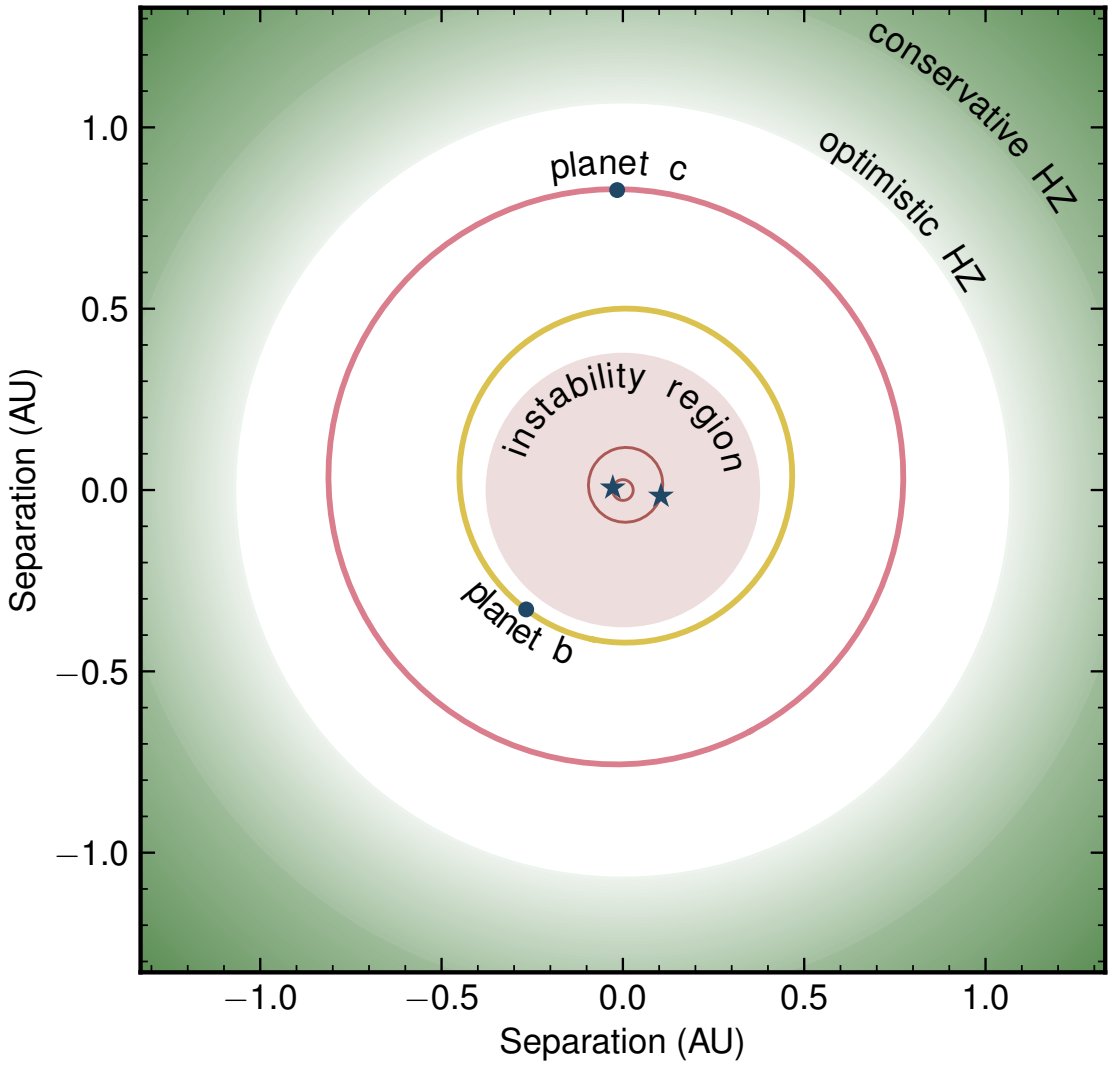

Figure 5: Overview of the TOI-1338/BEBOP-1 system along with the extent of the systems habitable zone calculated using the Multiple Star HZ website (Müller & Haghighipour (2014)). The conservative habitable zone is shown by the dark green region, while the optimistic habitable zone is shown by the light green region. Binary stars are marked by the blue stars in the centre. TOI-1338/BEBOP-1c's orbit is shown by the red orbit models, based on 500 randomly drawn posterior samples from a `kima` run, shaded from the $50^{\rm th}$ to $99^{\rm th}$ percentiles. TOI-1338/BEBOP-1b's orbit is shown by the yellow models, and is also based on 500 random samples drawn from the posterior in its discovery paper (Kostov et al. (2020)).

L 363-38 b: a planet newly discovered with ESPRESSO orbiting a nearby M dwarf star

L. F.Sartori[1], C. Lovis[2], J.-B. Delisle[2], M. Lendl[2], G. Cugno[1], A. Boehle[1], F. Dannert[1], A. Krenn[2,3], J. L. Gubler[1], S. P. Quanz[1]

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Astronomy & Astrophysics, published (2023A&A...670..A42)

Context. Planets around stars in the solar neighbourhood will be prime targets for characterisation with upcoming large space- and ground-based facilities. Since large-scale exoplanet searches will not be feasible with such telescopes, it is crucial to use currently available data and instruments to find possible target planets before next generation facilities come online.

Aims. We aim at detecting new extrasolar planets around stars in the solar neighbourhood by blind radial velocity (RV) search with ESPRESSO. Our target sample consist of nearby stars ($d < 11$pc) with little (< 10) or no previous RV measurements.

Methods. We use 31 radial velocity measurements obtained with ESPRESSO at the VLT between December 2020 and February 2022 of the nearby M dwarf star ($\mathrm{M}_\star = 0.21\ \mathrm{M}_\odot$, $d = 10.23$ pc) L 363-38 to derive the orbital parameters of the newly discovered planet. In addition, we use TESS photometry and archival VLT/NaCo high contrast imaging data to put further constraints on the orbit inclination and the possible planetary system architecture around L 363-38.

Results. We present the detection of a new extrasolar planet orbiting the nearby M dwarf star L 363-38. L 363-38 b is a planet with minimum mass $m_p\ \sin(i) = 4.67 \pm 0.43 M_\oplus$ orbiting its star with a period $P = 8.781 \pm 0.007d$, corresponding to a semi-major axis $a = 0.048 \pm 0.006$ AU, which is well inside the inner edge of the habitable zone. We further estimate a minimum radius $r_p\ \sin(i) = 1.55 - 2.75 R_\oplus$ and an equilibrium temperature $\mathrm{T}_{eq} \approx 330$K.

Download/Website: `https://doi.org/10.1051/0004-6361/202244347`
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DREAM I. Orbital architecture orrery

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Astronomy & Astrophysics, published / 2023A&A...669A..63B

The distribution of close-in exoplanets is shaped by a complex interplay between atmospheric and dynamical processes. The Desert-Rim Exoplanets Atmosphere and Migration (DREAM) program aims at disentangling those processes through the study of the hot Neptune desert, whose rim hosts planets that are undergoing, or survived, atmospheric evaporation and orbital migration. In this first paper, we use the Rossiter-McLaughlin Revolutions (RMR) technique to investigate the orbital architecture of 14 close-in planets ranging from mini-Neptune to Jupiter-size and covering a broad range of orbital distances. While no signal is detected for the two smallest planets, we were able to constrain the sky-projected spin–orbit angle of six planets for the first time, to revise its value for six others, and, thanks to constraints on the stellar inclination, to derive the 3D orbital architecture in seven systems. These results reveal a striking three-quarters of polar orbits in our sample, all being systems with a single close-in planet but of various stellar and planetary types. High-eccentricity migration is favored to explain such orbits for several evaporating warm Neptunes, supporting the role of late migration in shaping the desert and populating its rim. Putting our measurements in the wider context of the close-in planet population will be useful to investigate the various processes shaping their architectures.

Download/Website: `arxiv:2301.07727`

Contact: `vincent.bourrier@unige.ch`

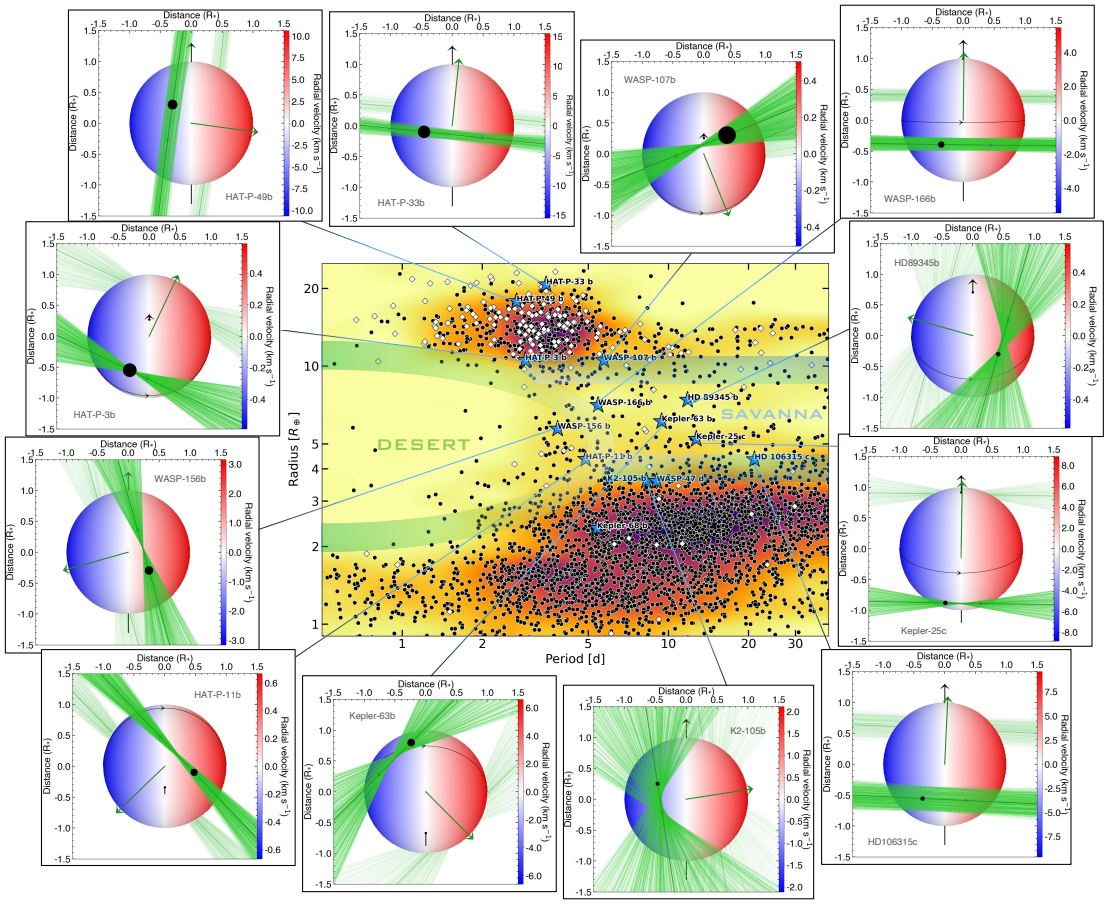

Figure 6: Distribution of close-in exoplanets as a function of their radius and orbital period. Green and blue contours show the approximate boundaries of the Neptunian desert and savanna. White squares indicate exoplanets with measured spin–orbit angles. Blue stars highlight planets in our sample, whose projections on the sky plane are displayed for the best-fit orbital architectures. The stellar equator, plotted as a solid black line, is shown only in systems where the stellar inclination is constrained. The stellar disk is colored as a function of its surface RV field. The normal to the planetary orbital plane is shown as a green arrow extending from the star center. The green solid curve represents the best-fit orbital trajectory, with thinner lines materializing its 1 σ uncertainty range. The star, planet (black disk), and orbit are to scale for a given system.

3 Jobs and Positions

Position as Academy Scientist in Machine Learning

Space Research Institute, Graz (Austria), 31 October 2022

The Space Research Institute (IWF), with about 100 employees from twenty nations, is one of the largest institutes of the Austrian Academy of Sciences (OeAW). The institute is located in the Victor Franz Hess Research Center of the OeAW in the south of Graz and hosts eight research groups on the astrophysics of the solar system, exoplanets, and space instrumentation. The IWF also operates a world-leading satellite laser ranging station at the Lustbühel Observatory.

The Space Research Institute in Graz invites applications for an

ACADEMY SCIENTIST (F*M)
in Machine Learning
(full-time, 40h per week)

We invite ambitious candidates who are interested in the development and application of machine learning techniques in astronomy and instrumentation at the IWF. We strive for a tight collaboration between instrumentation and space science as we understand instrumentation as science enabler.

Your tasks:

- Support IWF research and space instrumentation groups in all matters of machine learning
- Development of a competence hub for machine learning for application in astronomy, space science and space technology development
- Publication activities

Your profile:

- PhD in relevant fields (mathematics, statistics, physics, engineering)
- Experience in developing machine learning applications in astrophysics, physics, geoscience and/or technology development
- Experience and readiness to introduce our researchers and engineers to the field of machine learning

The appointment begins as early as January 01st, 2023 and is initially for 3 years with the possibility to extend for another 3 years.

Applications must include a cover letter, curriculum vitae, list of publications, a statement of the applicant's experience in machine learning (2 page) and a machine learning plan with view on the IWFs research spectrum (1 page), certificates for full academic record, and the full contact information for two references. Please send the application as one PDF file, mentioning Job ID: IWF106AS122 to Cosima Muck, cosima.muck@oeaw.ac.at, no later than October 31st, 2022. Inquiries about the position should be directed to Cosima Muck.

The Austrian Academy of Sciences pursues a non-discriminatory employment policy and values equal opportunities, and diversity. Individuals from underrepresented groups are particularly encouraged to apply.

Download/Website: `https://www.oeaw.ac.at/en/iwf/aktuelles/layer/details/open-position-job-id-iwf106as122`
Contact: `cosima.muck@oeaw.ac.at`

PostDoc Position in Astrochemistry in Protoplanetary Disks

Dr. Peter Woitke

Space Research Institute (IWF) of the Austrian Academy of Sciences (OeAW), as early as June 1st, 2023

The Space Research Institute (IWF) of the Austrian Academy of Sciences (OeAW), Austria's leading non-university research and science institution, is offering a

POSTDOC POSITION (F*M)
in Astrochemistry in Protoplanetary Disks
(full-time, 40h per week)

The successful candidate will join the new research group founded at the IWF entitled "Planet-forming Disks and Astrochemistry" led by Dr. Peter Woitke as part of the OeAW's efforts to expand the theme of exoplanet research at the Space Research Institute (IWF) in Graz.

The Space Research Institute (IWF) is involved in about 20 missions led by the world's main space agencies. The disk group will focus on connecting astrochemistry with planet formation, and to link those theories to both astronomical and solar system observations, and here links to current and future observational campaigns with IWF contribution are highly desirable.

The candidate is expected to be an expert in at least one of the following fields

- astrochemistry in protoplanetary disks,
- observation of protoplanetary disks and solar system bodies,
- links to the early solar system, planet formation, meteorites, and geology,
- future mission involvement and project management.

The candidate is expected to contribute to the development of the disk group in Graz by submitting new observational proposals and funding applications. Observational data obtained with ground-based facilities, space-borne instruments and in-situ solar system exploration missions are to be compared to modelling results obtained with the thermo-chemical disk simulation code ProDiMo (https://prodimo.iwf.oeaw.ac.at), concerning, for example, the ionisation and the evolution of the chemical composition of the gas in the disk, the formation of mixed ice phases, and the material composition of the rocks forming in the disks. New suitable ESA L, M, and F space missions are to be identified, and supported by personal involvement in the international teams leading them.

The applicant must hold a PhD in Physics, Geophysics, Astrophysics, or a related field. The appointment is initially for a duration of 3 years, with the possibility of an extension for another 3 years. The appointment begins as early as June 1st, 2023, but can also be agreed to start at a later time.

A valid application must include (1) curriculum vitae, (2) publication list, (3) research statement - max 3 pages, (4) academic certificates, and (5) names of three referees willing to send letters of recommendation. Applications should be sent via email to cosima.muck@oeaw.ac.at (mentioning Job ID: IWF172PD122) in a single PDF file. The closing date of applications is **March 1st, 2023**, but remains open until a suitable candidate has been found. For inquiries, contact Dr. Peter Woitke (peter.woitke@oeaw.ac.at). For more information about the institute and the disk group, see https://www.oeaw.ac.at/en/iwf.

Download/Website: `https://www.oeaw.ac.at/fileadmin/Institute/iwf/pdf/jobs/IWF172PD122.pdf`

Contact: `cosima.muck@oeaw.ac.at or peter.woitke@oeaw.ac.at`

Research Fellow in Protoplanetary Discs

Dr Farzana Meru

University of Warwick, ASAP

The University of Warwick seeks to appoint a Research Fellow (start date ASAP) within the group of Dr Farzana Meru on the topic of protoplanetary discs. The appointment will initially be for 2 years with the possibility of extension, subject to the outcome of a funding application. Applications for a part-time position and those from underrepresented minorities are particularly encouraged and welcome.

The successful candidate will work with Dr Farzana Meru on the topic of dust in self-gravitating discs. The post is primarily expected to involve numerical simulations, but where relevant, an observational connection will certainly be encouraged. The candidate is expected to develop their own research ideas and will be encouraged to contribute to Dr Meru's wider research focus on planet formation and evolution.

Dr Meru's group is based in the University of Warwick's Astronomy & Astrophysics group – a leading UK institution for exoplanet & disc research, with 88 researchers including 16 faculty members working on discs and exoplanets. The group was recently donated $£3.5$m to spend on PhD students and postdoctoral fellowships, attracting high quality international researchers. The exoplanet research is extremely active and the vibrant discs research group spans the fields of protoplanetary, debris, white dwarf and black hole discs.
The continuing professional development of her group is of great importance to Dr Meru, including developing students and researchers in ways that give them a career boost. The candidate will have the opportunity to develop their CV, e.g. through supervising PhD and undergraduate research projects, and taking on other responsibilities that will enhance their development in positive ways for their future goals.

The candidate will have an expertise in one or more of the following areas: protoplanetary discs, planet formation, dust evolution, accretion disc physics, numerical simulations. Areas outside these are encouraged if they complement the project. Applicants should demonstrate a proven research track record. Strong written and oral communication skills will be essential. The candidate will possess excellent planning and time management skills to ensure their research objectives are achieved effectively, and will be capable of working effectively both independently and in a research team. The candidate will also have a proven commitment to and/or lived experience of addressing Equality, Diversity and Inclusion issues in the workplace.

Candidates should submit a formal application at along with all of the following: (i) an up-to-date CV complete with publication list and metrics (max 2 pages plus publications list), (ii) a concise (max 2 pages) statement of research describing their past research accomplishments, as well as their relevant scientific and technical experience, (iii) an ANONYMOUS statement of future research plans along with how these plans link to the advertised post (max 2 pages), (iv) a statement about Equality, Diversity and Inclusion (max 1 page). A cover letter is not needed. Note that the future research plans must be written in a way where the reader can not tell who is writing it, as this will be assessed blindly and purely on the merit of scientific ideas. Examples of how to write an anonymous research proposal can be found at the below weblink.

For equity purposes, the panel will firstly assess the future research and EDI statements blindly. Please provide details of three referees (letters will only be requested if needed). All applications will be given equal consideration. Please direct all informal inquiries about the role and the group's Equality, Diversity and Inclusion culture to Dr Farzana Meru. Deadline: 8th March 2023

Download/Website: `https://warwick.ac.uk/fac/sci/physics/research/astro/vacancies/`

Contact: `f.meru@warwick.ac.uk`

PhD position - Modelling of microorganisms in extraterrestrial environments

Brice-Olivier Demory

University of Bern, 1 Oct 2023 or earlier

The Exoplanets and Origins of Life research group (www.saintex.unibe.ch) at the University of Bern's Centre for Space and Habitability (CSH) invites applications for a PhD position part of the new ERC SenseLife project, which aims at remotely detecting traces of past or present life in the Solar System.
The PhD will focus on the modelling and experimental acquisition of the polarisation signals of microorganisms that are relevant candidates for extinct/extant life in the icy moons of the solar system (e.g. methanogens, sulphur-reducing bacteria). Polarimetric data will be obtained from laboratory experiments (including anaerobic cultivation of microorganisms and their molecular identification) and will be combined with data retrieved during field campaigns (in e.g. mountain lakes and glaciers). The data will be compiled into a library of biosignatures that will be used to reconstruct, identify and benchmark specific polarisation spectra per metabolic niche using Bayesian methods. The results of this endeavour will then be used to assess the potential of spectro-polarimetry for the remote detection of life in extraterrestrial environments.
The successful candidate will join an interdisciplinary team with expertise spanning astrophysics, microbiology, biomedicine and engineering. The new group member will also have the opportunity to be involved in other key activities of the group, such as medical instrumentation for cancer research and surgery at the Faculty of Medicine of the University of Bern.

Profile We are looking for a creative and motivated candidate, a team player, with a MSc degree in physics, mathematics, chemistry, biology or computer science. Expertise in numerical modelling and optics (in particular polarisation) is an asset but not mandatory. Excellent oral and written skills in English is a requirement.

What we offer The position is based at the Centre for Space and Habitability, which strives to investigate key questions in space sciences through interdisciplinarity. SenseLife collaborates tightly with the Microbiology Laboratory of the University of Neuchâtel where the lab measurements are conducted. The city of Bern is well known for its quality of life, cultural richness and beautiful surroundings offering plenty of opportunities for outdoor activities. The position is funded for a period of 4 years. The annual salary is competitive and there is ample funding for travel, publications and computing resources. Child allowance and maternity/paternity leave are offered.

Application Applications are invited from all nationalities and should consist of 1) a 2-page cover letter detailing your interest in joining the group and in the PhD topic, 2) a CV, 3) transcripts of your grades of courses obtained during your bachelor's and master's degrees, as well as 4) two letters of recommendation to be sent by the referees themselves.
Application materials should be submitted in a single PDF file to info.csh@unibe.ch with the mention "SenseLife PhD position" in the subject line. The review of the applications will start immediately and will continue until the position is filled.
The latest expected start date is 1 October 2023.
The University of Bern is committed to equality, diversity and inclusion. Individuals from underrepresented groups are particularly encouraged to apply.

Contact: `brice.demory@unibe.ch`

4 Conferences and Workshops

PhD summer school “Introduction to cosmochemistry and planet formation”

Elishevah van Kooten & Anders Johansen
Globe Institute, University of Copenhagen

Museum of Natural History, Copenhagen, 21 August - 25 August 2023

This course covers the formation of the planets in the Solar System and around other stars (a) from the perspective of the meteoritic evidence, (b) from the theory of planet formation and (c) from observations of protoplanetary discs and exoplanets. The focus of the cosmochemistry part is on introducing the different meteorite classes, age determination of the components of meteorites and the measured elemental abundances and isotope ratio of meteorites. Emphasis will be made on the meteoric evidence for how the planets formed in the Solar System. The planet formation theory part covers the properties of protoplanetary discs around young stars, radial transport of gas and dust, dust growth within these discs, the formation of planetesimals and the assembly of planetary systems. Finally, the observational part covers the observations of the formation and evolution of protoplanetary discs, observations of dust growth in these discs and observations of small and large exoplanets around other stars.

The target group is PhD students working on geochemistry, geophysics, cosmochemistry, planet formation or star formation. The number of participants is limited to 30.

Application deadline: 31st May 2023

Confirmed lecturers are Elishevah van Kooten, Anders Johansen, Michiel Lambrechts, Martin Schiller, Martin Bizzarro, and Caroline Dorn.

Download/Website: `https://phdcourses.ku.dk/DetailKursus.aspx?id=110472&sitepath=SUND`

Contact: `elishevah.vankooten@sund.ku.dk, anders.johansen@sund.ku.dk`

Planets *not* orbiting main sequence stars

Alex Wolszczan (Chair), Isabelle Baraffe, Martin Dominik, Boris Gänsicke, Andrzej Niedzielski, Roberto Silvotti, Eva Villaver, Dimitri Veras

European Astronomical Society (EAS) 2023 special session SS12, July 13th, 2023 in three blocks: 9:00-10:30, 11:00-12:30 and 16:45-18:15

During the European Astronomical Society's (EAS) 2023 meeting in Krakow, Poland, we will be hosting a special session over three 90-minute blocks on Thursday, July 13th on the topic of **Planets not orbiting main sequence stars (SS12)**. The content will cover planetary systems hosted by subgiant stars, giant stars, subdwarfs, white dwarfs, neutron stars and no stars whatsoever (free-floating planets). Just not main-sequence stars! Each block (9:00-10:30, 11:00-12:30 and 16:45-18:15) will consist of invited talks covering the breadth of this topic, followed by a discussion. Please note that registration for EAS is now open, with four tiers of deadlines (Feb 26th, Apr 30th, Jul 9th, Onsite) and corresponding prices.

Download/Website: `https://eas.unige.ch/EAS_meeting/session.jsp?id=SS12`

Contact: `alexastro.psu.edu`

2023 Sagan Summer Hybrid Workshop
Characterizing Exoplanet Atmospheres: The Next Twenty Years

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

Hybrid Workshop, July 24-28, 2023

Observations of an exoplanet's atmosphere provide the best hope for distinguishing the makeup of its outer layers, and the only hope for understanding the interplay between formation, natal composition, chemical and disequilibrium processes, and dynamics and circulation. The field is entering a revolution in our understanding of exoplanet atmospheres thanks to measurements from the ground, from space, and particularly from JWST, the superlative facility for exoplanet studies. In the longer term, such observations will also be essential for seeking signs of biosignature gasses in nearby exoplanets using future, next-generation observatories.

Workshop Topics include:

- Atomosphere Fundamentals
- Direct Imaging and Spectroscopy
- Transmission, Secondary Eclipses, and Phase Curves
- Interferometric Observations
- Star-Planet Interactions
- Lessons Learned from Brown Dwarfs and the Solar System
- Atmospheric Escape and Mass Loss
- Observations of Terrestrial Exoplanet Atmospheres
- Retrievals and Fitting models to Data
- JWST Transit Science and Imaging

The preliminary agenda, including confirmed speakers is available on the workshop website. This year's workshop will cover theoretical modeling, interpretation, and observations of exoplanets using a variety of telescopes, techniques, and hands-on exercises, presented by leading experts in the field. The hands-on sessions will address reducing and fitting JWST data and also give attendees experience with tools for modeling and retrieving exoplanet atmospheres.

We plan to hold the 2023 workshop as a hybrid with both in-person and on-line attendance. It is unclear at this time what, if any, public health restrictions will be in place in July 2023 due to COVID.

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 and registration will open February 16, 2023. Please contact us with any questions or to be added to the email list.

Download/Website: `http://nexsci.caltech.edu/workshop/2023`
Contact: `sagan_workshop@ipac.caltech.edu`

The 5th Workshop on Extremely Precise Radial Velocities

J. Burt, B. J. Fulton, SOC Co-Chairs

Conference, March 27-30, 2023

EPRV 5 will provide an opportunity to discuss key technical and scientific issues after a gap of four years since the last comparable meeting. The conference will feature talks from all major instrument and data analysis teams, to ensure that the community is aware of what each independent node is working towards and what challenges they are facing. We will invite representatives from stellar physics and heliophysics to increase the knowledge transfer between our fields and to hopefully spark new, cross disciplinary collaborations. A primary objective of the meeting agenda will be to allow ample time for discussion both during and after talk sessions, so that participants can engage in the level of detailed conversation that has made previous iterations such a boon to the field.

Please visit the conference website for the agenda. Note that the early in-person registration deadline is February 17 and submissions for poster presentations are being accepted through this date as well. Registration to join the conference online is available through mid-March. Please check the conference website for complete information and email us at eprv5@lists.astro.caltech.edu if you have any questions.

Download/Website: `https://conference.ipac.caltech.edu/eprv5/`

Contact: `eprv5@lists.astro.caltech.edu`

Formation of planetary systems: connecting theory and observations – Special Session at EAS 2023

Joanna Drążkowska
Max Planck Institute for Solar System Research, Göttingen, Germany

Kraków, Poland, 10 July 2023

The new observations of young stars with their surrounding disks and the raising number of known exoplanets bring new constraints on the planet formation process. Thus, in recent years the planet formation theory is undergoing major changes. The goal of this special session is to facilitate discussion between observers and theorists working on planet formation. The session will cover the timeliest topics such as observations and modelling of disk substructures, constraints on dust sizes, and planet-disk interactions. This discussion will drive future observational and numerical studies to address the key open questions in our understanding of planet formation.
The session will be organised around three topical blocks:

- Observations of protoplanetary disks: since a decade ago, high-resolution observations of protoplanetary disks have been made with ALMA, VLT-SPHERE, and other telescopes. However, interpretation of these observational data relies heavily on physical and chemical modelling of the disks. Thus, it is necessary to discuss the new observational findings in the context of the state-of-the-art models.
- Models of protoplanetary disks and planet-forming processes: planet formation is a multi-stage process spanning over 40 orders of magnitude in mass. Traditionally, the models are separated into models of early stages of planet formation when micron-sized dust grains grow into centimeter-sized pebbles and late-stage models of planetary embryo growth. This session will cover recent models of each of these stages of planet formation, particularly the efforts of considering both processes together (grain and embryo growth), as well as models of protoplanetary disk structure.
- Models of planetary systems assembly: comparison of the synthetic populations of planetary systems to exoplanet data is the best way of verifying our planet formation theory. In this part, we want to cover the recent developments in these models including planetary growth, migration, and multi-planet interactions. Furthermore, we want to identify the areas of the synthesis models which need major progress in the next years.

Scientific Organising Committee:

- Joanna Drążkowska (MPS Göttingen, Germany, chair)
- Anna Miotello (ESO Garching, Germany, co-chair)
- Ewa Szuszkiewicz (University of Szczecin, Poland, co-chair)
- Michiel Lambrechts (Lund Observatory, Sweden and University of Copenhagen, Denmark, co-chair)
- Paola Pinilla (University College London, United Kingdom)

Abstract submission deadline is 1 March 2023.

Download/Website: `https://eas.unige.ch/EAS_meeting/session.jsp?id=SS6`

Contact: `drazkowska@mps.mpg.de`

Call for Abstracts – (Theme 1, Session 1f) Exoplanet atmospheric characterization, interior-surface-atmosphere interactions, and planetary habitability

Marie-Luise Steinmeyer[1], *Sebastian Danielache*[2], *Yamila Miguel*[3], *Yui Kawashima*[4], *Kaustubh Hakim*[5]
[1] Globe Institute, University of Copenhagen
[2] Sophia University
[3] Leiden Observatory
[4] RIKEN
[5] KU Leuven

Goldschmidt 2023, Lyon, France, 9–14 July 2023

Dear colleagues,

Please consider submitting an abstract to the session on (Theme 1, Session 1f) Exoplanet atmospheric characterization, interior-surface-atmosphere interactions, and planetary habitability at Goldschmidt 2023.

The abstract deadline is **1 March 2023**

After the detection of more than 5000 exoplanets during the past three decades, new and upcoming advanced telescopes aim to unveil the chemistry of the atmospheres of terrestrial-type exoplanets, potentially including a handful of habitable zone planets. Molecules made of C, H, N, O, and S elements are expected to be the first ones to be detected from the atmosphere of Earth-sized exoplanets. One of the main objectives of this theme is "planetary habitability, which defines the physicochemical conditions at the surface of a planet required for life to develop". Since first suggested, numerous reports about prebiotic synthesis under CO atmospheres and its implications for the origins of life have been reported. Additionally, atmospheres with a variety of carbon redox state (CO2/CO/CH4) have been suggested as an intermediary step in the evolution of rocky planets. Some key questions are: How do the surface and interior of a planet affect the atmosphere chemistry? What are the implications on the origin of life as we know it? This session brings together planetary and exoplanet scientists specializing in various domains including interior-atmosphere coupling, planetary redox states, ocean-atmosphere interactions, ocean chemistry, atmosphere radiative transfer, thermochemical equilibrium and kinetics, photochemistry, experimental petrology, isotope and chamber studies, volatile cycling, geochemical cycling, habitable zone climates, geodynamics and thermal evolution, to address exoplanet atmospheric characterization, interior-surface-atmosphere interactions, and planetary habitability
This session will provide a fertile ground for scientists from multiple disciplines where ideas and findings from one field can inform, influence, and promote other fields.

Session details: `https://conf.goldschmidt.info/goldschmidt/2023/meetingapp.cgi/Session/4779`

Abstract instructions: `https://conf.goldschmidt.info/goldschmidt/2023/cfp.cgi`

Conference details: `https://conf.goldschmidt.info/goldschmidt/2023/goldschmidt/2023/meetingapp.cgi`

Looking forward to receiving your abstracts.

Contact: `kaustubh.hakim@kuleuven.be`

5 Exoplanet Archives

January 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, February 7, 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`).

January 26, 2023

Two New Planets

This week we welcome two new planets: super-Earth GJ 1151 c, which happens to be in a system that lost a planet to a published refutation in 2021, and hot Jupiter TOI-4582 b.

January 20, 2023

Two Planets Added and Two Demoted

One of this week's two new planets is TOI-700 e, a second planet in that system's habitable zone that shows how NASA's TESS is finding smaller and smaller worlds. Read the discovery paper by Gilbert et al. 2023 (`https://bit.ly/40pTyFZ`) and the NASA Exoplanets media article (`http://bit.ly/40uPnsD`). This week's other new planet is nu Oct A b.

We have also added a new candidate planet to the proxima Cen System Overview page (`https://bit.ly/3l60Gau`).

Lastly, we have dispositioned two planets in the archive to False Positive Planets: Kepler-486 b (KOI-189 b) and Kepler-492 b (KOI-205 b). Both demotions are based on published refutations; further details are given on the Excluded Targets page (`http://bit.ly/2ToWIXN`). Data for both objects will remain on their respective System Overview pages.

January 9, 2023

Happy New Year!

For our first release of 2023, we present six planets that include a new, fourth planet in the Kepler-138 system, as well as new parameters for two confirmed planets in the same system that are possible water worlds.

Observations by NASA's Hubble and Spitzer space telescopes revealed measured densities of Kepler-138 c & d, suggesting the two inner super-Earths are much lighter than expected and probably have very significant water oceans. Details about these results, as well as Kepler-138 e, are in Piaulet et al. 2022 (`https://bit.ly/3DDRNLu`) and NASA's news (`http://bit.ly/3RCNqX2`).

The other new planets this week are OGLE-2006-BLG-284L A b, KMT-2021-BLG-1077L b, KMT-2021-BLG-1077L c, MOA-2020-BLG-135L b, and TOI-1288 c.

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

Contact: `mharbut@caltech.edu`

TEPCat: Current Status and Updates

J. Southworth
Astrophysics Group, Keele University, Staffordshire, ST5 5BG, UK

Keele University, February 2023

Since 2011 the Transiting Extrasolar Planets Catalogue (TEPCat) has been maintained in the form of a freely-available online catalogue as a service to the community (Southworth, 2011, MNRAS, 417, 2166). The server hosting TEPCat, along with other webpages, recently becaome unavailable without notice. A new server is being prepared and should be online soon. Webpages and datafiles from the current version of TEPCat can be obtained by emailing John Southworth at the email address below.

Recent changes and improvements to TEPCat:

- 25 new planetary systems added this year
- revisions to the listed properties for 43 systems this year
- the *Homogeneous Studies* section removed as is was getting out of date
- extensive updates of arXiv references to those for the final journal article
- most webpages made smaller by up to a factor of 2, via improved HTML coding, for faster loading
- changelog subdivided into a page per year for faster loading

Other online resources hosted alongside TEPCat are also affected, including DEBCat (the Detached Eclipsing Binary Catalogue), the JKTEBOP light curve analysis code, and the JKTABSDIM physical properties code. These are also available via email request to John Southworth.

Download/Website: `https://www.astro.keele.ac.uk/jkt/tepcat/`

Contact: `taylorsouthworth@gmail.com`

6 As seen on astro-ph

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

January 2023

astro-ph/2301.07165: **Inferring the rate of technosignatures from sixty years of nondetection** *by Claudio Grimaldi*
astro-ph/2301.02578: **Earth as a time crystal: macroscopic nature of a quantum-scale phenomenon from transformative moderation of geomagnetic polarity, topography, and climate by precession resonance due to many-body entrainment** *by Mensur Omerbashich*
astro-ph/2301.00293: **Orbital Migration of Protoplanets in a Marginally Gravitationally Unstable Disk. II. Migration, Merging, and Ejection** *by Alan P. Boss*
astro-ph/2301.00313: **Stellar Karaoke: Deep Blind Separation of Terrestrial Atmospheric Effects out of Stellar Spectra by Velocity Whitening** *by Nima Sedaghat et al.*
astro-ph/2301.00415: **PCA-based Data Reduction and Signal Separation Techniques for James-Webb Space Telescope Data Processing** *by Güray Hatipoğlu*
astro-ph/2301.00689: **Comparative analysis of observations of the selected exoplanet transits obtained at the Kyiv Comet station with the database of the orbital telescopes TESS and Kepler** *by M. Lobodenko et al.*
astro-ph/2301.01371: **Identifying Exoplanets with Deep Learning. V. Improved Light Curve Classification for TESS Full Frame Image Observations** *by Evan Tey et al.*
astro-ph/2301.01370: **TESS Discovery of Twin Planets near 2:1 Resonance around Early M-Dwarf TOI 4342** *by Evan Tey et al.*
astro-ph/2301.01291: **Speckle Space-Time Covariance in High-Contrast Imaging** *by Briley L. Lewis et al.*
astro-ph/2301.01284: **Polar circumtriple planets and disks can only form close to a triple star** *by Stephen Lepp et al.*
astro-ph/2301.01306: **The K2 & TESS Synergy II: Revisiting 26 systems in the TESS Primary Mission** *by Erica Thygesen et al.*
astro-ph/2301.01093: **Photochemical hazes can trace the C/O ratio in exoplanet atmospheres** *by Lia Corrales et al.*
astro-ph/2301.01065: **Sub-Jovian desert of exoplanets at its boundaries: Parameter dependence along the main sequence** *by Gyula Szabó M et al.*
astro-ph/2301.01263: **Updated characterization of long-period single companion by combining radial velocity, relative astrometry, and absolute astrometry** *by F. Philipot et al.*
astro-ph/2301.01789: **Vortex weighing and dating of planets in protoplanetary discs** *by Roman R. Rafikov, Nicolas P. Cimerman*
astro-ph/2301.01775: **In Search of the Edge: A Bayesian Exploration of the Detectability of Red Edges in Exoplanet Reflection Spectra** *by Jonathan Gomez Barrientos et al.*
astro-ph/2301.01694: **Diagnosing limb asymmetries in hot and ultra-hot Jupiters with high-resolution transmission spectroscopy** *by Arjun B. Savel et al.*
astro-ph/2301.01472: **Dust processing in protoplanetary envelopes as the origin of hot minerals in comets** *by Mohamad Ali-Dib*
astro-ph/2301.01684: **A kinematically detected planet candidate in a transition disk** *by Jochen Stadler et al.*
astro-ph/2301.02250: **The Colorado Ultraviolet Transit Experiment (CUTE) Mission Overview** *by Kevin France et al.*
astro-ph/2301.02176: **An Equation of State of CO for use in Planetary Modeling** *by Morris Podolak et al.*

astro-ph/2301.02116: **Simulated performance of the molecular mapping for young giant exoplanets with the Medium Resolution Spectrometer of JWST/MIRI** *by M. Mâlin et al.*
astro-ph/2301.01900: **False Alarms Revealed in a Planet Search of TESS Light Curves** *by Michelle Kunimoto et al.*
astro-ph/2301.01869: **Enabling Ice Core Science on Mars and Ocean Worlds** *by Alexander G. Chipps et al.*
astro-ph/2301.02150: **A Gaian Habitable Zone** *by Rudy Arthur, Arwen Nicholson*
astro-ph/2301.02564: **Early Insights for Atmospheric Retrievals of Exoplanets using JWST Transit Spectroscopy** *by Savvas Constantinou et al.*
astro-ph/2301.02745: **Optical Properties of Organic Hazes in Water-rich Exoplanet Atmospheres: Implications for Observations with JWST** *by Chao He et al.*
astro-ph/2301.02652: **Diverse Carbonates in Exoplanet Oceans Promote the Carbon Cycle** *by Kaustubh Hakim et al.*
astro-ph/2301.02531: **Re-parameterisation of four limb darkening laws and their implementation into the JKTEBOP code** *by John Southworth*
astro-ph/2301.02482: **Evolution of the reservoirs of volatiles in the protosolar nebula** *by Antoine Schneeberger et al.*
astro-ph/2301.02477: **The CARMENES search for exoplanets around M dwarfs, Wolf 1069 b: Earth-mass planet in the habitable zone of a nearby, very low-mass star** *by D. Kossakowski et al.*
astro-ph/2301.02415: **Photochemical and RadiatiOn Transport model for Extensive USe (PROTEUS)** *by Yuki Nakamura et al.*
astro-ph/2301.02374: **A framework for the architecture of exoplanetary systems. I. Four classes of planetary system architecture** *by Lokesh Mishra et al.*
astro-ph/2301.02373: **A framework for the architecture of exoplanetary systems. II. Nature versus nurture: Emergent formation pathways of architecture classes** *by Lokesh Mishra et al.*
astro-ph/2301.02486: **Longterm Stability of Planetary Systems formed from a Transitional Disk** *by Rory Bowens et al.*
astro-ph/2301.02961: **The Abundance of Belatedly Habitable Planets and Ambiguities in Definitions of the Continuously Habitable Zone** *by Noah W. Tuchow, Jason T. Wright*
astro-ph/2301.03669: **Moist convection is most vigorous at intermediate atmospheric humidity** *by Jacob T. Seeley, Robin D. Wordsworth*
astro-ph/2301.03639: **Emergent Spectral Fluxes of Hot Jupiters: an Abrupt Rise in Day Side Brightness Temperature Under Strong Irradiation** *by Drake Deming et al.*
astro-ph/2301.03704: **TESS-Gaia Light Curve: a PSF-based TESS FFI light curve product** *by Te Han, Timothy D. Brandt*
astro-ph/2301.03617: **A Second Earth-Sized Planet in the Habitable Zone of the M Dwarf, TOI-700** *by Emily A. Gilbert et al.*
astro-ph/2301.03209: **A JWST NIRSpec phase curve for WASP-121b: dayside emission strongest eastward of the substellar point and nightside conditions conducive to cloud formation** *by Thomas Mikal-Evans et al.*
astro-ph/2301.03442: **Twenty-five years of exoplanet discoveries: The exoplanet hosts** *by Bárbara Rojas-Ayala*
astro-ph/2301.03348: **A rocky exoplanet classification method and its application to calculating surface pressure and surface temperature** *by Sarah R. N. McIntyre et al.*
astro-ph/2301.03466: **Redox state and interior structure control on the long-term habitability of stagnant-lid planets** *by Philipp Baumeister et al.*
astro-ph/2301.03825: **An Analytical Theory for the Growth from Planetesimals to Planets by Polydisperse Pebble Accretion** *by Wladimir Lyra et al.*
astro-ph/2301.04206: **Detecting exomoons from radial velocity measurements of self-luminous planets: application to observations of HR 7672 B and future prospects** *by Jean-Baptiste Ruffio et al.*
astro-ph/2301.04191: **A JWST transmission spectrum of a nearby Earth-sized exoplanet** *by J. Lustig-Yaeger et*

al.

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