ExoPlanet News
An Electronic Newsletter

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Contents

1 Editorial

Welcome to Edition 159 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!

With this edition we also introduce a new editorial team which consists of Jeanne Davoult (Bern University), Eleonora Alei, Haiyang Wang, and Daniel Angerhausen (all ETH Zurich).

Our thanks go to Holly Capelo (Physics Institute Bern), Lokesh Mishra (Physics Institute Bern & Geneva Observatory), and Julia Venturini (ISSI Bern) for their service to the exoplanet community over the past two years.

For our dear readers and contributors, however, nothing will change - the new team is again looking forward to your paper abstract, job ad or meeting announcement. 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 11. October 2022.

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

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

2 Abstracts of refereed papers

The Molecular Composition of Shadowed Protosolar Disk Midplanes beyond the Water Snowline

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The Astrophysical Journal, in press (arXiv:2208.06005)

The disk midplane temperature is potentially affected by the dust traps/rings. The dust depletion beyond the water snowline will cast a shadow. In this study, we adopt a detailed gas-grain chemical reaction network, and investigate the radial gas and ice abundance distributions of dominant carbon-, oxygen-, and nitrogen-bearing molecules in disks with shadow structures beyond the water snowline around a protosolar-like star. In shadowed disks, the dust grains at $r \sim 3-8$ au are predicted to have more than $\sim 5-10$ times amounts of ices of organic molecules such as H_2CO, CH_3OH, and NH_2CHO, saturated hydrocarbon ices such as CH_4 and C_2H_6, in addition to H_2O, CO, CO_2, NH_3, N_2, and HCN ices, compared with those in non-shadowed disks. In the shadowed regions, we find that hydrogenation (especially of CO ice) is the dominant formation mechanism of complex organic molecules. The gas-phase N/O ratios show much larger spatial variations than the gas-phase C/O ratios, thus the N/O ratio is predicted to be a useful tracer of the shadowed region. N_2H^+ line emission is a potential tracer of the shadowed region. We conclude that a shadowed region allows the recondensation of key volatiles onto dust grains, provides a region of chemical enrichment of ices that is much closer to the star than within a non-shadowed disk, and may explain to some degree the trapping of O_2 ice in dust grains that formed comet 67P/Churyumov-Gerasimenko. We discuss that, if formed in a shadowed disk, Jupiter does not need to have migrated vast distances.

Download/Website: `https://arxiv.org/abs/2208.06005`

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Impact of stellar flares on the chemical composition and transmission spectra of gaseous exoplanets orbiting M dwarfs

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Astronomy & Astrophysics, in press (arXiv:2209.02483)

Stellar flares of active M dwarfs can affect the atmospheric composition of close-orbiting gas giants, and can result in time-dependent transmission spectra. We aim to examine the impact of a variety of flares, differing in energy, duration, and occurrence frequency, on the composition and transmission spectra of close-orbiting, tidally locked gaseous planets with climates dominated by equatorial superrotation. We used a series of pseudo-2D photo- and thermochemical kinetics models, which take advection by the equatorial jet stream into account, to simulate the neutral molecular composition of a gaseous planet ($T_{\rm eff} = 800$ K) that orbits a M dwarf during artificially constructed flare events. We then computed transmission spectra for the evening and morning limb. We find that the upper regions (i.e. below $10\,\mu$bar) of the dayside and evening limb are heavily depleted in CH_4 and NH_3 up to several days after a flare event with a total radiative energy of 2×10^{33} erg. Molar fractions of C_2H_2 and HCN are enhanced up to a factor three on the nightside and morning limb after day-to-nightside advection of photodissociated CH_4 and NH_3. Methane depletion reduces transit depths by 100-300 parts per million (ppm) on the evening limb and C_2H_2 production increases the 14 μm feature up to 350 ppm on the morning limb. We find that repeated flaring drives the atmosphere to a composition that differs from its pre-flare distribution and that this translates to a permanent modification of the transmission spectrum. We show that single high-energy flares can affect the atmospheres of close-orbiting gas giants up to several days after the flare event, during which their transmission spectra are altered by several hundred ppm. Repeated flaring has important implications for future retrieval analyses of exoplanets around active stars, as the atmospheric composition and resulting spectral signatures substantially differ from models that do not include flaring.

Download/Website: `https://arxiv.org/abs/2209.02483`

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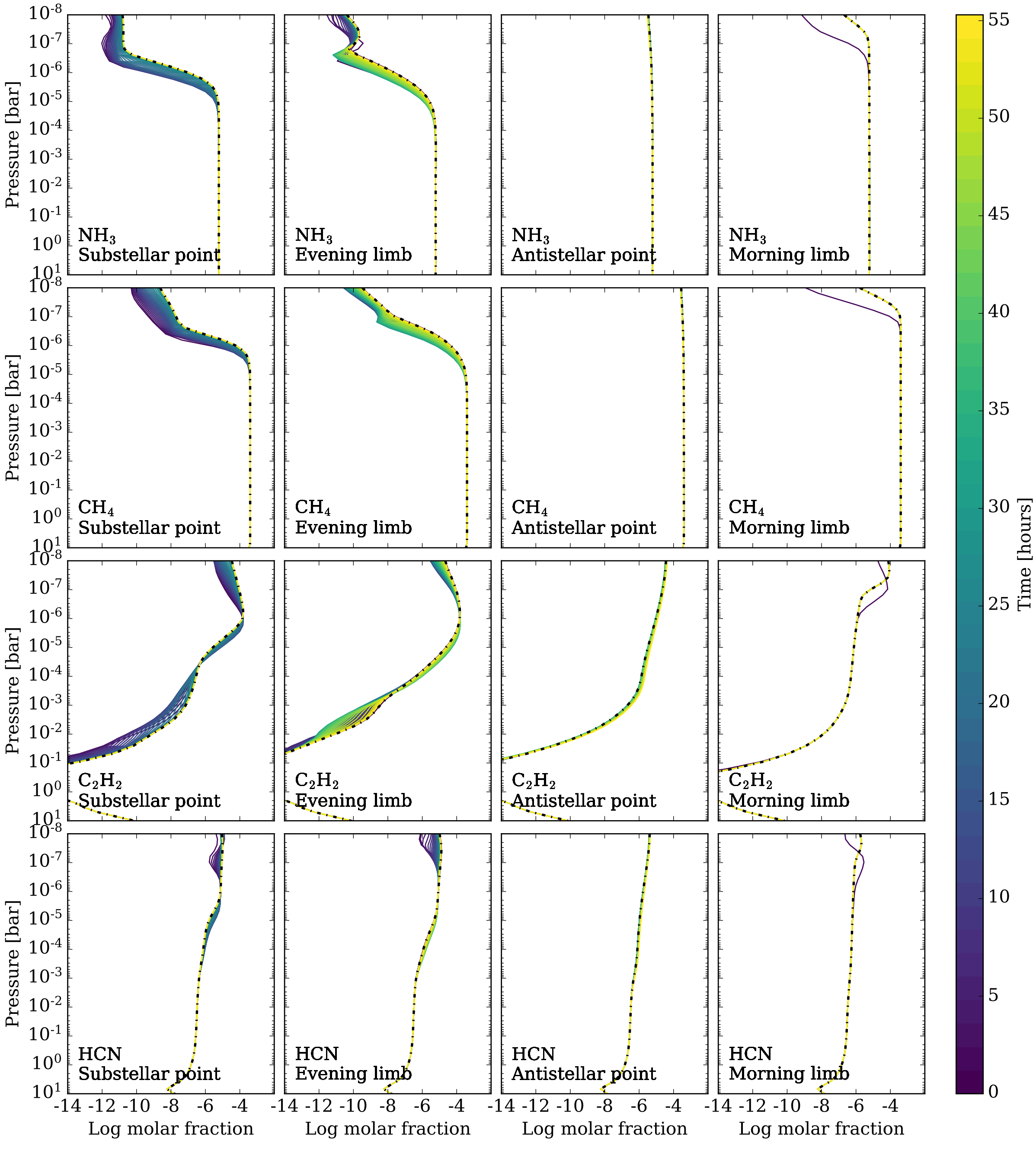

Figure 1: Evolution of CH_4, NH_3, C_2H_2, and HCN (*top to bottom*) on the substellar point, evening limb, antistellar point and morning limb (*left to right*) during the first ~ 2.3 days after the flare event that started on $t = 0$. The pre-flare distributions are represented by the black dashed-dotted lines.

Two long-period transiting exoplanets on eccentric orbits: NGTS-20 b (TOI-5152 b) and TOI-5153 b

S. Ulmer-Moll [1,2], M. Lendl [1], S. Gill [2,3], S. Villanueva [4], M.J. Hobson [5], F. Bouchy [1], R. Brahm [6,7], D. Dragomir [8], N. Grieves [1], C. Mordasini [9], et al.
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Astronomy & Astrophysics, in press (arXiv:2207.03911)

Long-period transiting planets provide the opportunity to better understand the formation and evolution of planetary systems. Their atmospheric properties remain largely unaltered by tidal or radiative effects of the host star, and their orbital arrangement reflects a different, and less extreme, migrational history compared to close-in objects. The sample of long-period exoplanets with well determined masses and radii is still limited, but a growing number of long-period objects reveal themselves in the TESS data.
Our goal is to vet and confirm single transit planet candidates detected in the TESS space-based photometric data through spectroscopic and photometric follow up observations with ground-based instruments. We use the Next Generation Transit Survey (NGTS) to photometrically monitor the candidates in order to observe additional transits.
We report the discovery of two massive, warm Jupiter-size planets, one orbiting the F8-type star TOI-5153 and the other orbiting the G1-type star NGTS-20 (=TOI-5152). From our spectroscopic analysis, both stars are metal-rich with a metallicity of 0.12 and 0.15, respectively. Follow-up radial velocity observations were carried out with CORALIE, CHIRON, FEROS, and HARPS. TOI-5153 hosts a 20.33 day period planet with a planetary mass of $3.26^{+0.18}_{-0.17}\,\mathrm{M_J}$, a radius of $1.06^{+0.04}_{-0.04}\,\mathrm{R_J}$, and an orbital eccentricity of $0.091^{+0.024}_{-0.026}$. NGTS-20 b is a $2.98^{+0.16}_{-0.15}\,\mathrm{M_J}$ planet with a radius of $1.07^{+0.04}_{-0.04}\,R_J$ on an eccentric $(0.432^{+0.023}_{-0.023})$ orbit with an orbital period of 54.19 days.
Both planets are metal-enriched and their heavy element content is in line with the previously reported mass-metallicity relation for gas giants. Both warm Jupiters orbit moderately bright host stars making these objects valuable targets for follow-up studies of the planetary atmosphere and measurement of the spin-orbit angle of the system.

Download/Website: `https://arxiv.org/abs/2207.03911`

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RVSPY - Radial Velocity Survey for Planets around Young stars. Target characterisation and high-cadence survey

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Astronomy & Astrophysics, in press (arXiv:2209.01125)

We introduce our Radial Velocity Survey for Planets around Young stars (RVSPY), characterise our target stars, and search for substellar companions at orbital separations smaller than a few au from the host star. We use the FEROS spectrograph to obtain high signal-to-noise spectra and time series of precise radial velocities (RVs) of 111 stars most of which are surrounded by debris discs. Our target stars have spectral types between early F and late K, a median age of 400 Myr, and a median distance of 45 pc. We determine for all target stars their basic stellar parameters and present the results of the high-cadence RV survey and activity characterization. We achieve a median single-measurement RV precision of 6 m/s and derive the short-term intrinsic RV scatter of our targets (median 22 m/s), which is mostly caused by stellar activity and decays with age from $>$100 m/s at $<$20 Myr to $<$20 m/s at $>$500 Myr. We discover six previously unknown close companions with orbital periods between 10 and 100 days, three of which are low-mass stars, and three are in the brown dwarf mass regime. We detect no hot companion with an orbital period $<$10 days down to a median mass limit of $\sim$1 $M_{\rm Jup}$ for stars younger than 500 Myr, which is still compatible with the established occurrence rate of such companions around main-sequence stars. We find significant RV periodicities between 1.3 and 4.5 days for 14 stars, which are, however, all caused by rotational modulation due to starspots. We also analyse the TESS photometric time series data and find significant periodicities for most of the stars. For 11 stars, the photometric periods are also clearly detected in the RV data. We also derive stellar rotation periods ranging from 1 to 10 days for 91 stars, mostly from TESS data. From the intrinsic activity-related short-term RV jitter, we derive the expected mass-detection thresholds for longer-period companions.

Download/Website: `https://arxiv.org/pdf/2209.01125.pdf`

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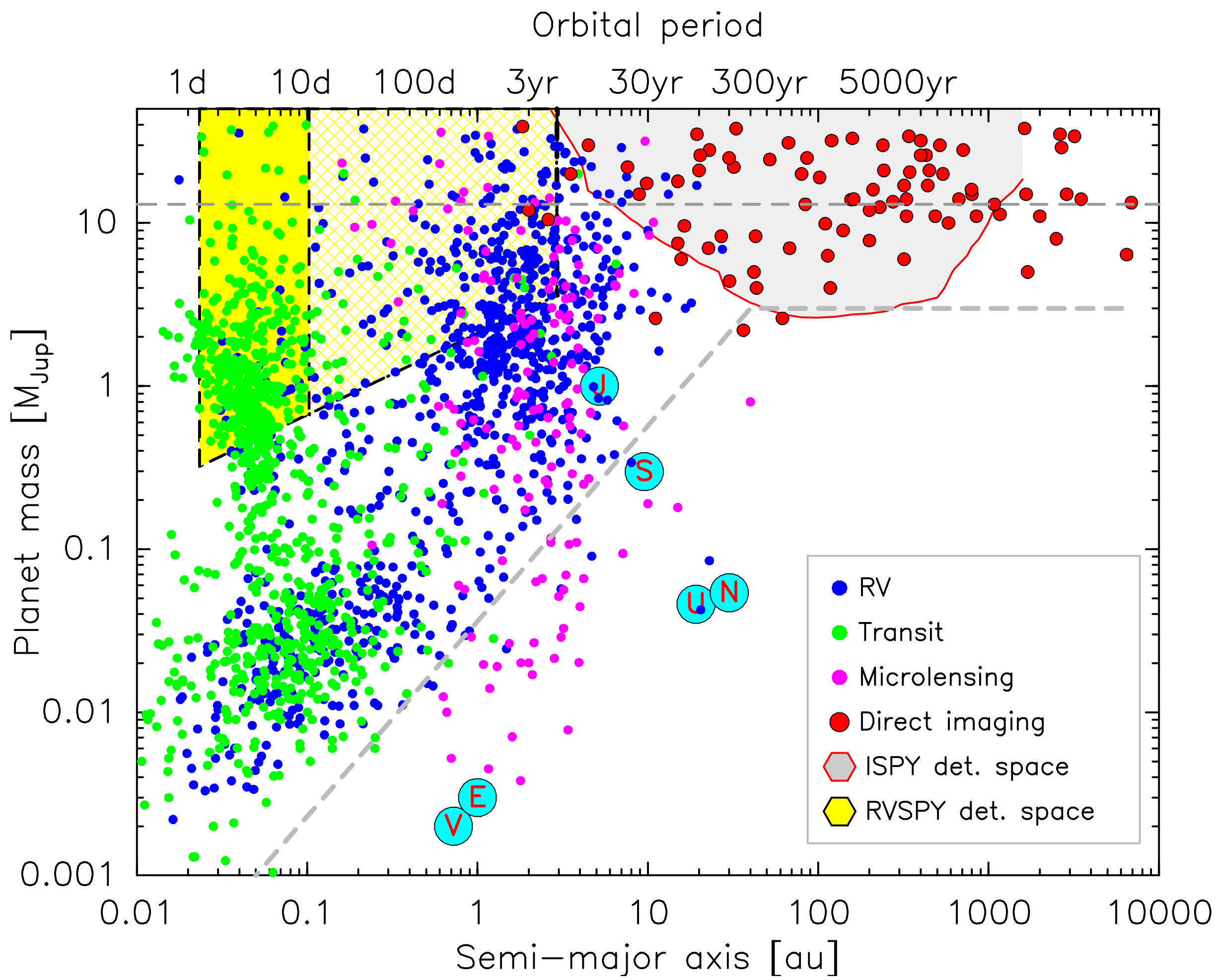

Figure 2: Distribution of planet mass vs. orbital separation of confirmed exoplanets as listed on exopolanet.eu (January 2022, Schneider et al. 2011). Labelled on top are the corresponding orbital periods for $M_* = 1\,\mathrm{M}_\odot$ and $M_\mathrm{p} << M_*$. The main detection methods are marked by different colours. Solar System planets are represented by cyan circles and red letters. The horizontal dashed line marks the approximate deuterium burning mass limit. The solid yellow-shaded area marks the parameter space probed by our high-cadence RVSPY survey, assuming a conservative mean $3\,\sigma$-sensitivity of 60 m/s and a mean stellar mass of $1\,\mathrm{M}_\odot$. The yellow-hatched area marks the extended detection space probed by our RVSPY survey assuming a long-term monitoring duration of 5 years. The grey-shaded area marks the parameter space probed by the NACO-ISPY survey (10% detection probability, Launhardt et al. 2020). The light-grey dashed line marks the approximate detection threshold of current-day exoplanet searches.

Sub-stellar Companions of Intermediate-mass Stars with CoRoT: CoRoT–34b, CoRoT–35b, and CoRoT–36b.

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MNRAS, published (2022MNRAS.tmp.2069S)

Theories of planet formation give contradicting results of how frequent close-in giant planets of intermediate mass stars (IMSs; $1.3 \leq \mathrm{M}_\star \leq 3.2\,\mathrm{M}_\odot$) are. Some theories predict a high rate of IMSs with close-in gas giants, while others predict a very low rate. Thus, determining the frequency of close-in giant planets of IMSs is an important test for theories of planet formation. We use the CoRoT survey to determine the absolute frequency of IMSs that harbour at least one close-in giant planet and compare it to that of solar-like stars. The CoRoT transit survey is ideal for this purpose, because of its completeness for gas-giant planets with orbital periods of less than 10 days and its large sample of main-sequence IMSs. We present a high precision radial velocity follow-up programme and conclude on 17 promising transit candidates of IMSs, observed with CoRoT. We report the detection of CoRoT–34b, a brown dwarf close to the hydrogen burning limit, orbiting a 1.1 Gyr A-type main-sequence star. We also confirm two inflated giant planets, CoRoT–35b, part of a possible planetary system around a metal-poor star, and CoRoT–36b on a misaligned orbit. We find that $0.12 \pm 0.10\,\%$ of IMSs between $1.3 \leq M_\star \leq 1.6 M_\odot$ observed by CoRoT do harbour at least one close-in giant planet. This is significantly lower than the frequency ($0.70 \pm 0.16\,\%$) for solar-mass stars, as well as the frequency of IMSs harbouring long-period planets ($\sim 8\,\%$).

Download/Website: `https://academic.oup.com/mnras/article/516/1/636/6653114`

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The EBLM project – IX. Five fully convective M-dwarfs, precisely measured with *CHEOPS* and *TESS* light curves

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MNRAS, in press (arXiv-2209.03128)

Eclipsing binaries are important benchmark objects to test and calibrate stellar structure and evolution models. This is especially true for binaries with a fully convective M-dwarf component for which direct measurements of these stars' masses and radii are difficult using other techniques. Within the potential of M-dwarfs to be exoplanet host stars, the accuracy of theoretical predictions of their radius and effective temperature as a function of their mass is an active topic of discussion. Not only the parameters of transiting exoplanets but also the success of future atmospheric characterisation rely on accurate theoretical predictions. We present the analysis of five eclipsing binaries with low-mass stellar companions out of a sub-sample of 23, for which we obtained ultra high-precision light curves using the *CHEOPS* satellite. The observation of their primary and secondary eclipses are combined with spectroscopic measurements to precisely model the primary parameters and derive the M-dwarfs mass, radius, surface gravity, and effective temperature estimates using the PYCHEOPS data analysis software. Combining these results to the same set of parameters derived from *TESS* light curves, we find very good agreement (better than 1% for radius and better than 0.2% for surface gravity). We also analyse the importance of precise orbits from radial velocity measurements and find them to be crucial to derive M-dwarf radii in a regime below 5% accuracy. These results add five valuable data points to the mass-radius diagram of fully-convective M-dwarfs.

Download/Website: https://arxiv.org/abs/2209.03128

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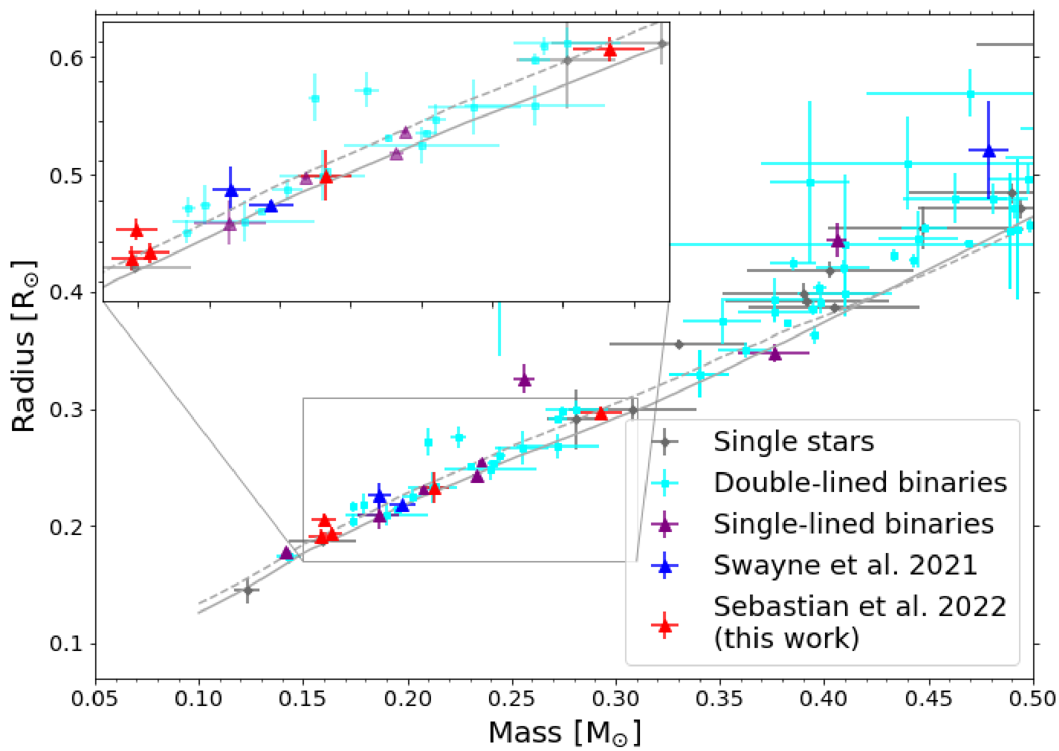

Figure 3: Mass-radius diagram for low mass stars. Triangles: Single lined eclipsing binaries, with *CHEOPS* programme targets highlighted in red and blue. Gray, and Cyan squares: single stars and double lined binaries from literature with measured mass, radius, and effective temperature. The zoom in section highlights the MIST model tracks for [Fe/H]=0, grey line, and [Fe/H]=0.25, grey dotted line.

The Demographics of *Kepler*'s Earths and super-Earths into the Habitable Zone

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The Astronomical Journal, in press (arXiv:2209.04047)

Understanding the occurrence of Earth-sized planets in the habitable zone of Sun-like stars is essential to the search for Earth analogues. Yet a lack of reliable Kepler detections for such planets has forced many estimates to be derived from the close-in ($2 < P_{\rm orb} < 100$ days) population, whose radii may have evolved differently under the effect of atmospheric mass loss mechanisms. In this work, we compute the intrinsic occurrence rates of close-in super-Earths ($\sim 1 - 2\,R_\oplus$) and sub-Neptunes ($\sim 2 - 3.5\,R_\oplus$) for FGK stars ($0.56 - 1.63\,M_\odot$) as a function of orbital period and find evidence of two regimes: where super-Earths are more abundant at short orbital periods, and where sub-Neptunes are more abundant at longer orbital periods. We fit a parametric model in five equally populated stellar mass bins and find that the orbital period of transition between these two regimes scales with stellar mass, like $P_{\rm trans} \propto M_*^{1.7\pm0.2}$. These results suggest a population of former sub-Neptunes contaminating the population of Gyr-old close-in super-Earths, indicative of a population shaped by atmospheric loss. Using our model to constrain the long-period population of intrinsically rocky planets, we estimate an occurrence rate of $\Gamma_\oplus = 15^{+6}_{-4}\%$ for Earth-sized habitable zone planets, and predict that sub-Neptunes may be $\sim$twice as common as super-Earths in the habitable zone (when normalized over the natural log orbital period and radius range used). Finally, we discuss our results in the context of future missions searching for habitable zone planets.

Download/Website: `https://arxiv.org/abs/2209.04047`

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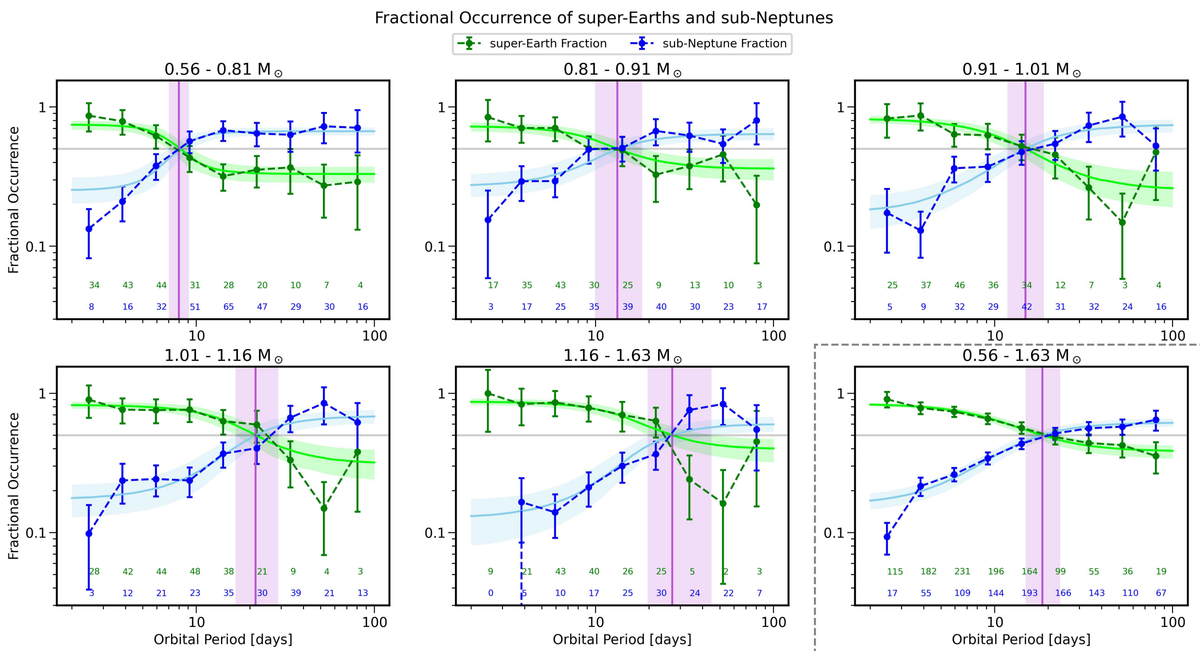

Figure 4: The fractional occurrence of super-Earths (green) and sub-Neptunes (blue) relative to their combined planet occurrence. Each panel represents a different stellar mass bin, with the full FGK sample in the lower-right. The colored numbers in each panel indicate the number of observed candidate planets of a given type within a particular orbital period bin (and stellar mass bin). Dashed points represent the observed occurrence as calculated by for a selection of orbital period bins. Solid lines indicate the best fit distributions as evaluated for that bin. The horizontal grey line marks a fractional occurrence of 0.5, corresponding to an equal abundance of super-Earths and sub-Neptunes, and the orbital period where each fit matches this condition is marked by a vertical purple line. Shaded regions indicate 1σ envelopes.

TEMPus VoLA: the Timed Epstein Multi-pressure Vessel at Low Accelerations

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Review of Scientific Instruments, in press (https://arxiv.org/abs/2209.00635)

The field of planetary system formation relies extensively on our understanding of the aerodynamic interaction between gas and dust in protoplanetary disks. Of particular importance are the mechanisms triggering fluid instabilities and clumping of dust particles into aggregates, and their subsequent inclusion into planetesimals. We introduce the Timed Epstein Multi-pressure vessel at Low Accelerations (TEMPusVoLA), which is an experimental apparatus for the study of particle dynamics and rarefied gas under micro-gravity conditions. This facility contains three experiments dedicated to studying aerodynamic processes, i) the development of pressure gradients due to collective particle-gas interaction, ii) the drag coefficients of dust aggregates with variable particle-gas velocity, iii) the effect of dust on the profile of a shear flow and resultant onset of turbulence. The approach is innovative with respect to previous experiments because we access an untouched parameter space in terms of dust particle packing fraction, and Knudsen, Stokes, and Reynolds numbers. The mechanisms investigated are also relevant for our understanding of the emission of dust from active surfaces such as cometary nuclei and new experimental data will help interpreting previous datasets (Rosetta) and prepare future spacecraft observations (Comet Interceptor). We report on the performance of the experiments, which has been tested over the course of multiple flight campaigns. The project is now ready to benefit from additional flight campaigns, to cover a wide parameter space. The outcome will be a comprehensive framework to test models and numerical recipes for studying collective dust particle aerodynamics under space-like conditions.

Contact: holly.capelo@unibe.ch

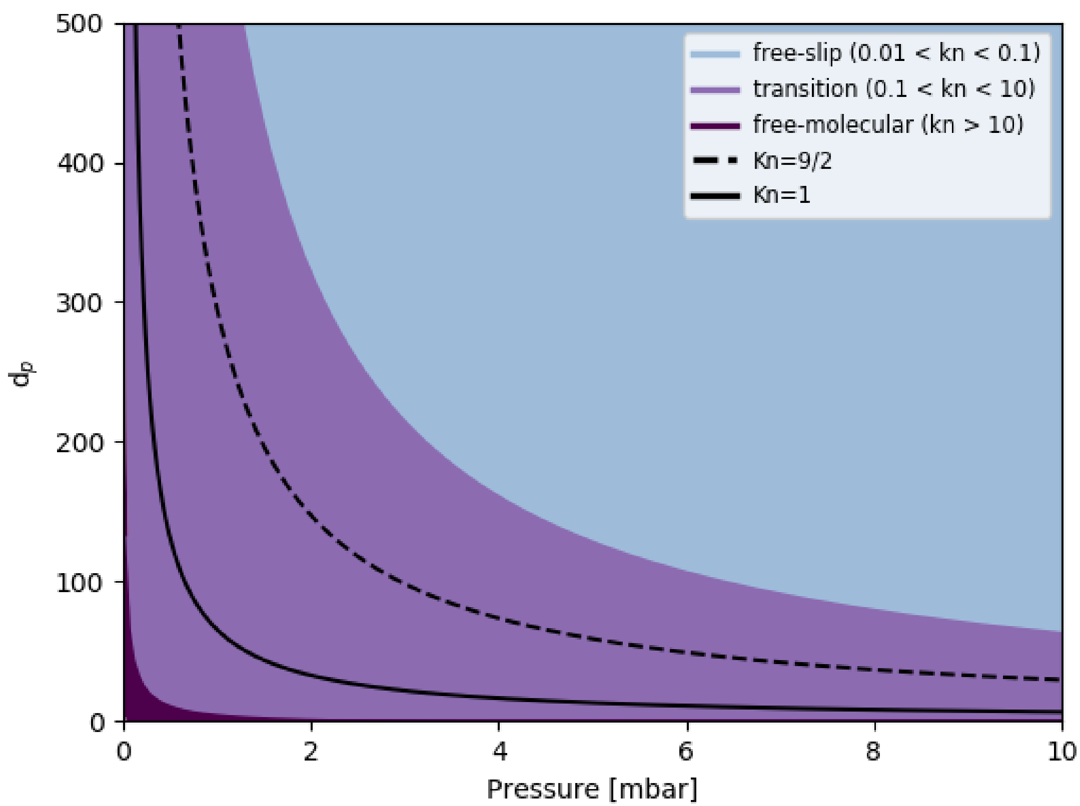

Figure 5: Comparison of particle size to mean inter-molecular distance in a laboratory setting. Solid black line: length scale (mean free path λ, particle size) as a function of gas pressure (air, room temperature). Drag regime divisions are indicated in the legend, with light blue corresponding to the free slip regime, transitional flow in violet, and free molecular flow in plum. Note that these divisions are subject to definition and are gradual. The pure continuum flow regime is not relevant at these values of Kn. The aerodynamic drag regime experienced by particles of meter scale on smaller in protoplanetary discs (always in transitional flow or free molecular flow) can be accessed by studying particles in the size ranges of a few tens hundreds of micrometres and gas pressures below 10 mbar.

3 Jobs and Positions

Postdoctoral Research Fellow in Astrophysical Fluid Dynamics

Dr Adrian J. Barker
University of Leeds, UK

University of Leeds, Leeds, UK, 1st October 2022 or as soon as possible thereafter

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

The successful candidate will work with Dr Adrian Barker in the Department of Applied Mathematics (https://eps.leeds.ac.uk/maths/staff/4006/dr-adrian-j-barker), in collaboration with Profs Rainer Hollerbach (https://eps.leeds.ac.uk/maths/staff/4036/professor-rainer-hollerbach) and Chris Jones (https://eps.leeds.ac.uk/maths/staff/4042/professor-christopher-jones-). They will join the Astrophysical and Geophysical Fluid Dynamics research group (https://agfd.leeds.ac.uk), which is one of the largest such groups in the world. This project will strongly complement and benefit from other STFC-funded projects at Leeds, including in magnetic and thermal evolution of magnetars, as well as a Leverhulme Trust Early Career Fellowship on tidal flows in stars and planets. The research will also complement and benefit from The Leeds Institute for Fluid Dynamics (https://fluids.leeds.ac.uk), a cross-disciplinary research institute in fluid dynamics at Leeds, which hosts the UK's EPSRC Centre for Doctoral Training in Fluid Dynamics.

The post is available to start as soon as possible, but the start date is flexible and could be delayed until March 2023 at the latest. The funds are available for 3 years and the salary range is Grade 7 (£34,304 to £40,927 p.a.).

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

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

Closing Date: 15th September 2022

Download/Website: https://jobs.leeds.ac.uk/Vacancy.aspx?ref=EPSMA1067

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

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`

PhD positions: International Max Planck Research School for Solar System Science at the University of Göttingen

S. Schuh, IMPRS Scientific Coordinator

Max-Planck-Institut für Sonnensystemforschung, Justus-von-Liebig-Weg 3, 37077 Göttingen, Germany
in collaboration with Georg-August-University of Göttingen, Germany

Location: Göttingen, Date: Review of applications begins on 1 November 2022 for starting dates in 2023

The Solar System School invites applications for PhD positions in Solar System Science.
The International Max Planck Research School for Solar System Science at the University of Göttingen ("Solar System School") offers a research-oriented doctoral programme in Solar system science. The Max Planck Institute for Solar System Research (MPS) offers PhD projects in three main areas: "Sun and Heliosphere", "Solar and Stellar Interiors" and "Planetary Science". The open PhD projects also include topics in extra-solar planet research, with one focus on asteroseismology of exoplanet host stars. The Max Planck Institute for Solar System Research hosts the Data Center for the PLATO mission.
Solar System School students collaborate with leading scientists in these fields and graduates are awarded a doctoral degree from the renowned University of Göttingen or, if they choose, another university.
The Solar System School is open to students from all countries and offers an international three-year PhD program in an exceptional research environment with state-of-the-art facilities on the Göttingen Campus. Successful applicants will be offered a three-year doctoral support contract as well as postdoc wrap-up funding.
The language of the structured graduate program is English, with complimentary German language courses offered (optional). The program includes an inspiring curriculum of scientific lectures and seminars as well as advanced training workshops and provides relocation costs and travel funds to attend international conferences.
Applicants to the Solar System School should have a keen interest in Solar system science and a record of academic excellence. They must have, or must be about to obtain, an M.Sc. degree or equivalent in physics, earth science or a related field, including a written Masters thesis, and must document a good command of the English language.
Review of applications for a starting date of September 2023 will begin on 1 November 2022, but other starting times are also negotiable. The positions are awarded on a competitive basis.
The Max Planck Society strives for gender equality and diversity. The Max Planck Society seeks to increase the number of individuals of underrepresented genders and therefore explicitly encourages individuals of underrepresented genders to apply. The Max Planck Society is committed to employing more individuals with severe disabilities. Applications from individuals with severe disabilities are explicitely encouraged.

Applications should be submitted online through the application portal, following the instructions at `http://www.mps.mpg.de/phd/applynow`

Download/Website: `http://www.solar-system-school.de`
`https://www.mps.mpg.de/phd/solar-system-school-call-2022.pdf`
`https://www.mps.mpg.de/phd/solar-system-school-poster-2022.pdf`

Contact: `info@solar-system-school.de`

IMPRS

for Solar System Science at the University of Göttingen

INTERNATIONAL MAX PLANCK RESEARCH SCHOOL

SOLAR SYSTEM SCHOOL

4 Conferences and Workshops

NASA Exoplanet Exploration Program: Call for ExoExplorer and ExoGuide Applications 2023

ExoExplorer Organizing and Steering Committees

NASA's Exoplanet Explorers ("ExoExplorers") Seminar Series is now accepting applications for its 3rd cohort, which will run January—June 2023! This program supports the professional development of graduate students and postdoctoral researchers focused on exoplanet-related research or instrumentation. Each member of the cohort will be featured in a webinar that will be live-streamed to the exoplanet community, helping to increase their visibility within the field. Participants will also learn from established exoplanet researchers and engineers ("ExoGuides"), and have access to professional development events on topics chosen by the cohort.
ExoGuide applications are due September 16th 2022, and ExoExplorer applications are due September 22nd, 2022. For more information, including a full description of the program and instructions on how to apply, please visit the ExoExplorers website at: https://exoplanets.nasa.gov/exep/exopag/exoexplorers/

Download/Website: `https://exoplanets.nasa.gov/exep/exopag/exoexplorers/exoexplorers-call/`

Contact: `exoexplorers_questions@jpl.nasa.gov`

NoRCEL Blue Earth Project event 2023: ”Is it time for Planet B?”

S. Jheeta[1], M. Dominik[2], O. Kotsyurbenko[3], E. Chatzitheodoridis[4]

[1] Network of Researchers on the Chemical Evolution of Life (NoRCEL), Leeds, UK
[2] University of St Andrews, Centre for Exoplanet Science, St Andrews, UK
[3] Yugra State University, Khanty-Mansiysk, Russian Federation
[4] National Technical University of Athens, Greece

Leeds (UK) and online, Saturday, 21 Jan 2023

Stephen Hawking proposed a doomsday scenario in which humanity might have as little as 100 years before leaving Earth, while Elon Musk does not want to wait for that long. Is this how we should confront existential threats to our presence on Earth, or is this a misleading and potentially dangerous or counterproductive direction of thought? Where lies our responsibility for the ecosystem that we depend on? Whatever the answer might be, the future of humanity depends on sound action and must not be left to speculative visions. Join a panel discussion covering a range of perspectives, including existential risk, planetary science, biodiversity, future of humanity, and anthropology.

Download/Website: `https://norcel.net/bep/bep2023`

Contact: `kathynorcelgroup@gmail.com`

Rocky Worlds Discussions – Virtual Meeting Series

Tim Lichtenberg, Amy Bonsor, Oliver Shorttle, Robin Wordsworth, Sarah Hoerst, Hiroyuki Kurokawa, Rebecca Fischer

Fully virtual, launch on 6 October 2022

We are launching a new virtual meeting series, *Rocky Worlds Discussions* (https://discussions.rockyworlds.org), to bring together planetary scientists, astronomers, and earth scientists to pave the way for the next decade of interdisciplinary rocky exoplanet discovery and characterisation. *Rocky Worlds Discussions* aims to grow a globally connected community that meets for seminars followed by discussion on a monthly basis. We aim to foster a lively debate on the major questions cutting across the communities of exoplanet astronomy, planetary science, and astrobiology.

All meetings are conducted virtually via Zoom. The first thematic meetings will be introduced by talks from the following speakers:

6 October 2022, 13.00 UTC:
Anat Shahar (Carnegie EPL) – *An Interdisciplinary (Preliminary) Understanding of Planetary Evolution*

3 November 2022, 13.00 UTC:
Simon Lock (U Bristol) – *Impact-driven atmospheric loss from terrestrial planets*

1 December 2022, 15.00 UTC:
Sujoy Mukhopadhyay (UC Davis) – *Volatile accretion and evolution in the terrestrial planets*

The up-to-date meeting schedule can be found at the website, where you can join the mailing list and further community spaces. We look forward to seeing you virtually at *Rocky Worlds Discussions*!

Download/Website: `https://discussions.rockyworlds.org`

Contact: `discussions@rockyworlds.org`

The Fifth Workshop on Extremely Precise Radial Velocities

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

Conference, March 27-30, 2023

We are pleased to announce that The Fifth Workshop on Extremely Precise Radial Velocities (EPRV 5) will take place March 27 - 30, 2023 at the Hilton Beachfront Resort in Santa Barbara, California.

Since the previous meeting in 2019, a new generation of Extreme Precision RV instruments has been deployed at sites around the world. Dedicated solar telescopes have provided new insights into the variability of Sun-like stars and an increased use of machine-learning-based data analysis has pushed RV planet sensitivity to new heights. EPRV 5 will allow the RV community to discuss the impact and implications of our advancements and failures over the past four years. The conference will cover all major aspects of EPRV science, from instrumentation and survey planning to spectral extraction and activity mitigation efforts, among other topics, and allow ample time for detailed discussion, both during and after talk sessions. As such, in-person participation is strongly preferred, however some level of remote attendance will likely be facilitated.

Abstract submission will be available on October 1, 2022 with a submission deadline of November 15, 2022.

Registration information and rates will be available later in the year. We expect to have some funds available to support travel for early career researchers.

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

Download/Website: `https://conference.ipac.caltech.edu/eprv5/`
Contact: `eprv5@lists.astro.caltech.edu`

5 Exoplanet Archives

August 2022 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, September 13, 2022

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`).

August 25, 2022

First JWST Exoplanet Transmission Spectroscopy Data Available in the NASA Exoplanet Archive!

We've added new WASP-39 b (`https://bit.ly/wasp-39b`) spectra from NASA's Webb Telescope to our Transmission Spectroscopy table (`https://bit.ly/transitspec`), which provides a single place to access publicly available spectra taken by various telescopes for this object, including NASA's Hubble and Spitzer, the Very Large Telescope, and Chile's Observatorio Astronómico Nacional.

Pro Tip: Enter WASP-39 b in the Planet Name column to filter the table and view only the WASP-39 b entries.

Read the media release (`https://go.nasa.gov/3BfOJoa`) and the discovery paper (`https://arxiv.org/abs/2208.11692`).

August 18, 2022

Beta Release of Airmass Visualization Tool

As part of our Transit and Ephemeris Service (`https://bit.ly/TransitEphemeris`), we have added an airmass visualization tool to help users identify the most appropriate targets for follow-up observations. When you run a search using the service, you will now see a new column appear in the results tab. Clicking on that column will bring up a plot of the target's airmass over the course of the night on the selected row, with any transit events demarcated.

There may be brief performance issues during this beta release testing period during which the plot may take some number of seconds to appear, however we expect this to improve in the future.

Two New Planets

We've released two planets this week, one of which was discovered by NASA's TESS mission. They are OGLE-2019-BLG-0362L b (`https://bit.ly/3RDjF7d`) and TOI-2196 b (`https://bit.ly/3AVGyMr`).

August 12, 2022

Over 5,000 TOIs Added to System Overview Pages

We've added more than 5,000 TESS Objects of Interest (TOIs) to new or existing System Overview pages to make it easier to identify systems with candidate planets for follow-up investigation.

Systems with known confirmed planets now display companion TOIs on their respective System Overview pages. New System Overview pages have been created for TOIs that are not part of a known planetary system. In both cases, the pages display TOI parameters from the Exoplanet Follow-up Observing Program (ExoFOP) (`https://bit.ly/ExoFOP-all`).

You can access the TOI System Overview pages a few different ways:

- Enter the host, planet, or candidate name in the Explore the Archive search on our home page.
- If the system has confirmed planets, click on its entry in the Planetary Systems interactive table.
- Click on the candidate planet's name in the TESS Project Candidates interactive table (`https://bit.ly/TESSProjCand`).

August 4, 2022

Seven New Planets, One Demotion

We've added seven planets this week, including KMT-2020-BLG-0414L b (`https://bit.ly/3B0r0XU`), the lowest mass-ratio microlensing planet to date. We've also demoted HD 92987 b to false positive planet status based on a published refutation. Note: The false positive planet's data are still available on the HD 92987 System Overview page (`https://bit.ly/3D3hSEh`).

The new planets are CoRoT-35 b, CoRoT-36 b, HD 93963 A b & c, GJ 3929 c, and KMT-2020-BLG-0414L b & c.

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

6 As seen on astro-ph

The following list contains exoplanet related entries appearing on astro-ph in August 2022.

August 2022

astro-ph/2208.00018: **Low Spin-Axis Variations of Circumbinary Planets** by *Renyi Chen, Gongjie Li, Molei Tao*

astro-ph/2208.00022: **Constraining the Densities of the Three Kepler-289 Planets with Transit Timing Variations** by *Michael Greklek-McKeon et al.*

astro-ph/2208.00469: **H2S and SO2 detectability in Hot Jupiters: Sulfur species as indicator of metallicity and C/O ratio** by *J. Polman et al.*

astro-ph/2208.00984: **Battle of the Predictive Wavefront Controls: Comparing Data and Model-Driven Predictive Control for High Contrast Imaging** by *J. Fowler, Maaike A. M. Van Kooten, Rebecca Jensen-Clem*

astro-ph/2208.00996: **Performance of near-infrared high-contrast imaging methods with JWST from commissioning** by *Jens Kammerer et al.*

astro-ph/2208.01598: **Gap Opening and Inner Disk Structure in the Strongly Accreting Transition Disk of DM Tau** by *Logan Francis et al.*

astro-ph/2208.01606: **Constrained Reference Star Differential Imaging: Enabling High-Fidelity Imagery of Highly Structured Circumstellar Disks** by *Kellen Lawson et al.*

astro-ph/2208.01650: **Irradiation-driven escape of primordial planetary atmospheres III. Revised planetary parameters and mass-loss rates for nearby gaseous planets after Gaia DR2** by *R. Spinelli et al.*

astro-ph/2208.01657: **A Clear View of a Cloudy Brown Dwarf Companion from High-Resolution Spectroscopy** by *Jerry W. Xuan et al.*

astro-ph/2208.01716: **The power of wavelets in analysis of transit and phase curves in presence of stellar variability and instrumental noise III. Accuracy of transit parameters** by *Szilárd Kálmán, Gyula Szabó M., Szilárd Csizmadia*

astro-ph/2208.01902: **Growing the seeds of pebble accretion through planetesimal accretion** by *Sebastian Lorek, Anders Johansen*

astro-ph/2208.02317: **Spectropolarimetry of life: airborne measurements from a hot air balloon** by *Willeke Mulder et al.*

astro-ph/2208.02421: **Sensitive Multi-beam Targeted SETI Observations towards 33 Exoplanet Systems with FAST** by *Zhen-Zhao Tao et al.*

astro-ph/2208.02503: **Cosmic-ray ionization rate in protoplanetary disks with sheared magnetic fields** by *Yuri I. Fujii, Shigeo S. Kimura*

astro-ph/2208.02542: **The Origin of the Doppler-flip in HD 100546: a large scale spiral arm generated by an inner binary companion** by *Brodie J. Norfolk et al.*

astro-ph/2208.03226: **Photometric Characterization and Trajectory Accuracy of Starlink Satellites: Implications for Ground-Based Astronomical Surveys** by *Grace Halferty et al.*

astro-ph/2208.03387: **Variability from thermo-resistive instability in the atmospheres of hot jupiters** by *Raphael Hardy, Andrew Cumming, Paul Charbonneau*

astro-ph/2208.03604: **Moon-packing around an Earth-mass Planet** by *Suman Satyal, Billy Quarles, Marialis Rosario-Franco*

astro-ph/2208.03916: **Modeling H alpha and He 10830 transmission spectrum of WASP-52b** by *Dongdong Yan et al.*

astro-ph/2208.04230: **OGLE-2019-BLG-0362Lb: A super-Jovian-mass planet around a low-mass star** by *Sun-Ju Chung et al.*

astro-ph/2208.04323: **Keeping Exoplanet Science Caffeinated with ESPRESSO** by *Louise Dyregaard Nielsen, Julia Victoria Seidel*

astro-ph/2208.04330: **The evolution of protoplanetary disc radii and disc masses in star-forming regions** by *Bridget Marchington (1), Richard J. Parker (1) (1. University of Sheffield, UK)*

astro-ph/2208.04439: **System Architecture and Planetary Obliquity: Implications for Long-Term Habitability** by *Pam Vervoort et al.*
astro-ph/2208.04501: **Observation Scheduling and Automatic Data Reduction for the Antarctic telescope, ASTEP+** by *Georgina Dransfield et al.*
astro-ph/2208.04615: **A detailed dynamical model for inclination-only dependent lunisolar resonances. Effect on the "eccentricity growth" mechanism** by *Edoardo Legnaro, Christos Efthymiopoulos*
astro-ph/2208.04759: **Unifying High- and Low-resolution Observations to Constrain the Dayside Atmosphere of KELT-20b/MASCARA-2b** by *David Kasper et al.*
astro-ph/2208.04794: **Challenges in forming Phobos and Deimos directly from a splitting of an ancestral single moon** by *Ryuki Hyodo et al.*
astro-ph/2208.04818: **The stable climate of KELT-9b** by *K. D. Jones et al.*
astro-ph/2208.04837: **Mapping the Complex Kinematic Substructure in the TW Hya Disk** by *Richard Teague et al.*
astro-ph/2208.04867: **Direct Discovery of the Inner Exoplanet in the HD206893 System** by *S. Hinkley et al.*
astro-ph/2208.05016: **Near-infrared Accretion Signatures from the Circumbinary Planetary Mass Companion Delorme 1 (AB)b** by *S. K. Betti et al.*
astro-ph/2208.05041: **Eccentric debris belts reveal the dynamical history of the companion exoplanet** by *Laetitia Rodet, Dong Lai*
astro-ph/2208.05338: **Growth and Evolution of Secondary Volcanic Atmospheres: II. The Importance of Kinetics** by *Philippa Liggins et al.*
astro-ph/2208.05423: **Inferred Properties of Planets in Mean-Motion Resonances are Biased by Measurement Noise** by *David Jensen, Sarah C. Millholland*
astro-ph/2208.05541: **Jupiter and Saturn as Spectral Analogs for Extrasolar Gas Giants and Brown Dwarfs** by *Daniel J. Coulter, Jason W. Barnes, Jonathan J. Fortney*
astro-ph/2208.05562: **Exoplanet weather and climate regimes with clouds and thermal ionospheres: A model grid study in support of large-scale observational campaigns** by *Christiane Helling et al.*
astro-ph/2208.05594: **Atmospheric Monitoring and Precise Spectroscopy of the HR 8799 Planets with SCExAO/CHARIS** by *Jason J. Wang et al.*
astro-ph/2208.05797: **TOI-2196 b: Rare planet in the hot Neptune desert transiting a G-type star** by *Carina M. Persson et al.*
astro-ph/2208.05874: **Misaligned circumbinary disks as efficient progenitors of interstellar asteroids** by *Anna C. Childs, Rebecca G. Martin*
astro-ph/2208.05989: **Signatures of impact-driven atmospheric loss in large ensembles of exoplanets** by *Quadry Chance, Sarah Ballard, Keivan Stassun*
astro-ph/2208.06005: **The Molecular Composition of Shadowed Protosolar Disk Midplanes beyond the Water Snowline** by *Shota Notsu et al.*
astro-ph/2208.06006: **Exoplanet Radio Transits as a Probe for Exoplanetary Magnetic Fields – Time-dependent MHD Simulations** by *Soumitra Hazra, Ofer Cohen, Igor V. Sokolov*
astro-ph/2208.06045: **Fractional Order Analysis of the Polytropic Models Applied to Exoplanets** by *Essam Elkholy, Mohamed I. Nouh*
astro-ph/2208.06297: **Greater climate sensitivity and variability on TRAPPIST-1e than Earth** by *Assaf Hochman, Paolo De Luca, Thaddeus D. Komacek*
astro-ph/2208.06333: **TOI-1452 b: SPIRou and TESS reveal a super-Earth in a temperate orbit transiting an M4 dwarf** by *Charles Cadieux et al.*
astro-ph/2208.06396: **HD 56414 b: A Warm Neptune Transiting an A-type Star** by *Steven Giacalone et al.*
astro-ph/2208.06443: **Photobombing Earth 2.0: Diffraction Limit Related Contamination and Uncertainty in Habitable Planet Spectra** by *Prabal Saxena*
astro-ph/2208.06523: **Thermal Evolution and magnetic history of rocky planets** by *Jisheng Zhang, Leslie Rogers*
astro-ph/2208.06656: **Atmospheric Thermal Emission Effect on Chandrasekhar's Finite Atmosphere Prob-**

lem by *Soumya Sengupta*

astro-ph/2208.07287: **Precise mass determination for the keystone sub-Neptune planet transiting the mid-type M dwarf G 9-40** by *R. Luque et al.*

astro-ph/2208.07328: **TOI-836: A super-Earth and mini-Neptune transiting a nearby K-dwarf** by *Faith Hawthorn et al.*

astro-ph/2208.07390: **Chemical evolution in ices on drifting, planet-forming pebbles** by *Christian Eistrup, Thomas Henning*

astro-ph/2208.07393: **Alternative Methylated Biosignatures I: Methyl Bromide, A Capstone Biosignature** by *Michaela Leung et al.*

astro-ph/2208.07428: **Revising Properties of Planet-host Binary Systems II: Apparent Near-Earth Analog Planets in Binaries Are Often Sub-Neptunes** by *Kendall Sullivan, Adam L. Kraus*

astro-ph/2208.07836: **PICASO 3.0: A One-Dimensional Climate Model for Giant Planets and Brown Dwarfs** by *Sagnick Mukherjee et al.*

astro-ph/2208.07883: **A Reanalysis of the Composition of K2-106b: an Ultra-short Period Super-Mercury Candidate** by *Romy Rodríguez Martínez et al.*

astro-ph/2208.07915: **Reference-star differential imaging on SPHERE/IRDIS** by *Chen Xie et al.*

astro-ph/2208.08447: **Combining Photometry and Astrometry to Improve Orbit Retrieval of Directly Imaged Exoplanets** by *Margaret Bruna et al.*

astro-ph/2208.08448: **On the Masses, Age, and Architecture of the VHS J1256-1257AB b System** by *Trent J. Dupuy et al.*

astro-ph/2208.08451: **The coexistence of the streaming instability and the vertical shear instability in protoplanetary disks: Planetesimal formation thresholds explored in two-dimensional global models** by *Urs Schäfer, Anders Johansen*

astro-ph/2208.09031: **Debiasing the Minimum-Mass Extrasolar Nebula: On the Diversity of Solid Disk Profiles** by *Matthias Y. He, Eric B. Ford*

astro-ph/2208.09204: **The SHARDDS survey: limits on planet occurrence rates based on point sources analysis via the Auto-RSM framework** by *C.-H. Dahlqvist et al.*

astro-ph/2208.09230: **Millimeter Gap Contrast as a Probe for Turbulence Level in Protoplanetary Disks** by *Yao Liu et al.*

astro-ph/2208.09297: **Attempt to obtain the general relativistic planet's motion by special relativity techniques** by *Yoshio Kubo*

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