ExoPlanet News
An Electronic Newsletter

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Contents

1 Editorial

Welcome to Edition 161 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!

Starting from this issue, we also introduce the 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 13 December 2022.

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

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

2 Abstracts of refereed papers

Planet-star interactions with precise transit timing. III. Entering the regime of dynamical tides

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Astronomy & Astrophysics, in press (arXiv:2209.10597)

Hot Jupiters on extremely short-period orbits are expected to be unstable due to tidal dissipation and spiral toward their host stars. That is because they transfer the angular momentum of the orbital motion through tidal dissipation into the stellar interior. Although the magnitude of this phenomenon is related to the physical properties of a specific star-planet system, statistical studies show that tidal dissipation might shape the architecture of hot Jupiter systems during the stellar lifetime on the main sequence. The efficiency of tidal dissipation remains poorly constrained in star-planet systems. Stellar interior models show that the dissipation of dynamical tides in radiation zones could be the dominant mechanism driving planetary orbital decay. These theoretical predictions can be verified with the transit timing method. We acquired new precise transit mid-times for five planets. They were previously identified as the best candidates for which orbital decay might be detected. Analysis of the timing data allowed us to place tighter constraints on the orbital decay rate. No statistically significant changes in their orbital periods were detected for all five hot Jupiters in systems HAT-P-23, KELT-1, KELT-16, WASP-18, and WASP-103. For planets HAT-P-23 b, WASP-18 b, and WASP-103 b, observations show that the mechanism of the dynamical tidal dissipation probably does not operate in their host stars, preventing their orbits from rapidly decaying. This finding aligns with the models of stellar interiors of F-type stars, in which dynamical tides are not fully damped due to convective cores. For KELT-16 b, the span of transit timing data was not long enough to verify the theoretical predictions. KELT-1 b was identified as a potential laboratory for studying the dissipative tidal interactions of inertial waves in a convective layer. Continued observations of those two planets may provide further empirical verification of the tidal dissipation theory.

Download/Website: `https://arxiv.org/abs/2209.10597`

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A millimeter-multiwavelength continuum study of VLA 1623 West

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The Astrophysical Journal, in press (arXiv:2209.06781)

VLA 1623 West is an ambiguous source that has been described as a shocked cloudlet as well as a protostellar disk. We use deep ALMA 1.3 and 0.87 millimeter observations to constrain its shape and structure to better determine its origins. We use a series of geometric models to fit the *uv* visibilities at both wavelengths with `GALARIO`. Although the Real visibilities show structures similar to what has been identified as gaps and rings in protoplanetary disks, we find that a modified Flat-Topped Gaussian at high inclination provides the best fit to the observations. This fit agrees well with expectations for an optically thick highly inclined disk. Nevertheless, we find that the geometric models consistently yield positive residuals at the four corners of the disk at both wavelengths. We interpret these residuals as evidence that the disk is flared in the millimeter dust. We use a simple toy model for an edge-on flared disk and find that the residuals best match a disk with flaring that is mainly restricted to the outer disk at $R > 30$ au. Thus, VLA 1623W may represent a young protostellar disk where the large dust grains have not yet had enough time to settle into the mid-plane. This result may have implications for how disk evolution and vertical dust settling impact the initial conditions leading to planet formation.

Download/Website: `https://arxiv.org/abs/2209.06781`

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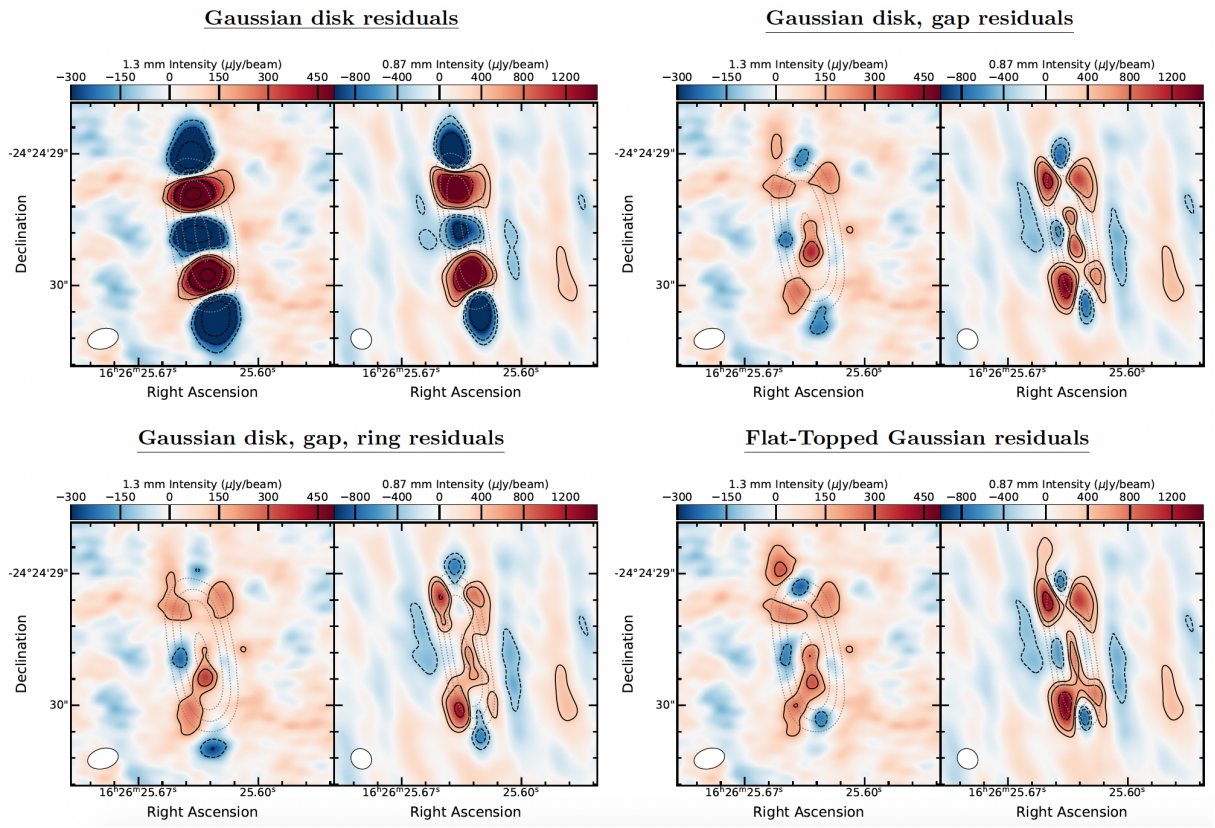

Figure 1: Residuals were imaged after the subtraction of the Fourier transform of the different disk models. The black contours represent $\pm 3, 5, 10, 20\sigma$ residuals.The grey dotted lines represent the original disk emission at $20, 50, 100, 200\sigma$. In each pair of panels, the left panel represents the 1.3 mm residuals with a $\sigma_6 = 54\mu$Jy, and the right panel is the 0.87 mm residuals with a $\sigma_7 = 110\mu$Jy. Aside from the Gaussian disk model, the three other model residuals are remarkably consistent and similar, albeit with small differences, and generally display positive residuals at the disk's four corners. The excess emission at the disk's four corners is attributed to millimeter dust's outer disk flaring.

Prediction of an Earth-sized Planet Formed in the Habitable Zone of the SPECULOOS-2 System

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Research Notes of the American Astronomical Society, Published (2022RNAAS...6..213B)

Transiting planets in the nearby TRAPPIST-1 system provide rare examples of habitable zone (HZ), Earth-sized planets that can be characterized via transmission spectroscopy. However, these present-day HZ planets likely formed interior to HZ and probably underwent an evolution very different from that of Earth. We present the integrative analysis of the planetary architecture of the recently discovered planetary system SPECULOOS-2. Our analysis answers the question: If there are additional exoplanets in the SPECULOOS-2 system, what are their orbital and physical properties? We predict an Earth-sized planet in the habitable zone ($P \sim 14.5 - 18.2$ days). In contrast to TRAPPIST-1e, this predicted planet most likely completed its formation inside the habitable zone. If confirmed, this planet will offer an Earth-sized, habitable zone planet that is likely to have an evolutionary path more similar to Earth than those in the TRAPPIST-1 system.

Download/Website: `https://doi.org/10.3847/2515-5172/ac9ab8`

Contact: `exoplanetnews@nccr-planets.ch`

Editorial note: Articles published on Research Notes of the American Astronomical Society are non-peer reviewed.

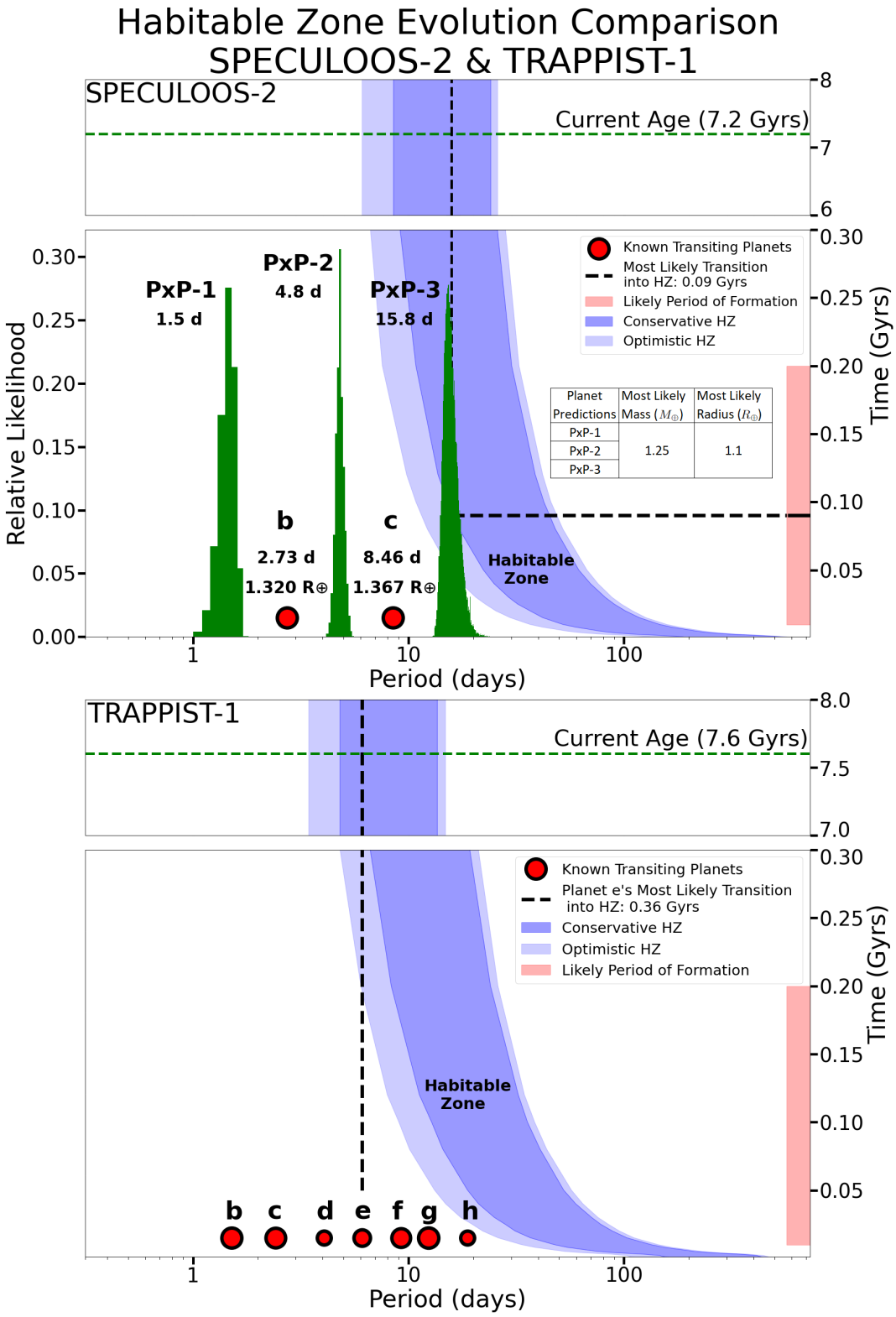

Figure 2: Top: Probability distributions of predicted exoplanet periods (green) and HZ evolution (blue) for SPECULOOS-2. Bottom: HZ evolution for TRAPPIST-1. TRAPPIST-1e forms interior to the HZ, while PxP-3 likely formed within the HZ.

Radio-Loud Exoplanet-Exomoon Survey (RLEES): GMRT Search for Electron Cyclotron Maser Emission

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The Astronomical Journal, accepted (arXiv:2210.13298)

We conducted the first dedicated search for signatures of exoplanet-exomoon interactions using the Giant Metrewave Radio Telescope (GMRT) as part of the radio-loud exoplanet-exomoon survey (RLEES). Due to stellar tidal heating, irradiation, and subsequent atmospheric escape, candidate 'exo-Io' systems are expected to emit up to 10^6 times more plasma flux than the Jupiter-Io DC circuit. This can induce detectable radio emission from the exoplanet-exomoon system. We analyze three 'exo-Io' candidate stars: WASP-49, HAT-P 12, and HD 189733. We perform 12-hour phase-curve observations of WASP-49b at 400 MHz during primary & secondary transit, as well as first & third quadratures achieving a 3σ upper-limit of 0.18 mJy/beam averaged over four days. HAT-P 12 was observed with GMRT at 150 and 325 MHz. We further analyzed the archival data of HD 189733 at 325 MHz. No emission was detected from the three systems. However, we place strong upper limits on radio flux density. Given that most exo-Io candidates orbit hot Saturns, we encourage more multiwavelength searches (in particular low frequencies) to span the lower range of exoplanet B-field strengths constrained here.

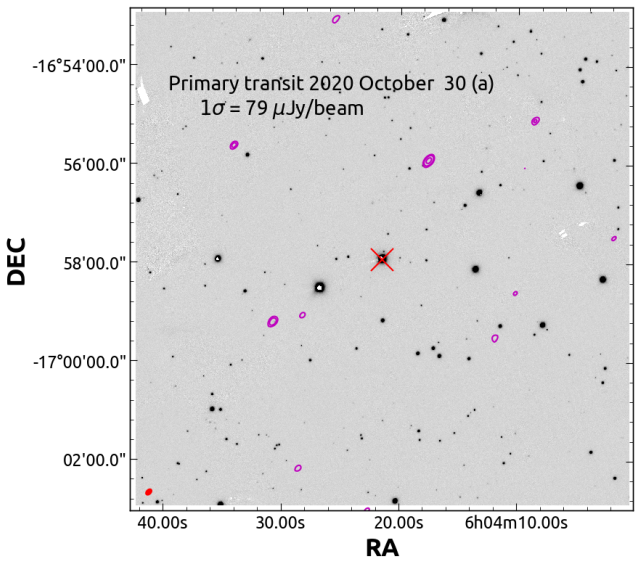

Figure 3: The uGMRT image (magenta contours) of the WASP-49 field at 400 MHz for the first night of observation overlaid on the PANSTARR g band image. The red cross marks the position of the WASP-49. The contours plotted are 5, 10, 30, and 50 $\times$ σ. The beam is shown as a red ellipse at the bottom left corner.

Download/Website: `https://arxiv.org/abs/2210.13298`

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Lightning-induced chemistry on tidally-locked Earth-like exoplanets

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Monthly Notices of the Royal Astronomical Society, published (2022MNRAS.517.2383B)

Determining the habitability and interpreting atmospheric spectra of exoplanets requires understanding their atmospheric physics and chemistry. We use a 3-D Coupled Climate-Chemistry Model, the Met Office Unified Model with the UK Chemistry and Aerosols framework, to study the emergence of lightning and its chemical impact on tidally-locked Earth-like exoplanets. We simulate the atmosphere of Proxima Centauri b orbiting in the Habitable Zone of its M-dwarf star, but the results apply to similar M-dwarf orbiting planets. Our chemical network includes the Chapman ozone reactions and hydrogen oxide (HO_x=H+OH+HO_2) and nitrogen oxide (NO_x=NO+NO_2) catalytic cycles. We find that photochemistry driven by stellar radiation (177–850 nm) supports a global ozone layer between 20–50 km. We parameterise lightning flashes as a function of cloud-top height and the resulting production of nitric oxide (NO) from the thermal decomposition of N_2 and O_2. Rapid dayside convection over and around the substellar point results in lightning flash rates of up to 0.16 flashes $\mathrm{km}^{-2}\mathrm{yr}^{-1}$, enriching the dayside atmosphere below altitudes of 20 km in NO_x. Changes in dayside ozone are determined mainly by UV irradiance and the HO_x catalytic cycle. $\sim$45% of the planetary dayside surface remains at habitable temperatures ($T_{surf}>273.15$ K) and the ozone layer reduces surface UV radiation levels to 15%. Dayside-nightside thermal gradients result in strong winds that subsequently advect NO_x towards the nightside, where the absence of photochemistry allows NO_x chemistry to involve reservoir species. Our study also emphasizes the need for accurate UV stellar spectra to understand the atmospheric chemistry of exoplanets.

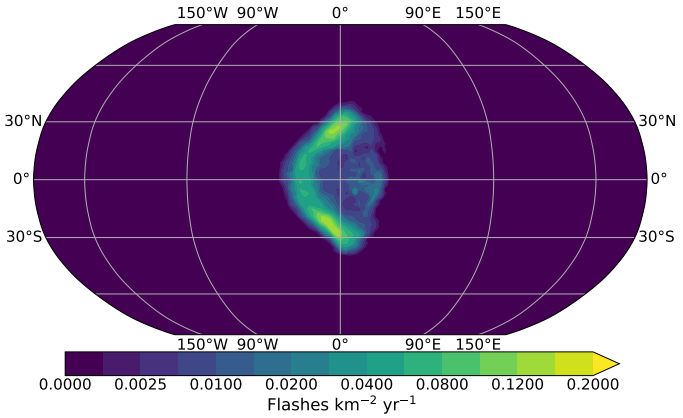

Figure 4: Annual lightning flash rates on Proxima Centauri b, following parametrizations shown in equation (1) (Price & Rind 1992; Luhar et al. 2021). The mean of 120 days was taken from the high-frequency flash rate output and subsequently scaled to annual rates.

Download/Website: `https://doi.org/10.1093/mnras/stac2722`

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Precise near-infrared photometry, accounting for precipitable water vapour at SPECULOOS Southern Observatory

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Monthly Notices of the Royal Astronomical Society, Accepted. (arXiv:2211.0015)

The variability induced by precipitable water vapour (PWV) can heavily affect the accuracy of time-series photometric measurements gathered from the ground, especially in the near-infrared. We present here a novel method of modelling and mitigating this variability, as well as open-sourcing the developed tool – Umbrella. In this study, we evaluate the extent to which the photometry in three common bandpasses (*r'*, *i'*, *z'*), and SPECULOOS' primary bandpass (*I+z'*), are photometrically affected by PWV variability. In this selection of bandpasses, the *I+z'* bandpass was found to be most sensitive to PWV variability, followed by *z'*, *i'*, and *r'*. The correction was evaluated on global light curves of nearby late M- and L-type stars observed by SPECULOOS' Southern Observatory (SSO) with the *I+z'* bandpass, using PWV measurements from the LHATPRO and local temperature/humidity sensors. A median reduction in RMS of 1.1% was observed for variability shorter than the expected transit duration for SSO's targets. On timescales longer than the expected transit duration, where long-term variability may be induced, a median reduction in RMS of 53.8% was observed for the same method of correction.

Download/Website: `https://arxiv.org/abs/2211.00156`

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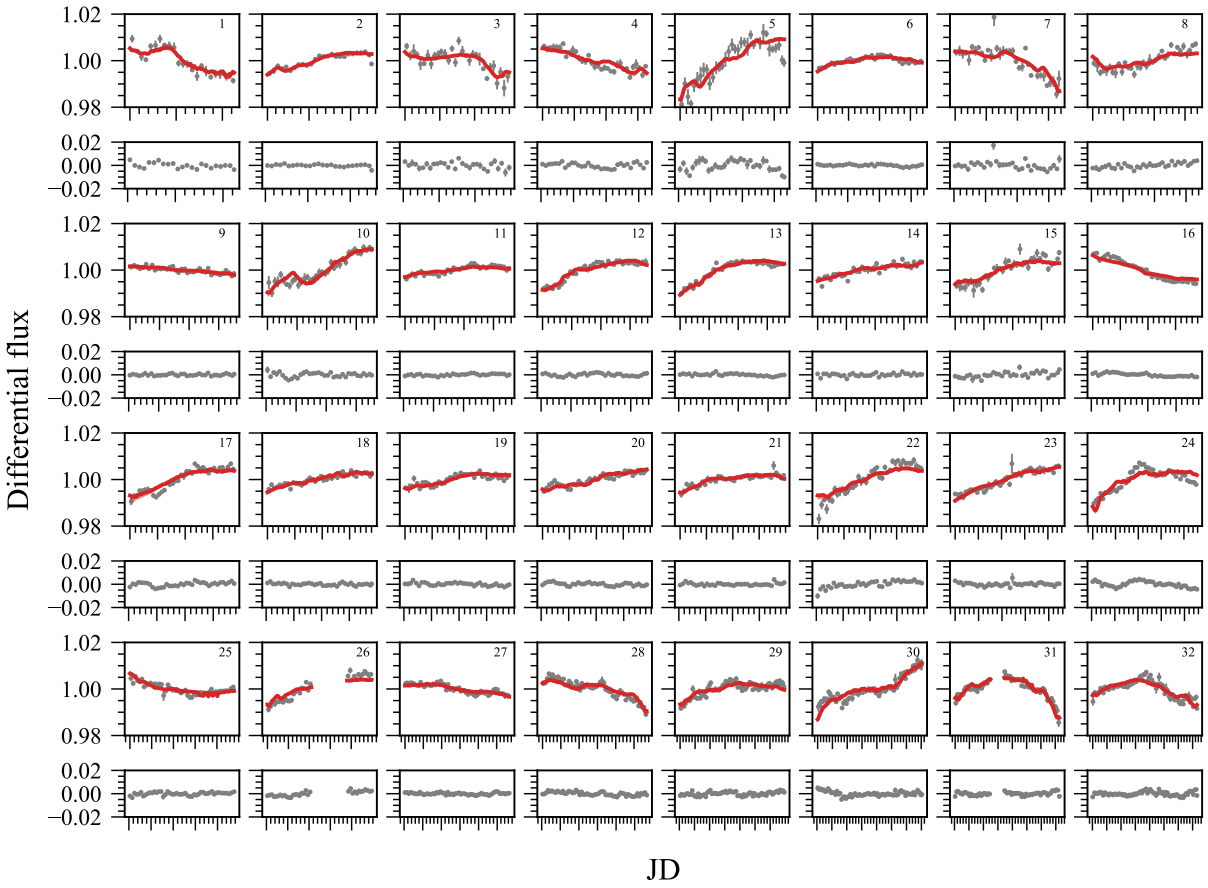

Figure 5: A selection of 32 observations of 19 different targets observed with the *I*+*z'* bandpass which matched closely with the expected trend from the correction. Top row: 0.005 JD binned (7.2 minutes) uncorrected differential flux light curves in grey. Expected trend from the correction in red, using estimated line-of-sight + altitude difference PWV and knowledge of the target and comparison stars effective temperatures. In shaded red, although the effect is not visible for the majority of examples, the expected trend from the correction also plotted using $\pm$100 K from the target's effective temperature. Second row: Residual of the correction (observed data - expected trend) of the above subplot. Row order then repeats. Ordered from shortest to longest timescales, where the major ticks on the x-axis are 0.05 JD (72 minutes).

Using debris disk observations to infer substellar companions orbiting within or outside a parent planetesimal belt

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Astronomy & Astrophysics, in press (arXiv:2210.05315)

Context. Alongside a debris disk, substellar companions often exist in the same system. The companions influence the dust dynamics via their gravitational potential.
Aims. We analyze whether the effects of secular perturbations, originating from a substellar companion, on the dust dynamics can be investigated with spatially resolved observations.
Methods. We numerically simulated the collisional evolution of narrow and eccentric cold planetesimal belts around a star of spectral type A3 V that are secularly perturbed by a substellar companion that orbits either closer to or farther from the star than the belt. Our model requires a perturber on an eccentric orbit ($e > 0.3$) that is both far from and more massive than the collisionally dominated belt around a luminous central star. Based on the resulting spatial dust distributions, we simulated spatially resolved maps of their surface brightness in the K, N, and Q bands and at wavelengths of 70 μm and 1300 μm.
Results. Assuming a nearby debris disk seen face-on, we find that the surface brightness distribution varies significantly with observing wavelength, for example between the N and Q band. This can be explained by the varying relative contribution of the emission of the smallest grains near the blowout limit. The orbits of both the small grains that form the halo and the large grains close to the parent belt precess due to the secular perturbations induced by a substellar companion orbiting inward of the belt. The halo, being composed of older grains, trails the belt. The magnitude of the trailing decreases with increasing perturber mass and hence with increasing strength of the perturbations. We recovered this trend in synthetic maps of surface brightness by fitting ellipses to lines of constant brightness. Systems with an outer perturber do not show a uniform halo precession since the orbits of small grains are strongly altered. We identified features of the brightness distributions suitable for distinguishing between systems with a potentially detectable inner or outer perturber, especially with a combined observation with JWST/MIRI in the Q band tracing small grain emission and with ALMA at millimeter wavelengths tracing the position of the parent planetesimal belt.

Download/Website: `http://arxiv.org/abs/2210.05315`

Contact: `tstuber@astrophysik.uni-kiel.de`

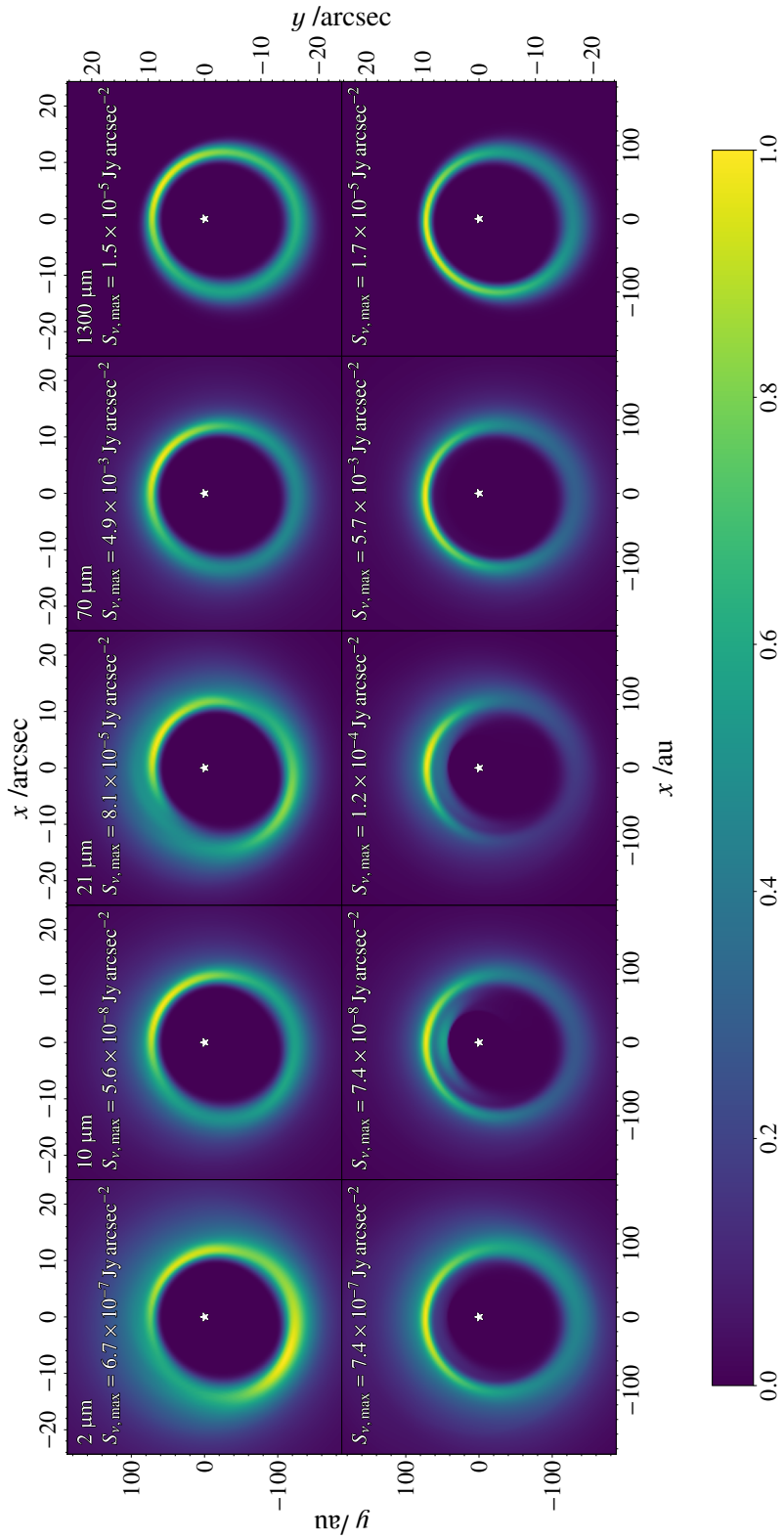

Figure 6: Surface brightness distributions of the system with a perturber orbiting inside the belt (*top* row) and the system with a perturber orbiting outside the belt (*bottom* row) for a stellar distance of 7.7 pc (e.g., Fomalhaut) at five wavelengths: 2 μm, 10 μm, 21 μm, 70 μm, and 1300 μm (from left to right), zoomed in on the central $\sim$ 190 au. Each distribution has been normalized by its respective maximum value, $S_{\nu,\,\mathrm{max}}$. The white asterisk denotes the position of the central star and defines the center of the coordinate system.

3 Jobs and Positions

2023 Trottier Postdoctoral Fellowship in Exoplanetary Science

Prof. René Doyon

Montréal, Canada, Starting date: May to September 2023

The Institute for Research on Exoplanets (iREx), affiliated with the Department of Physics of the Université de Montréal (UdeM), invites applications for the Trottier Postdoctoral Fellowship in experimental, observational or theoretical astrophysics applied to the study of exoplanets, which enables forefront independent research related to exoplanets. All areas of exoplanet research will be considered.

A PhD in physics, astronomy or related discipline is required at the time when the position starts. Preference will be given to applicants within 3 years of obtaining their PhD. Applicants with career interruptions due to parental, medical or family leaves, or other causes are invited to mention it in their cover letter, if so desired. The position start date is between **May and September 2023**, and is for two years, renewable for a third year subject to performance and availability of funds.

Applicants should submit a cover letter (optional, max 1 page), a CV, a list of publications, and a statement of research interests (max 2 pages), and should arrange to have three referees send a letter of reference to **irex-applications@umontreal.ca by December 2nd 2022 for full consideration**. This position will, however, remain open until filled.

The iREx consists of a growing team of about 60 people working on a variety of observational, theoretical and instrumental projects related to the study of exoplanets and other related fields of astrophysics. They work within several research institutions located in Quebec, Canada. Our team is actively involved in large international projects related to the detection and characterisation of exoplanets, notably the JWST and the SPIRou and NIRPS spectrographs, and have privileged access to time and data from these instruments.

The iREx advocates for diversity, inclusion and employment equity. We strongly encourage applications from women, visible and ethnic minorities, Indigenous people, persons with disabilities and people of all sexual orientations and gender identities to apply.

More information on the position and on our institute and its members, our research programs, our EPO initiatives and our EDI efforts can be found on our website: http://www.exoplanetes.umontreal.ca/?lang=en

Download/Website: `https://bit.ly/TrottierPostdoc2023`

Contact: `irex-applications@umontreal.ca`

PhD Positions in Exoplanet Science at the Kapteyn Astronomical Institute of the University of Groningen, The Netherlands

Tim Lichtenberg

Application open, deadline on 1st December 2022

The newly established Forming Worlds research group at the Kapteyn Astronomical Institute invites applications for two PhD positions focused on the interior and atmospheric evolution of rocky exoplanets for a start in 2023. The application deadline will be on 1 December 2022. Inquiries about the positions can be sent to tim.lichtenberg@rug.nl.

Detailed information on the positions and research environment can be found at: https://www.formingworlds.space/post/phd-positions-october-2022

Current and near-future exoplanet surveys gain ever-more accurate insights into the atmospheric and surface conditions of hot rocky exoplanets. These worlds share characteristics with the magma ocean epoch during the accretion of our own planet. The prospective students will simulate the transition from hot, globally molten epochs to cooler climatic and geodynamic regimes of rocky exoplanets. The goal is to advance interpretations of upcoming observations of lava exoplanets to gain insights into the formation of the prebiotic atmosphere of the Hadean Earth. The two projects will focus on a better understanding of the build-up of rocky planetary atmospheres during high-temperature magma ocean epochs and operate at the highly cross-disciplinary interfaces of exoplanet astronomy and the geosciences.

The Kapteyn Astronomical Institute is part of the Netherlands Research School for Astronomy (NOVA) and is recognised worldwide for the quality of its research in multiple areas of astronomy. With 15 faculty and 50 PhD students, Groningen occupies a strategic place in Dutch astronomy, hosting both the Kapteyn Astronomical Institute, the low-energy astrophysics division of the Netherlands Institute for Space Research (SRON) and the NOVA sub-mm lab. The Kapteyn Institute has a strong connection with the Netherlands Institute for Radio Astronomy (ASTRON) in Dwingeloo, a European centre of radio astronomy research. Staff and PhD students at the Kapteyn Institute frequently collaborate with SRON and ASTRON scientists and engineers. There are also strong interdisciplinary connections with other institutes in the Faculty of Science and Engineering, and the Dutch Origins Center. English is the common language spoken at the institute.

We seek motivated students with a strong background in the physical sciences or geosciences, including, but not limited to, physics, astronomy, geophysics, geochemistry, atmospheric sciences, or computational sciences with minors in related disciplines. Diversity and Inclusion are a part of the mission of the Forming Worlds research group and the Kapteyn Astronomical Institute, as outlined in our group-internal Code of Conduct and the Diversity and Inclusion Policy of the University of Groningen. We look for candidates who will create an open and positive climate that attracts curious students and researchers of all races, nationalities, and genders.

Successful applicants will be required to hold an MSc degree in planetary sciences or related fields by the starting date of the position. Application documents include a cover letter, research statement, CV, list of grades/transcript, and two reference letters. For full details please go to: https://www.rug.nl/research/kapteyn/vacatures/phd-positions.

Download/Website: `https://www.formingworlds.space/post/phd-positions-october-2022`

Contact: `tim.lichtenberg@rug.nl, phdkapteyn@astro.rug.nl`

4 Conferences and Workshops

Abstracts for The 5th Workshop on Extremely Precise Radial Velocities Due November 17!

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

Conference, March 27-30, 2023

We are pleased to announce that abstract submission for The Fifth Workshop on Extremely Precise Radial Velocities (EPRV 5) is open!

We are soliciting abstracts for contributed talks, posters, and splinter sessions, and participants may make multiple submissions within / across these categories. The deadline for both contributed talks and splinter sessions is Thursday, November 17th 2022 at 11:59p Pacific US time. Poster submissions will be accepted until February 17th 2023, and all talk abstracts that are not selected for the main conference program will automatically be considered for a poster.

You can find more information and links to the submission forms on the EPRV 5 website on the Abstract Submission page (`https://conference.ipac.caltech.edu/eprv5/page/6`).

If you have any questions, contact the conference co-chairs Jennifer Burt (jennifer.burt@jpl.nasa.gov) and BJ Fulton (bjfulton@ipac.caltech.edu) or email us at eprv5@lists.astro.caltech.edu

Registration and hotel information will be available in mid November 2022.

Download/Website: `https://conference.ipac.caltech.edu/eprv5/`
Contact: `eprv5@lists.astro.caltech.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 circulation. The field is entering a revolution in our understanding of exoplanet atmospheres thanks to measurements from the ground, from space, and particularly from the new 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.

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.

We currently plan to hold the 2023 workshop as a hybrid with both in-person and on-line attendance. It is unclear at this time (October 2022) 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 and there is no registration fee. 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 in February 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`

Call for Abstracts – Evolution and Characterisation of Earth-sized Exoplanets, Super-Earths, and Sub-Neptunes at EGU 2023

Dennis Höning[1], *Francesca Miozzi*[2], *Kaustubh Hakim*[3]
[1] Potsdam Institute for Climate Impact Research, Germany
[2] Carnegie Institution for Science, USA
[3] University of Bern, Switzerland

EGU 2023 Vienna, Austria, 23–28 April 2023

Dear colleagues,

Please consider submitting an abstract to the session on Evolution and Characterisation of Earth-sized Exoplanets, Super-Earths, and Sub-Neptunes (PS7.1) at the European Geosciences Union (EGU) General Assembly 2023.

The abstract deadline is **10 January 2023 (13:00 CET)**, but those seeking travel support should submit their abstract by 1 December 2022 (13:00 CET). Travel support info: `https://egu23.eu/guidelines/supports_and_waivers.html`

Exoplanets smaller than Neptune, terrestrial exoplanets and sub-Neptunes, are ubiquitous in the galaxy. With advanced telescopes such as the James Webb Space Telescope, the atmospheric spectra of these planets are being retrieved, which will eventually provide insights into their atmospheric compositions. However, understanding the planetary interior state and evolution through time also requires the consideration of mineralogy and interior structure, mantle evolution, and volatile exchange between interior and atmosphere. To this interdisciplinary session, we invite contributions from numerical modeling, laboratory experimental studies, as well as observations of exoplanets and their atmospheres. We particularly welcome innovative work that highlights the impact of the study on predicting the evolution and on the characterisation of exoplanets. Applications range from magma ocean planets to planets within the habitable zone and from Earth-sized planets to sub-Neptunes. Contributions include geophysical and geochemical modeling, thermochemical equilibrium and kinetics, photochemistry, volatile outgassing and recycling, as well as high-pressure high-temperature laboratory experiments. Let us bridge the gap between prediction and observation of small to intermediate-sized exoplanets!

Session details: `https://meetingorganizer.copernicus.org/EGU23/session/45815`

Abstract instructions: `https://egu23.eu/programme/how_to_submit.html`

Conference details: `https://egu23.eu/`

Looking forward to receiving your abstracts.
Dennis Höning, Francesca Miozzi & Kaustubh Hakim

Contact: `kaustubh.hakim@unibe.ch`

5 Exoplanet Archives

October 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, November 8, 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`).

October 20, 2022

Three New Planets

This week's three new planets are KMT-2021-BLG-1898L b, HD 3167 e (a.k.a. K2-96 e) and NGTS-21 b—an inflated hot Jupiter with an unusually high mass for the low metallicity of its host star.

Updated Ephemerides for 300+ Planets

We've also updated the ephemerides for more than 300 planets from Ivshina & Winn 2022 (`https://bit.ly/3G07G15`). You can find these data in the Planetary Systems tables, as well as integrated into the Transit and Ephemeris Service (`http://bit.ly/2DnAv6c`), which can help with scheduling follow-up observations.

October 13, 2022

Nine Planets, Including a Trio of Giants

This week's new planets range from a super-Earth to one with the mass of 18 Jupiters—and even a trio of giants orbiting HD 184010.

The new planets are TOI-411 b & c (super-Earth and sub-Neptune), KOI-7368 b (a.k.a. Kepler-1974 b, a sub-Neptune), KOI-7913 b (a.k.a. Kepler-1975 b, a sub-Neptune), TOI-5542 b (an old, warm Jupiter), KIC 3526061 b (roughly 18 Jupiter masses!), and the trio of giants HD 184010 b, c, & d.

October 6, 2022

Seven New Planets, Three With the Smallest RV Signals To Date

This week's seven new planets include three in the HD 23472 system that have the smallest radial velocity semi-amplitudes detected to date, which also reveal Mercury-like densities for two of the inner planets. The RV

detections by ESO's ESPRESSO show that new spectrographs are capable of pushing to detections of smaller and smaller planets.

The new planets are HD 23472 d, e, & f, TOI-2545 b, TOI-5174 b, TOI-5238 b, and TOI-5398 b. Also, Fomalhaut b's status has been updated to False Positive Planet; its data can be viewed in the Fomalhaut System Overview page (`https://bit.ly/3NFXsEH`).

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 November 2022.
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.

November 2022

astro-ph/2210.00149: **CO2 ocean bistability on terrestrial exoplanets** *by R.J. Graham, Tim Lichtenberg, Ray Pierrehumbert*
astro-ph/2210.00214: **Orbital Stability of Proposed NY Virginis Exoplanets** *by Xinyu Mai, Robert L. Mutel*
astro-ph/2210.00424: **Dynamical history of the Galilean satellites for a fast migration of Callisto** *by Giacomo Lari, Melaine Saillenfest, Clara Grassi*
astro-ph/2210.00830: **Effects of Solar Activity, Solar Insolation and the Lower Atmospheric Dust on the Martian Thermosphere** *by N. V. Rao et al.*
astro-ph/2210.00913: **Collisional growth efficiency of dust aggregates and its independence of the strength of interparticle rolling friction** *by Sota Arakawa, Hidekazu Tanaka, Eiichiro Kokubo*
astro-ph/2210.00932: **On the evolution of pebble-accreting planets in evolving protoplanetary discs** *by Arnaud Pierens*
astro-ph/2210.01006: **Neural network for determining an asteroid mineral composition from reflectance spectra** *by David Korda et al.*
astro-ph/2210.01027: **NGTS-21b: An Inflated Super-Jupiter Orbiting a Metal-poor K dwarf** *by Douglas R. Alves et al.*
astro-ph/2210.01061: **Radiation protection and shielding materials for crewed missions on the surface of Mars** *by Dionysios Gakis, Dimitra Atri*
astro-ph/2210.01130: **Directly tracing the vertical stratification of molecules in protoplanetary disks** *by T. Paneque-Carreño et al.*
astro-ph/2210.01394: **Material Properties of Organic Liquids, Ices, and Hazes on Titan** *by Xinting Yu et al.*
astro-ph/2210.01432: **Fragment Dynamics in Active Asteroid 331P/Gibbs** *by Man-To Hui, David Jewitt*
astro-ph/2210.01460: **Survival of Terrestrial N2-O2 Atmospheres in Violent XUV Environments through Efficient Atomic Line Radiative Cooling** *by Akifumi Nakayama, Masahiro Ikoma, Naoki Terada*
astro-ph/2210.01466: **No evidence for radius inflation in hot Jupiters from vertical advection of heat** *by Aaron David Schneider et al.*
astro-ph/2210.01669: **Evaluating the Plausible Range of N2O Biosignatures on Exo-Earths: An Integrated Biogeochemical, Photochemical, and Spectral Modeling Approach** *by Edward W. Schwieterman et al.*
astro-ph/2210.01782: **Large Interferometer For Exoplanets (LIFE): VI. Detecting rocky exoplanets in the habitable zones of Sun-like stars** *by Jens Kammerer et al.*
astro-ph/2210.01814: **Immediate origin of the Moon as a post-impact satellite** *by Jacob A. Kegerreis et al.*
astro-ph/2210.02052: **Nonlinear Outcome of Coagulation Instability in Protoplanetary Disks II: Dust Ring Formation Mediated by Backreaction and Fragmentation** *by Ryosuke T. Tominaga et al.*
astro-ph/2210.02096: **Asteroid spin-states of a 4 Gyr collisional family** *by D. Athanasopoulos et al.*
astro-ph/2210.02139: **The Scintillating Tail of Comet C/2020 F3 (Neowise)** *by R.A. Fallows et al.*
astro-ph/2210.02212: **Searching for Hα-emitting sources in the gaps of five transitional disks. SPHERE/ZIMPOL high-contrast imaging** *by N. Huélamo et al.*
astro-ph/2210.02339: **Particle clustering in turbulence: Prediction of spatial and statistical properties with deep learning** *by Yan-Mong Chan et al.*
astro-ph/2210.02436: **MOA-2020-BLG-208: Cool Sub-Saturn Planet Within Predicted Desert** *by Greg Olmschenk et al.*
astro-ph/2210.02464: **Roaring Storms in the Planetary-Mass Companion VHS 1256-1257 b: Hubble Space Telescope Multi-epoch Monitoring Reveals Vigorous Evolution in an Ultra-cool Atmosphere** *by Yifan*

Zhou et al.

astro-ph/2210.02484: **A Catalog of Habitable Zone Exoplanets** *by Michelle L. Hill et al.*

astro-ph/2210.02603: **Consequences of dynamically unstable moons in extrasolar systems** *by Bradley M. S. Hansen*

astro-ph/2210.02741: **Comet nuclei composition and evolution** *by Gianrico Filacchione et al.*

astro-ph/2210.03049: **Physical Characterization of Near-Earth Asteroid (52768) 1998 OR2: Evidence of Shock 1 Darkening/Impact Melt** *by Adam Battle et al.*

astro-ph/2210.03056: **Lava World: Exoplanet Surfaces** *by Marc-Antoine Fortin et al.*

astro-ph/2210.03098: **Simulating reflected light coronagraphy of Earth-like exoplanets with a large IR/O/UV space telescope: impact and calibration of smooth exozodiacal dust** *by Jens Kammerer et al.*

astro-ph/2210.03176: **Noble gases and stable isotopes track the origin and early evolution of the Venus atmosphere** *by Guillaume Avice et al.*

astro-ph/2210.03237: **Internal or external magma oceans in the earliest protoplanets – perspectives from nitrogen and carbon fractionation** *by Damanveer S. Grewal, Johnny D. Seales, Rajdeep Dasgupta*

astro-ph/2210.03278: **Air-sea interactions on Titan: effect of radiative transfer on the lake evaporation and atmospheric circulation** *by Audrey Chatain et al.*

astro-ph/2210.03351: **Magnetic induction processes in Hot Jupiters, application to KELT-9b** *by Wieland Dietrich et al.*

astro-ph/2210.03434: **Optical Polarimetry of the May 2022 Lunar Eclipse** *by Iain A Steele et al.*

astro-ph/2210.03725: **Stellar Flyby Analysis for Spiral Arm Hosts with Gaia DR3** *by Linling Shuai et al.*

astro-ph/2210.03993: **An astrometric mass estimate for asteroid (223) Rosa** *by M. Kretlow*

astro-ph/2210.04147: **The Possibility of Mirror Planet as Planet Nine in Solar System** *by Pei Wang*

astro-ph/2210.04162: **New Parameter Measurements for the Ultra-Short-Period Planet TOI-1807b** *by Peifeng Peng et al.*

astro-ph/2210.04248: **Residual Neural Networks for the Prediction of Planetary Collision Outcomes** *by Philip M. Winter et al.*

astro-ph/2210.04316: **In-flight radiometric calibration of the ExoMars TGO Colour and Stereo Surface Imaging System** *by Antoine Pommerol et al.*

astro-ph/2210.04462: **The Perkins INfrared Exosatellite Survey (PINES) II. Transit Candidates and Implications for Planet Occurrence around L and T Dwarfs** *by Patrick Tamburo et al.*

astro-ph/2210.04948: **Early Mars' habitability and global cooling by H2-based methanogens** *by Boris Sauterey et al.*

astro-ph/2210.04961: **Non-synchronous rotation on Europa driven by ocean currents** *by Yosef Ashkenazy, Eli Tziperman, Francis Nimmo*

astro-ph/2210.05094: **Climate of high obliquity exo-terrestrial planets with a three-dimensional cloud system resolving climate model** *by Takanori Kodama et al.*

astro-ph/2210.05101: **Anticipating the DART impact: Orbit estimation of Dimorphos using a simplified model** *by Shantanu P. Naidu et al.*

astro-ph/2210.05190: **Analysis of Low V Spacecraft Missions to Oort Cloud Comet C/2014 UN271** *by Adam Hibberd, T. Marshall Eubanks*

astro-ph/2210.05315: **Using debris disk observations to infer substellar companions orbiting within or outside a parent planetesimal belt** *by T. A. Stuber et al.*

astro-ph/2210.05414: **Earth as an Exoplanet: II. Earth's Time-Variable Thermal Emission and its Atmospheric Seasonality of Bio-Indicators** *by Jean-Noel Mettler et al.*

astro-ph/2210.05428: **Lithospheric loading model for large impact basin where mantle plug presents** *by Qingyun Deng et al.*

astro-ph/2210.05539: **Transition disks: the observational revolution from SEDs to imaging** *by Nienke van der Marel (1) ((1) Leiden Observatory, the Netherlands)*

astro-ph/2210.05595: **The Exoplanet Radius Valley from Gas-driven Planet Migration and Breaking of Reso-**

nant Chains *by Andre Izidoro et al.*

astro-ph/2210.05963: **A Note on the "Various Atmospheres over Water Oceans on Terrestrial Planets with a One-Dimensional Radiative-Convective Equilibrium Model** *by Tetsuya Hara et al.*

astro-ph/2210.06097: **The interplay between forming planets and photo-evaporating discs I: Forbidden line diagnostics** *by Michael L. Weber et al.*

astro-ph/2210.06390: **Spectral cube extraction for the VLT/SPHERE IFS: Open-source pipeline with full forward modeling and improved sensitivity** *by Matthias Samland et al.*

astro-ph/2210.06560: **First Steps of Planet Formation Around Very Low Mass Stars and Brown Dwarfs** *by Paola Pinilla*

astro-ph/2210.06571: **Light curves of transneptunian objects from the K2 mission of the Kepler Space Telescope** *by Viktória Kecskeméthy et al.*

astro-ph/2210.06665: **TOI-561 b: A Low Density Ultra-Short Period "Rocky" Planet around a Metal-Poor Star** *by Casey Brinkman et al.*

astro-ph/2210.06892: **Detection of barium in the atmospheres of the ultra-hot gas giants WASP-76b and WASP-121b** *by T. Azevedo Silva et al.*

astro-ph/2210.07084: **Solid grains ejected from terrestrial exoplanets as a probe of the abundance of life in the Milky Way** *by Tomonori Totani*

astro-ph/2210.07252: **The McDonald Accelerating Stars Survey (MASS): Architecture of the Ancient Five-Planet Host System Kepler-444** *by Zhoujian Zhang et al.*

astro-ph/2210.07395: **The case of HD 106906 debris disc: A binary's revenge** *by Mohammad Farhat, Antranik Sefilian, Jihad Touma*

astro-ph/2210.07478: **On the underestimation of dust mass in protoplanetary disks: Effects of disk structure and dust properties** *by Yao Liu et al.*

astro-ph/2210.07933: **TOI-179: a young system with a transiting compact Neptune-mass planet and a low-mass companion in outer orbit** *by S. Desidera et al.*

astro-ph/2210.07945: **A dense mini-Neptune orbiting the bright young star HD 18599** *by Jose I. Vines et al.*

astro-ph/2210.08018: **Constraints on Evolutionary Timescales for M Dwarf Planets from Dynamical Stability Arguments** *by Katie Teixeira, Sarah Ballard*

astro-ph/2210.08078: **Revisiting Radial Velocity Measurements of the K2-18 System with the Line-by-Line Framework** *by Michael Radica et al.*

astro-ph/2210.08134: **CO2-driven surface changes in the Hapi region on Comet 67P/Churyumov-Gerasimenko** *by Björn J. R. Davidsson et al.*

astro-ph/2210.08179: **A sub-Neptune transiting the young field star HD 18599 at 40 pc** *by Jerome P. de Leon et al.*

astro-ph/2210.08313: **Occurrence rate of hot Jupiters around early-type M dwarfs based on TESS data** *by Tianjun Gan et al.*

astro-ph/2210.08517: **Transmission spectroscopy of WASP-7 b with UVES – Detection of Na I D2 and tentative D1 line absorption** *by Hossein Rahmati et al.*

astro-ph/2210.08755: **Atmospheric heat redistribution effect on Emission spectra of Hot-Jupiters** *by Soumya Sengupta, Sujan Sengupta*

astro-ph/2210.08912: **Characterization of the HD 108236 system with CHEOPS and TESS. Confirmation of a fifth transiting planet** *by S. Hoyer et al.*

astro-ph/2210.08915: **Searching for Outbursts in the Ground-Based Photometry of 67P/Churyumov-Gerasimenko** *by Daniel Gardener, Colin Snodgrass, Nicolas Ligier*

astro-ph/2210.08996: **TOI-969: a late-K dwarf with a hot mini-Neptune in the desert and an eccentric cold Jupiter** *by J. Lillo-Box et al.*

astro-ph/2210.09008: **Estimating the depth of gaps opened by planets in eccentric orbit** *by F. J. Sanchez-Salcedo, R. O. Chametla, O. Chrenko*

astro-ph/2210.09124: **A billion or more years of possible periglacial/glacial cycling in Protonilus Mensae,**

Mars *by Richard J. Soare et al.*

astro-ph/2210.09152: **Planet Four: A Neural Network's Search For Polar Spring-time Fans On Mars** *by Mark D. McDonnell et al.*

astro-ph/2210.09219: **Venus boundary layer dynamics: eolian transport and convective vortex** *by Maxence Lefèvre*

astro-ph/2210.09240: **The Impact of Turbulent Vertical Mixing in the Venus Clouds on Chemical Tracers** *by Maxence Lefèvre, Emmanuel Marcq, Franck Lefèvre*

astro-ph/2210.09283: **TOI-1136 is a Young, Coplanar, Aligned Planetary System in a Pristine Resonant Chain** *by Fei Dai et al.*

astro-ph/2210.09400: **Comet Science With Ground Based and Space Based Surveys in the New Millennium** *by J. M. Bauer et al.*

astro-ph/2210.09417: **Stability analysis of planetary systems via second-order Rényi entropy** *by Tamás Kovács et al.*

astro-ph/2210.09652: **The orbital evolution of Atira asteroids** *by Hsuan-Ting Lai, Wing-Huen Ip*

astro-ph/2210.09713: **Planetary system around LTT 1445A unveiled by ESPRESSO: Multiple planets in a triple M-dwarf system** *by B. Lavie et al.*

astro-ph/2210.10004: **A Radiative-Convective Model for Terrestrial Planets with Self-Consistent Patchy Clouds** *by James D. Windsor et al.*

astro-ph/2210.10008: **A transmission spectrum of the sub-Earth planet L98-59 b in 1.1-1.7 m** *by Mario Damiano et al.*

astro-ph/2210.10217: **The astorb database at Lowell Observatory** *by Nicholas A. Moskovitz et al.*

astro-ph/2210.10248: **A kinematic excess in the annular gap and gas depleted cavity in the disc around HD 169142** *by Himanshi Garg et al.*

astro-ph/2210.10463: **LavAtmos: An open source chemical equilibrium vaporisation code for lava worlds** *by Christiaan van Buchem et al.*

astro-ph/2210.10699: **Hubble WFC3 Spectroscopy of the Rocky Planet L 98-59 b: No Evidence for a Cloud-Free Primordial Atmosphere** *by Li Zhou et al.*

astro-ph/2210.10754: **Constraining the Interiors of Asteroids Through Close Encounters** *by Jack T Dinsmore, Julien de Wit*

astro-ph/2210.10800: **A Concise Treatise on Converting Stellar Mass Fractions to Abundances to Molar Ratios** *by Natalie R. Hinkel, Patrick A. Young, Caleb H. Wheeler III*

astro-ph/2210.10805: **TFAW survey II: 6 Newly Validated Planets and 13 Planet Candidates from K2** *by D. del Ser et al.*

astro-ph/2210.10815: **Turbulent Transport of Dust Particles in Protostellar Disks: The Effect of Upstream Diffusion** *by Ting-Tao Zhou et al.*

astro-ph/2210.10877: **Energy Dissipation in Synchronous Binary Asteroids** *by Alex J. Meyer et al.*

astro-ph/2210.10909: **TOI-3884 b: A rare 6-R planet that transits a low-mass star with a giant and likely polar spot** *by J.M. Almenara et al.*

astro-ph/2210.11207: **: a Bayesian observing strategy algorithm for planet detection in radial velocity blind-search surveys** *by O. Balsalobre-Ruza et al.*

astro-ph/2210.11488: **Gap-opening Planets Make Dust Rings Wider** *by Jiaqing Bi*

astro-ph/2210.11535: **Constraints on planetary tidal dissipation from a detailed study of Kepler 91b** *by L. Fellay et al.*

astro-ph/2210.11760: **Production of hot Jupiter candidates from high-eccentricity mechanisms for different initial planetary mass configurations** *by H. Garzón, Adrián Rodríguez, G. C. de Elía*

astro-ph/2210.11809: **Ground-based Optical Transmission Spectroscopy of the Nearby Terrestrial Exoplanet LTT 1445Ab** *by Hannah Diamond-Lowe et al.*

astro-ph/2210.11896: **The effect of collisional erosion on the composition of Earth-analog planets in Grand Tack models: Implications for the formation of the Earth** *by Allibert L. et al.*

astro-ph/2210.11967: **The effect of water and electron collisions in the rotational excitation of HF in comets** *by J. Loreau, A. Faure, F. Lique*

astro-ph/2210.11986: **The Mantis Network II: Examining the 3D high-resolution observable properties of the UHJs WASP-121b and WASP-189b through GCM modelling** *by Elspeth K. H. Lee et al.*

astro-ph/2210.12019: **Revealing the interior structure of icy moons with a Bayesian approach to magnetic induction measurements** *by John B. Biersteker et al.*

astro-ph/2210.12121: **Planet Engulfment Detections are Rare According to Observations and Stellar Modeling** *by Aida Behmard et al.*

astro-ph/2210.12211: **Independent validation of the temperate Super-Earth HD79211 b using HARPS-N** *by Victoria DiTomasso et al.*

astro-ph/2210.12344: **Systematic KMTNet Planetary Anomaly Search, Paper VII: Complete Sample of q¡104 Planets from the First Four-Year Survey** *by Weicheng Zang et al.*

astro-ph/2210.12474: **ExoMol line lists – XLV. Rovibronic molecular line lists of calcium monohydride (CaH) and magnesium monohydride (MgH)** *by Alec Owens et al.*

astro-ph/2210.12477: **ExoMol line lists – XLVI: Empirical rovibronic spectra of silicon mononitrate (SiN) covering the 6 lowest electronic states and 4 isotopologues** *by Mikhail Semenov et al.*

astro-ph/2210.12480: **ExoMol line lists – XLVII. Rovibronic molecular line list of the calcium monohydroxide radical (CaOH)** *by Alec Owens et al.*

astro-ph/2210.12710: **L 363-38 b: a planet newly discovered with ESPRESSO orbiting a nearby M dwarf star** *by Lia F. Sartori et al.*

astro-ph/2210.12847: **The Mantis Network III: A titanium cold-trap on the ultra-hot Jupiter WASP-121 b** *by H.J. Hoeijmakers et al.*

astro-ph/2210.13091: **On the dust of tailless Oort-cloud comet C/2020 T2 (Palomar)** *by Yuna Grace Kwon, Joseph R. Masiero, Johannes Markkanen*

astro-ph/2210.13147: **Clusters of heavy particles in two-dimensional Keplerian turbulence** *by Fabiola Antonietta Gerosa, Héloïse Meheut, Jérémie Bec*

astro-ph/2210.13257: **3D modelling of the impact of stellar activity on tidally locked terrestrial exoplanets: atmospheric composition and habitability** *by Robert J. Ridgway et al.*

astro-ph/2210.13298: **Radio-Loud Exoplanet-Exomoon Survey (RLEES): GMRT Search for Electron Cyclotron Maser Emission** *by Mayank Narang et al.*

astro-ph/2210.13314: **Structured Distributions of Gas and Solids in Protoplanetary Disks** *by Jaehan Bae et al.*

astro-ph/2210.13346: **The three regimes of atmospheric evaporation for super-Earths and sub-Neptunes** *by Darius Modirrousta-Galian, Jun Korenaga*

astro-ph/2210.13365: **Spin State Evolution of (99942) Apophis during its 2029 Earth Encounter** *by C. J. Benson et al.*

astro-ph/2210.13380: **Averaged Solar Torque Rotational Dynamics for Defunct Satellites** *by Conor J. Benson, Daniel J. Scheeres*

astro-ph/2210.13413: **Razor-thin dust layers in protoplanetary disks: Limits on the vertical shear instability** *by C.P. Dullemond et al.*

astro-ph/2210.13519: **Phosphine in the Venusian Atmosphere: A Strict Upper Limit from SOFIA GREAT Observations** *by M. A. Cordiner et al.*

astro-ph/2210.13674: **Halting Migration in Magnetospherically Sculpted Protoplanetary Disks** *by Tze Yeung Mathew Yu, Brad Hansen, Yasuhiro Hasegawa*

astro-ph/2210.14028: **Metal-silicate partitioning of W and Mo and the role of carbon in controlling their abundances in the Bulk Silicate Earth** *by E. S. Jennings et al.*

astro-ph/2210.14125: **Rossiter-McLaughlin detection of the 9-month period transiting exoplanet HIP41378 d** *by S. Grouffal et al.*

astro-ph/2210.14187: **Elemental Abundances of Kepler Objects of Interest in APOGEE DR17** *by Aida Behmard et al.*

astro-ph/2210.14194: **Is binning always sinning? The impact of time-averaging for exoplanet phase curves** *by Giuseppe Morello, Achrène Dyrek, Quentin Changeat*
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