ExoPlanet News
An Electronic Newsletter

No. 152, 8 February 2022

Editors: D. Angerhausen, L. Mishra, H. Capelo & J. Venturini
NCCR PlanetS, Gesellschaftsstrasse 6, CH-3012 Bern, Switzerland

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

Contents

1 Editorial

Dear readers,

Welcome to the February 2022 edition of the ExoPlanet News!

In this issue you will find abstracts of scientific papers, job advertisements, announcements, the latest exoplanet talks, updates from the Exoplanet archive, and an overview of exoplanet-related articles on astro-ph.

We remind you of some **guidelines for using our templates**. If you follow these guidelines, you will make our job easier:

- Please rename the *.tex* file you send from *abstract_template* to something with your last name, like *jobs_smith* or *announcement_miller*
- Avoid using hyperlinks, the newsletter template cannot yet handle the package *hyperref*.
- Do not use any defined command, additional packages or separate bibliographies.
- Abstract: should occupy maximum one page of the pdf without figure. If the list of authors is too large for this, please cut the list of authors, add "et al." followed by "(a complete list of authors can be found on the publication)".
- Figure: attach it to the e-mail without large white margins. It should be one single pdf file per abstract.
- Prior to submission, please remember to comment the three lines which start the tex document and the last line which ends the document.
- Please remember to fill the brackets {} after the title with author names.

For the next month we look forward to your paper abstracts, job ads or meeting announcements. Also special announcements are welcome. As always, we would also be happy to receive feedback concerning the newsletter. The Latex template for submitting contributions, as well as all previous editions of ExoPlanet News, can be found on the ExoPlanet News webpage (http://nccr-planets.ch/exoplanetnews/).

The next issue will appear on March 8, 2022.

Daniel Angerhausen
Lokesh Mishra
Holly Capelo
Julia Venturini

2 Abstracts of refereed papers

A rich population of free-floating planets in the Upper Scorpius young stellar association

N. Miret-Roig[1,2] *& H. Bouy*[1] *& S. N. Raymond*[1] *& M. Tamura*[3,4] *& E. Bertin*[5,6] *& D. Barrado*[7] *& J. Olivares*[1] *& P. A. B. Galli*[1] *& J-C. Cuillandre*[8] *& L. M. Sarro*[9] *& A. Berihuete*[10] *& N. Huélamo*[7]

[1] Laboratoire d'Astrophysique de Bordeaux, Univ. Bordeaux, CNRS, B18N, allée Geoffroy Saint-Hilaire, 33615 Pessac, France
[2] University of Vienna, Department of Astrophysics, Türkenschanzstraße 17, 1180 Wien, Austria
[3] Department of Astronomy, Graduate School of Science, The University of Tokyo, Tokyo, Japan
[4] Astrobiology Center, National Institutes of Natural Sciences, Tokyo, Japan
[5] CNRS, UMR 7095, Institut d'Astrophysique de Paris, F-75014 Paris, France
[6] Sorbonne Université, Institut d'Astrophysique de Paris, F-75014 Paris, France
[7] Centro de Astrobiología (CSIC-INTA), Depto. de Astrofísica, ESAC Campus, Camino Bajo del Castillo s/n, 28692, Villanueva de la Cañada, Madrid, Spain
[8] AIM, CEA, CNRS, Université Paris-Saclay, Université de Paris, F-91191 Gif-sur-Yvette, France
[9] Depto. de Inteligencia Artificial, UNED, Juan del Rosal 16, 28040 Madrid, Spain
[10] Depto. Estadística e Investigación Operativa, Universidad de Cádiz, Avda. República Saharaui s/n, 11510 Puerto Real, Cádiz, Spain

Nature Astronomy, published (2021NatAs.tmp..248M)

Free-floating planets are planetary-mass objects that are not bound to host stars. First discovered in the 1990s, their nature and origin are still largely unconstrained because of a lack of large homogeneous samples enabling a statistical analysis of their properties. To date, most free-floating planets have been discovered using indirect methods; micro-lensing surveys have proven particularly successful to detect these objects down to a few Earth masses [1,2]. However, the ephemeral nature of micro-lensing events prevents any follow-up observations and individual characterisation. Several studies have identified free-floating planets in young stellar clusters [3,4] and the Galactic field [5] but their samples are small or heterogeneous in age and origin. Here we report the discovery of between 70 and 170 free-floating planets (depending on the assumed age) in the region encompassing Upper Scorpius and Ophiuchus, the closest young OB association to the Sun. It is the largest homogeneous sample of nearly coeval free-floating planet discovered to date. We found an excess of free-floating planet by a factor of up to seven compared to core-collapse models predictions [6,7,8], demonstrating that other formation mechanisms may be at work. We estimate that ejection from planetary systems might have a contribution comparable to that of core-collapse in the formation of free-floating planet. Therefore, ejections due to dynamical instabilities in giant exoplanet systems must be frequent within the first 10 Myr of a system's life.

Download/Website: `https://www.nature.com/articles/s41550-021-01513-x`

Contact: `nuria.miret.roig@univie.ac.at`

References [1] Mróz, P. et al. A Terrestrial-mass Rogue Planet Candidate Detected in the Shortest-timescale Microlensing Event. *Astrophysical Journal Letters* 903, L11 (2020). [2] Ryu, Y.-H. et al. KMT-2017-BLG-2820 and the Nature of the Free-floating Planet Population. *The Astronomical Journal* 161, 126 (2021). [3] Scholz, A. et al. Substellar Objects in Nearby Young Clusters (SONYC). VI. The Planetary-mass Domain of NGC 1333. *The Astronomical Journal* 756, 24 (2012). [4] Peña Ramírez, K., Béjar, V. J. S., Zapatero Osorio, M. R., Petr-Gotzens, M. G. & Martín, E. L. New Isolated Planetary-mass Objects and the Stellar and Substellar Mass Function of the σ Orioni Cluster. *The Astronomical Journal* 754, 30 (2012). [5] Mróz, P. et al. No large population of unbound or wide-orbit Jupiter-mass planets. *Nature* 548, 183-186 (2017). [6] Chabrier, G. The Initial Mass Function: From Salpeter 1955 to 2005. In Corbelli, E., Palla, F. & Zinnecker, H. (eds.) *The Initial Mass Function 50 Years Later*, vol. 327 of *Astrophysics and Space Science Library*, 41 (2005). [7] Haugbølle, T., Padoan, P. & Nordlund,Å. The Stellar IMF from Isothermal MHD Turbulence. *The Astrophysical Journal* 854, 35 (2018). [8] Bate, M. R. The statistical properties of stars and their dependence on metallicity. *Monthly Notices of the Royal Astronomical Society* 484, 2341–2361 (2019). [9] Baraffe, I., Homeier, D., Allard, F. & Chabrier, G. New evolutionary models for pre-main sequence and main sequence low-mass stars down to the hydrogen-burning limit. *Astron. Astrophys.* 577, A42 (2015).

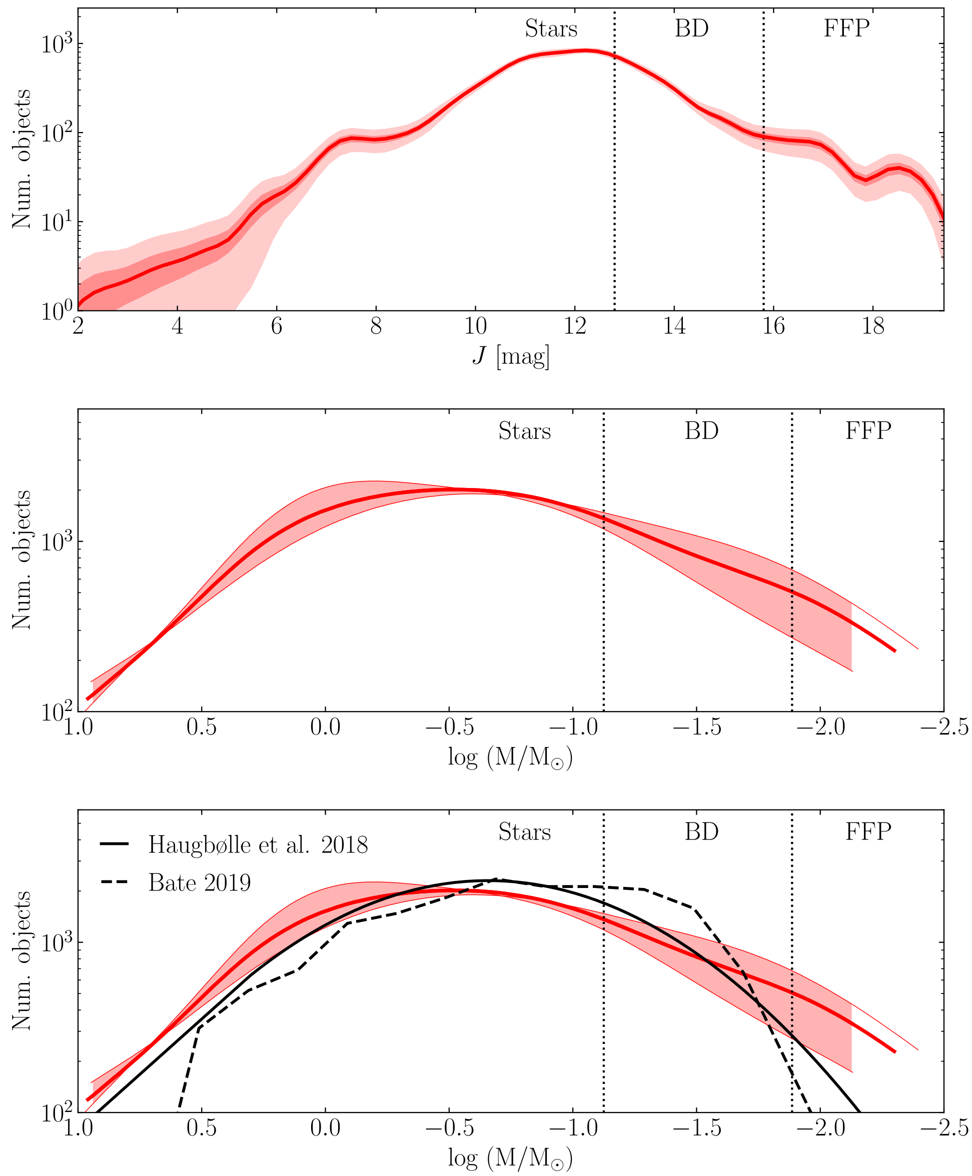

Figure 1: J apparent magnitude distribution (top) and mass function (middle and bottom) of the members of Upper Scorpius and Ophiuchus. The shaded regions indicate the 1 and 3σ uncertainties from a bootstrap (top) and the dispersion due to the age (3–10 Myr, middle and bottom). The mass functions from simulations [7,8] are overplotted on our observational mass function (bottom). All the functions are normalised in the mass range 0.004–10 $M_\odot$. The hydrogen (75 M_{Jup}) and deuterium (13 M_{Jup}) burning limits are indicated by the vertical dotted lines according to the BHAC15 evolutionary models [9] and assuming an age of 5 Myr.

A revised lower estimate of ozone columns during Earth's oxygenated history

G. J. Cooke[1], D. R. Marsh[1,2], C. Walsh[1], B. Black[3,4], J.-F. Lamarque[2]

[1] School of Physics and Astronomy, University of Leeds, Leeds LS2 9JT, UK
[2] National Center for Atmospheric Research, Boulder, CO 80301, USA
[3] Dept of Earth and Planetary Sciences, Rutgers University, Piscataway, NJ
[4] Dept of Earth and Atmospheric Sciences, CUNY City College, New York, NY

Royal Society Open Science, published (2021arXiv210211675C)

The history of molecular oxygen (O_2) in Earth's atmosphere is still debated; however, geological evidence supports at least two major episodes where O_2 increased by an order of magnitude or more: the Great Oxidation Event (GOE) and the Neoproterozoic Oxidation Event. O_2 concentrations have likely fluctuated (between 10^{-3} and 1.5 times the present atmospheric level) since the GOE ~ 2.4 Gyr ago, resulting in a time-varying ozone (O_3) layer. Using a three-dimensional (3D) chemistry-climate model, we simulate changes in O_3 in Earth's atmosphere since the GOE and consider the implications for surface habitability, and glaciation during the Mesoproterozoic. We find lower O_3 columns (reduced by up to 4.68 times for a given O_2 level) compared to previous work; hence, higher fluxes of biologically harmful UV radiation would have reached the surface. Reduced O_3 leads to enhanced tropospheric production of the hydroxyl radical (OH) which then substantially reduces the lifetime of methane (CH_4). We show that a CH_4 supported greenhouse effect during the Mesoproterozoic is highly unlikely. The reduced O_3 columns we simulate have important implications for astrobiological and terrestrial habitability, demonstrating the relevance of 3D chemistry-climate simulations when assessing paleoclimates and the habitability of faraway worlds.

Download/Website: `https://doi.org/10.1098/rsos.211165`

Contact: `pygjc@leeds.ac.uk`

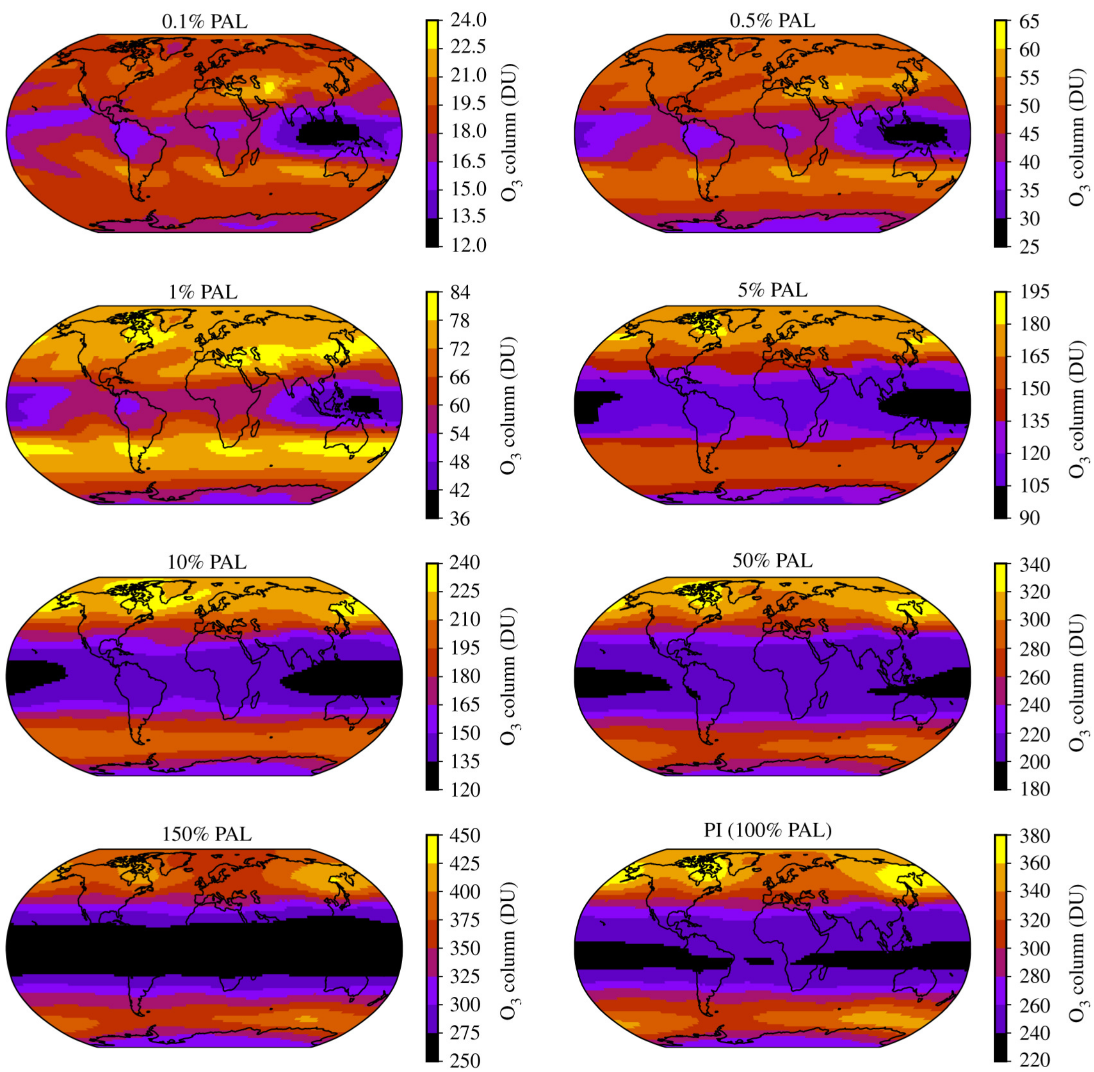

Figure 2: The O_3 column is plotted (superimposed on Earth's surface) in Dobson Units (DU) for the pre-industrial atmosphere and all the atmospheres where only oxygen concentrations were changed (0.1 - 150 percent the present atmospheric level). Note the different scales on the colourbars. The tropics straddle either side of the equator, with the poles at the top and bottom of the two-dimensional maps, and the extratropics at intermediate latitudes.

A model Earth-sized planet in the habitable zone of α Centauri A/B

H. S. Wang[1,2], C. H. Lineweaver[3,4], S. P. Quanz[1,2], S. J. Mojzsis[5,6,7], T. R. Ireland[8,4], P. A. Sossi[9], F. Seidler[1], T. Morel[10]

[1] ETH Zürich, Institute for Particle Physics and Astrophysics, Wolfgang-Pauli-Strasse 27, CH-8093 Zürich, Switzerland
[2] National Center for Competence in Research PlanetS (www.nccr-planets.ch)
[3] Research School of Astronomy and Astrophysics, Australian National University, Canberra, ACT 2611, Australia
[4] Research School of Earth Sciences, Australian National University, Canberra, ACT 2601, Australia
[5] Origins Research Institute, Research Centre for Astronomy and Earth Sciences, Konkoly Thege Miklós út 15-17, H- 1121 Budapest, Hungary.
[6] Department of Lithospheric Research, University of Vienna, UZA 2, Althanstraße 14, A-1090 Vienna, Austria.
[7] Department of Geological Sciences, University of Colorado, 2200 Colorado Avenue, Boulder, CO 80309-0399, USA.
[8] School of Earth and Environmental Sciences, University of Queensland, St Lucia QLD 4072, Australia
[9] ETH Zürich, Institute of Geochemistry and Petrology, Sonneggstrasse 5, CH-8092 Zürich, Switzerland.
[10] Space sciences, Technologies and Astrophysics Research (STAR) Institute, Université de Liège, Quartier Agora, Allée du 6 Août 19c, Bât. B5C, 4000 Liège, Belgium.

The Astrophysical Journal, in press (arXiv:2110.12565)

The bulk chemical composition and interior structure of rocky exoplanets are of fundamental importance to understanding their long-term evolution and potential habitability. Observations of the chemical compositions of the solar system rocky bodies and of other planetary systems have increasingly shown a concordant picture that the chemical composition of rocky planets reflects that of their host stars for refractory elements, whereas this expression breaks down for volatiles. This behavior is explained by devolatilization during planetary formation and early evolution. Here, we apply a devolatilization model calibrated with solar system bodies to the chemical composition of our nearest Sun-like stars – α Centauri A and B – to estimate the bulk composition of any habitable-zone rocky planet in this binary system ("α-Cen-Earth"). Through further modeling of likely planetary interiors and early atmospheres, we find that compared to Earth, such a planet is expected to have (i) a reduced (primitive) mantle that is similarly dominated by silicates albeit enriched in carbon-bearing species (graphite/diamond); (ii) a slightly larger iron core, with a core mass fraction of $38.4^{+4.7}_{-5.1}$ wt% (cf. Earth's 32.5 $\pm$ 0.3 wt%); (iii) an equivalent water-storage capacity; and (iv) a CO_2-CH_4-H_2O-dominated early atmosphere that resembles that of Archean Earth. Further taking into account its $\sim$ 25% lower intrinsic radiogenic heating from long-lived radionuclides, an ancient α-Cen-Earth ($\sim$ 1.5-2.5 Gyr older than Earth) is expected to have less efficient mantle convection and planetary resurfacing, with a potentially prolonged history of stagnant-lid regimes.

Download/Website: `https://arxiv.org/abs/2110.12565`

Contact: `haiwang@phys.ethz.ch`

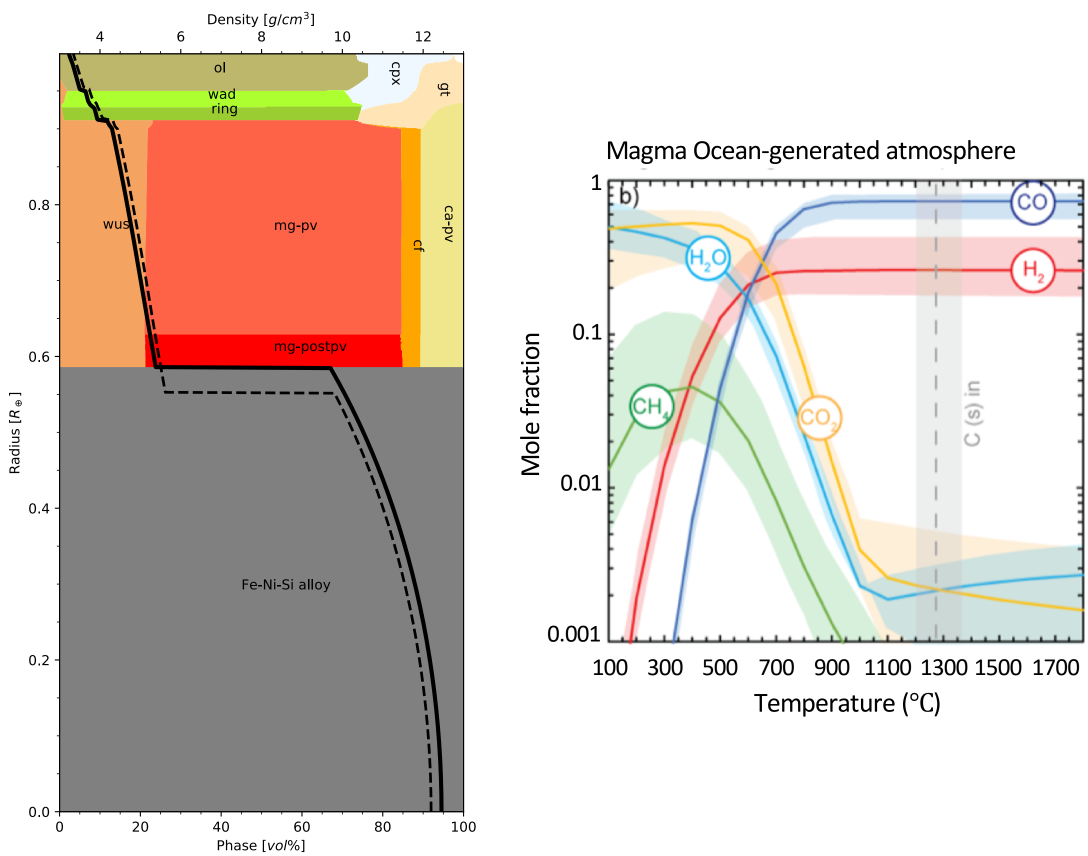

Figure 3: The modeled mantle mineralogy and interior structure (left) and magma-ocean-generated atmosphere (right) of a model α-Cen-Earth.

LRG-BEASTS: Sodium absorption and Rayleigh scattering in the atmosphere of WASP-94A b using NTT/EFOSC2

E. Ahrer[1,2], *P. J. Wheatley*[1,2], *J. Kirk*[3], *S. Gandhi*[4,1,2], *G. W. King*[5,1,2]

[1] Centre for Exoplanets and Habitability, University of Warwick, Gibbet Hill Road, CV4 7AL Coventry, UK
[2] Department of Physics, University of Warwick, Gibbet Hill Road, CV4 7AL Coventry, UK
[3] Center for Astrophysics — Harvard & Smithsonian, 60 Garden Street, Cambridge, MA 02138, USA
[4] Leiden Observatory, Leiden University, Postbus 9513, 2300 RA Leiden, The Netherlands
[5] Department of Astronomy, University of Michigan, Ann Arbor, MI 48109, USA

Monthly Notices of the Royal Astronomical Society, published (2022MNRAS.510.4857A)

We present an optical transmission spectrum for WASP-94A b, the first atmospheric characterisation of this highly-inflated hot Jupiter. The planet has a reported radius of $1.72^{+0.06}_{-0.05}$ R_{Jup}, a mass of only $0.456^{+0.032}_{-0.036}$ M_{Jup}, and an equilibrium temperature of 1508 ± 75 K. We observed the planet transit spectroscopically with the EFOSC2 instrument on the ESO New Technology Telescope (NTT) at La Silla, Chile: the first use of NTT/EFOSC2 for transmission spectroscopy. We achieved an average transit-depth precision of 128 ppm for bin widths of ~ 200 Å. This high precision was achieved in part by linking Gaussian Process hyperparameters across all wavelength bins. The resulting transmission spectrum, spanning a wavelength range of $3800 - 7140$ Å, exhibits a sodium absorption with a significance of 4.9σ, suggesting a relatively cloud-free atmosphere. The sodium signal may be broadened, with a best fitting width of 78^{+67}_{-32} Å in contrast to the instrumental resolution of 27.2 ± 0.2 Å. We also detect a steep slope in the blue end of the transmission spectrum, indicating the presence of Rayleigh scattering in the atmosphere of WASP-94A b. Retrieval models show evidence for the observed slope to be super-Rayleigh and potential causes are discussed. Finally, we find narrow absorption cores in the CaII H&K lines of WASP-94A, suggesting the star is enshrouded in gas escaping the hot Jupiter.

Download/Website: `https://academic.oup.com/mnras/article/510/4/4857/6499304`

Contact: `eva-maria.ahrer@warwick.ac.uk`

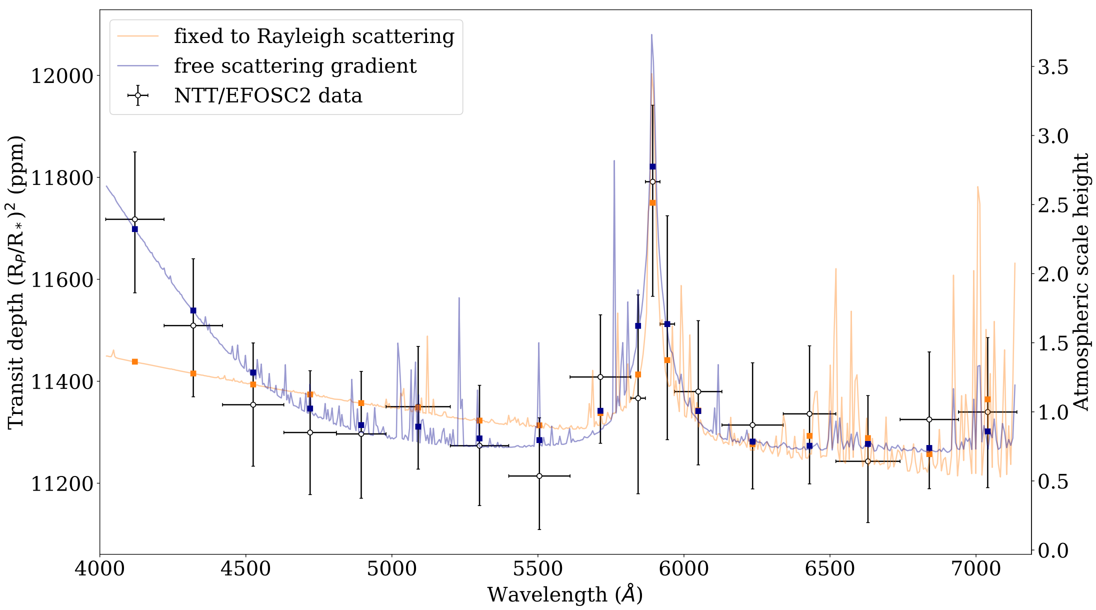

Figure 4: Obtained transmission spectrum for WASP-94A b using our GP simultaneous detrending method (black), revealing a sodium feature (5893 Å) and a scattering slope towards the blue end of the wavelength range. Two PLATON retrieval models are displayed, one where the scattering gradient is fixed to Rayleigh scattering (orange) and one where the gradient of the scattering slope is a free parameter (blue). Note that based on the Bayesian evidence, neither of the models is significantly preferred over the other.

Planet populations inferred from debris discs: insights from 178 debris systems in the ISPY, LEECH, and LIStEN planet-hunting surveys

T. D. Pearce[1], *R. Launhardt*[2], *R. Ostermann*[1], *G. M. Kennedy*[3,4], *M. Gennaro*[5], *M. Booth*[1], *A. V. Krivov*[1], *G. Cugno*[6], *T. K. Henning*[2], *A. Quirrenbach*[7], *A. Musso Barcucci*[2], *E. C. Matthews*[8], *H. L. Ruh*[7,9], *J. M. Stone*[10]

[1] Astrophysikalisches Institut und Universitätssternwarte, Friedrich-Schiller-Universität Jena, Schillergäßchen 2-3, D-07745 Jena, Germany
[2] Max Planck Institut für Astronomie, Königstuhl 17, 69117 Heidelberg, Germany
[3] Department of Physics, University of Warwick, Gibbet Hill Road, Coventry CV4 7AL, UK
[4] Centre for Exoplanets and Habitability, University of Warwick, Gibbet Hill Road, Coventry CV4 7AL, UK
[5] Space Telescope Science Institute, 3700 San Martin Drive Baltimore, MD 21218, USA
[6] ETH Zurich, Institute for Particle Physics and Astrophysics, Wolfgang-Pauli-Strasse 27, 8093 Zurich, Switzerland
[7] Landessternwarte, Zentrum für Astronomie der Universität Heidelberg, Königstuhl 12, D-69117 Heidelberg, Germany
[8] Observatoire de l'Université de Genève, Chemin Pegasi 51, 1290 Versoix, Switzerland
[9] Institut für Astrophysik, Friedrich-Hund Platz 1, D-37077 Göttingen, Germany
[10] Naval Research Laboratory, Remote Sensing Division, 4555 Overlook Ave. SW, Washington, DS, USA

Astronomy & Astrophysics, in press (arXiv:2201.08369)

We know little about the outermost exoplanets in planetary systems because our detection methods are insensitive to moderate-mass planets on wide orbits. However, debris discs can probe the outer-planet population because dynamical modelling of observed discs can reveal properties of perturbing planets. We use four sculpting and stirring arguments to infer planet properties in 178 debris-disc systems from the ISPY, LEECH, and LIStEN planet-hunting surveys. Similar analyses are often conducted for individual discs, but we consider a large sample in a consistent manner. We aim to predict the population of wide-separation planets, gain insight into the formation and evolution histories of planetary systems, and determine the feasibility of detecting these planets in the near future. We show that a 'typical' cold debris disc likely requires a Neptune- to Saturn-mass planet at $10 - 100$ au, with some needing Jupiter-mass perturbers. Our predicted planets are currently undetectable, but modest detection-limit improvements (e.g. from *JWST*) should reveal many such perturbers. We find that planets thought to be perturbing debris discs at late times are similar to those inferred to be forming in protoplanetary discs, so these could be the same population if newly formed planets do not migrate as far as currently thought. Alternatively, young planets could rapidly sculpt debris before migrating inwards, meaning that the responsible planets are more massive (and located farther inwards) than debris-disc studies assume. We combine self-stirring and size-distribution modelling to show that many debris discs cannot be self-stirred without having unreasonably high masses; planet- or companion-stirring may therefore be the dominant mechanism in many (perhaps all) debris discs. Finally, we provide catalogues of planet predictions and identify promising targets for future planet searches.

Download/Website: `https://ui.adsabs.harvard.edu/abs/2022arXiv220108369P/abstract`

Contact: `timothy.pearce@uni-jena.de`

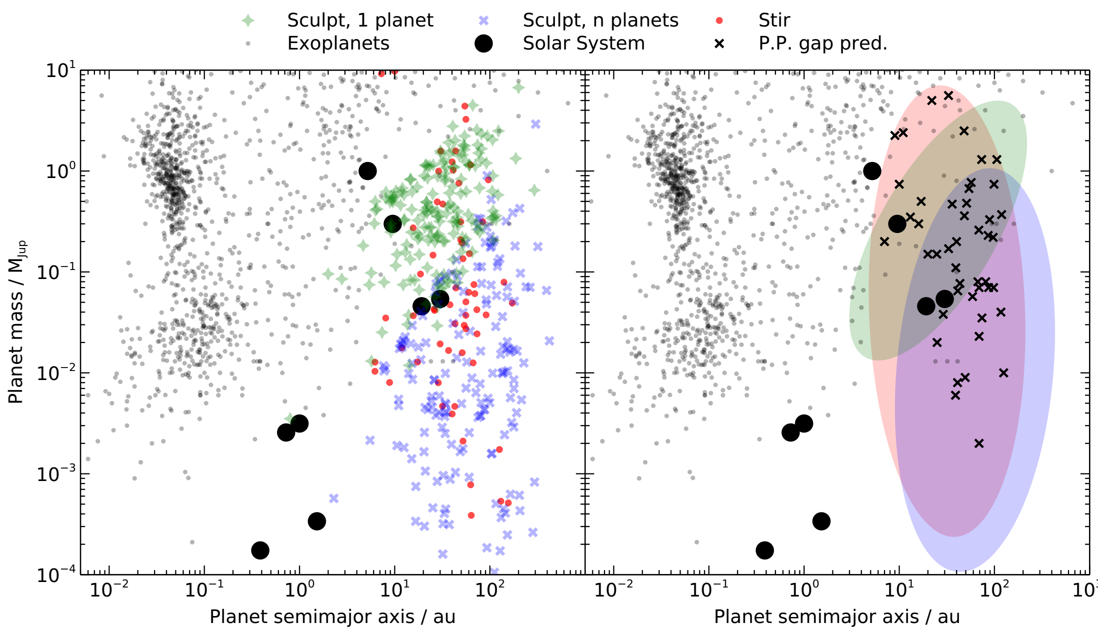

Figure 5: Planets predicted from our debris analyses, compared to known planets and those inferred to be forming in protoplanetary discs. Small black circles are known exoplanets from Exoplanet.eu, and large circles are Solar System planets. The left plot shows the planetary populations inferred from our debris analyses; green diamonds and blue crosses are the planets required to sculpt discs if sculpting is performed by one or multiple planets, respectively. Red circles are planets required to stir the discs. The plot shows that debris disc morphologies imply planetary populations that are poorly explored with current instruments, so the hypotheses that planets sculpt and stir debris discs are consistent with the lack of planet detections in these systems. Right plot: Comparison of our planets inferred from debris discs to those inferred to be forming in protoplanetary discs (black crosses; Lodato et al. 2019). To make the plot clearer, we have replaced our individual planet predictions with rough areas representing the three populations. Our planetary population inferred from debris discs well matches the population inferred to be forming in protoplanetary discs; if the forming planets remain *in situ*, then they could later join the population responsible for sculpting and stirring known debris discs. Alternatively, it is possible that the forming planets rapidly sculpt debris discs before migrating inwards. Uncertainties are omitted for clarity.

The impact of faculae on the radius determination of exoplanets: The case of the M-star GJ 1214.

E.W. Guenther[1]

[1] Thüringer Landessternwarte Tautenburg, Sternwarte 5, 07778 Tautenburg, Germany

Monthly Notices of the Royal Astronomical Society, in press (arXiv:2201.04413)

Precise measurements of exoplanets radii are of key importance for our understanding of the origin and nature of these objects. Measurement of the planet radii using the transit method have reached a precision that the effects of stellar surface features have to be taken into account. While the effects from spots have already been studied in detail, our knowledge of the effects caused by faculae is still limited. This is particularly the case for M-stars. Faculae can pose a problem if they are inhomogeneously distributed on the stellar surface. Using the eclipse mapping method, we study the distribution of the faculae on the surface of GJ 1214 using the Ca II H&K lines as tracers. In order to assess the homogeneity of the distribution in a quantitative way, we introduce the inhomogeneity factor IHF. IHF is 0% if the distribution is homogeneous, positive, if the plage regions are preferentially located along the path of the planet, and negative, if they are preferentially located outside the path of the planet. For GJ 1214, we derive a rather small value of IHF $= 7.7^{+12.0}_{-7.7}$%. We discuss the relevance of this result in the context of the PLATO and ARIEL missions.

Download/Website: `http://arxiv.org/abs/2201.04413`

Contact: `guenther@tls-tautenburg.de`

The similarity of multi-planet systems

J.F. Otegi[1,2], *R. Helled*[1], *F. Bouchy*[2]

[1] Observatoire Astronomique de l'Université de Genève, 51 Ch. des Maillettes, – Sauverny – 1290 Versoix, Switzerland
[2] Institute for Computational Science, University of Zurich, Winterthurerstr. 190, CH-8057 Zurich, Switzerland

Astronomy & Astrophysics, published (arXiv:2112.07413)

Previous studies using Kepler data suggest that planets orbiting the same star tend to have similar sizes. However, due to the faintness of the stars, only a few of the planets were also detected with radial velocity follow-ups, and therefore the planetary masses were mostly unknown. It is therefore yet to be determined whether planetary systems indeed behave like "peas in a pod". Follow-up programs of TESS targets significantly increased the number of confirmed planets with mass measurements, allowing for a more detailed statistical analysis of multi-planet systems. In this work we explore the similarity in radii, masses, densities, and period ratios of planets within planetary systems. We show that planets in the same system that are similar in radii could be rather different in mass and vice versa, and that typically the planetary radii of a given planetary system are more similar than the masses. We also find a transition in the peas in a pod pattern for planets more massive than $\sim 100\ M_\oplus$ and larger than $\sim 10\ R_\oplus$. Planets below these limits are found to be significantly more uniform. We conclude that other quantities, such as density, may be crucial to fully understanding the nature of planetary systems and that, due to the diversity of planets within a planetary system, increasing the number of detected systems is crucial for understanding the exoplanetary demographics.

Download/Website: `https://arxiv.org/pdf/2112.07413.pdf`

Contact: `jonfr17@gmail.com`

Let the Great World Spin: Revealing the Stormy, Turbulent Nature of Young Giant Exoplanet Analogs with the Spitzer Space Telescope

Johanna M. Vos[1], *Jacqueline K. Faherty*[1], *Jonathan Gagné*[2,3], *Mark Marley*[4], *Stanimir Metchev*[5], *John Gizis*[6], *Emily L. Rice*[1,7], *Kelle Cruz*[1,8,9]

[1] Department of Astrophysics, American Museum of Natural History, Central Park West at 79th Street, NY 10024, USA
[2] Planétarium Rio Tinto Alcan, Espace pour la Vie, 4801 av. Pierre-de Coubertin, Montréal, Québec, Canada
[3] Institute for Research on Exoplanets, Université de Montréal, 2900 Boulevard Édouard-Montpetit Montréal, QC Canada H3T 1J4
[4] University of Arizona Department of Planetary Sciences and Lunar and Planetary Laboratory
[5] Department of Physics & Astronomy and Centre for Planetary Science and Exploration, The University of Western Ontario, London, Ontario N6A 3K7, Canada
[6] Department of Physics and Astronomy, University of Delaware, Newark, DE 19716, USA
[7] Macaulay Honors College, City University of New York, 35 W. 67th Street, New York, NY 10023, USA
[8] Department of Physics and Astronomy, Hunter College, City University of New York, 695 Park Avenue, New York, NY 10065, USA
[9] Flatiron Institute, 162 Fifth Avenue, New York, NY 10010, USA

The Astrophysical Journal, published (2022ApJ...924...68V)

We present a survey for photometric variability in young, low-mass brown dwarfs with the Spitzer Space Telescope. The 23 objects in our sample show robust signatures of youth and share properties with directly-imaged exoplanets. We present three new young objects: 2MASS J03492367+0635078, 2MASS J09512690 −8023553 and 2MASS J07180871−6415310. We detect variability in 13 young objects, and find that young brown dwarfs are highly likely to display variability across the L2–T4 spectral type range. In contrast, the field dwarf variability occurrence rate drops for spectral types >L9. We examine the variability amplitudes of young objects and find an enhancement in maximum amplitudes compared to field dwarfs. We speculate that the observed range of amplitudes within a spectral type may be influenced by secondary effects such as viewing inclination and/or rotation period. We combine our new rotation periods with the literature to investigate the effects of mass on angular momentum evolution. While high mass brown dwarfs ($> 30M_{\rm Jup}$) spin up over time, the same trend is not apparent for lower mass objects ($< 30M_{\rm Jup}$), likely due to the small number of measured periods for old, low-mass objects. The rotation periods of companion brown dwarfs and planetary-mass objects are consistent with those of isolated objects with similar ages and masses, suggesting similar angular momentum histories. Within the AB Doradus group, we find a high variability occurrence rate and evidence for common angular momentum evolution. The results are encouraging for future variability searches in directly-imaged exoplanets with facilities such as the James Webb Space Telescope and 30-meter telescopes.

Download/Website: `https://ui.adsabs.harvard.edu/abs/2022ApJ...924...68V/abstract`

Contact: `jvos@amnh.org`

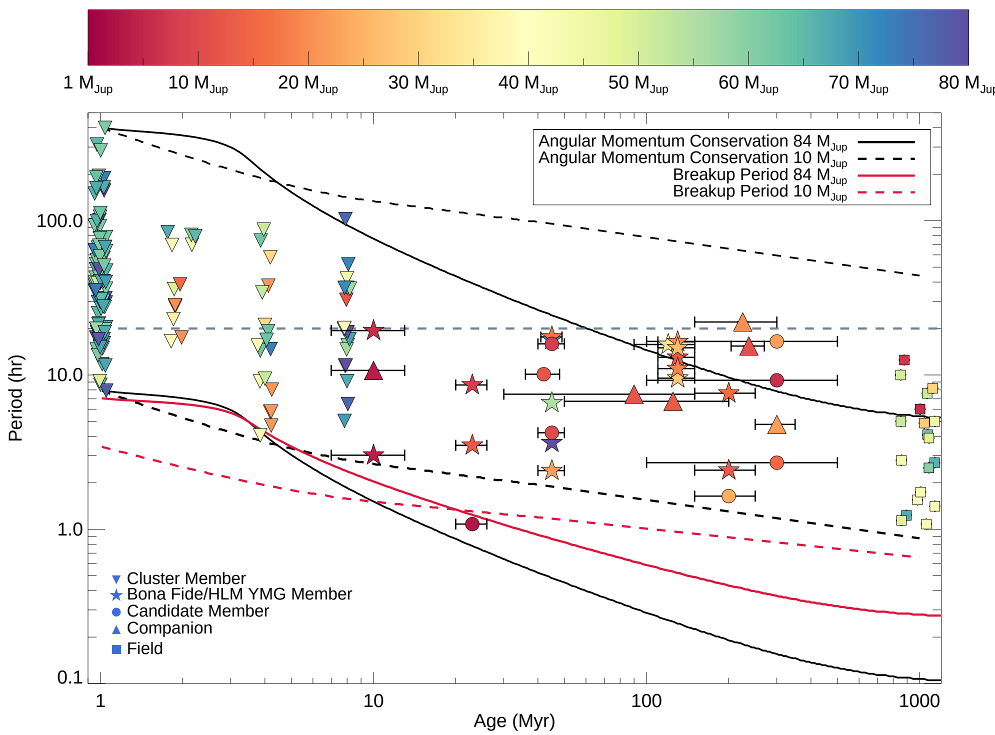

Figure 6: Brown dwarf rotation period as a function of age and color-coded by mass. Stars show bona-fide and high-likelihood members of young moving groups, circles show candidate members of young moving groups, squares show field brown dwarfs, which are plotted at 1 Gyr. Upside-down triangles are brown dwarf cluster members. Triangles show substellar companions with measured rotation rates. The 20 hr observation duration typically used by brown dwarf Spitzer variability studies is shown by the dashed line. While the higher mass brown dwarfs ($>$ $30\ M_{\rm Jup}$) can be seen to spin up with age, this behavior is not observed in the low mass sample ($< 30\ M_{\rm Jup}$), most likely because most low-mass objects lie in the intermediate age range. Companion brown dwarfs and planetary-mass objects at $10 - 500$ Myr have rotation periods consistent with those of isolated objects with similar masses, indicating that they likely have similar formation pathways and subsequent angular momentum evolution histories.

BEBOP II. Sensitivity to sub-Saturn circumbinary planets using radial-velocities

M.R Standing[1], *A.HMJ Triaud*[1], *J.P Faria*[2], *D.V Martin*[3], *et 13 al.*

[1] School of Physics & Astronomy, University of Birmingham, Edgbaston, Birmingham, B15 2TT, UK
[2] Depto. de Física e Astronomia, Faculdade de Ciências, Universidade do Porto, Rua do Campo Alegre, 4169-007 Porto, Portugal
[3] Department of Astronomy, The Ohio State University, 4055 McPherson Laboratory, Columbus, OH 43210, USA

Monthly Notices of Royal Astronomical Society, in press (2022MNRAS.tmp..155S/arXiv:2112.05652)

BEBOP is a radial-velocity survey that monitors a sample of single-lined eclipsing binaries, in search of circumbinary planets by using high-resolution spectrographs. Here, we describe and test the methods we use to identify planetary signals within the BEBOP data, and establish how we quantify our sensitivity to circumbinary planets by producing detection limits. This process is made easier and more robust by using a diffusive nested sampler. In the process of testing our methods, we notice that contrary to popular wisdom, assuming circular orbits in calculating detection limits for a radial velocity survey provides over-optimistic detection limits by up to 40% in semi-amplitude with implications for all radial-velocity surveys. We perform example analyses using three BEBOP targets from our Southern HARPS survey. We demonstrate for the first time a repeated ability to reach a residual root mean squared scatter of $3m\,s^{-1}$ (after removing the binary signal), and find we are sensitive to circumbinary planets with masses down to that of Neptune and Saturn, for orbital periods up to 1000 days.

Download/Website: `https://arxiv.org/abs/2112.05652`

Contact: `MXS1263@student.bham.ac.uk`

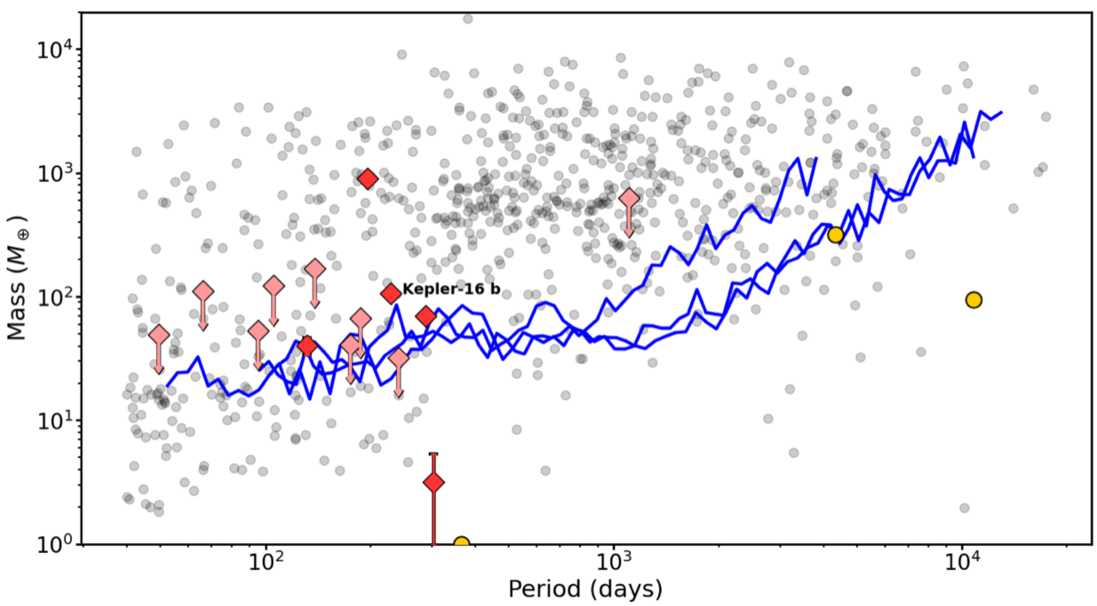

Figure 7: Mass vs period plot showing the three detection limits from this work as blue lines in comparison to confirmed exoplanets as grey circles, and transiting circumbinary planets as pink diamonds. Solar System planets are depicted as yellow dots for reference. Circumbinary planets in order of increasing period; Kepler-47 b, Kepler-413 b, TOI-1338 b, Kepler-38 b, Kepler-35 b, Kepler-64 b, Kepler-1661 b, Kepler-47 d, TIC-1729 b, Kepler-16 b, Kepler-453 b, Kepler-34 b, Kepler-47 c, Kepler-1647 b. Arrows illustrate planets with upper mass limits with the symbol placed to give a 2 sigma upper limit.

BEBOP III. Observations and an independent mass measurement of Kepler-16 (AB) b - the first circumbinary planet detected with radial velocities

A.HMJ Triaud[1], M.R Standing[1], N. Heidari[2], D.V Martin[3], I. Boisse[2], A. Santerne[2], A.CM Correia[4] and 26 al.

[1] School of Physics & Astronomy, University of Birmingham, Edgbaston, Birmingham, B15 2TT, UK
[2] Aix Marseille Univ, CNRS, CNES, LAM, Marseille, France
[3] Department of Astronomy, The Ohio State University, 4055 McPherson Laboratory, Columbus, OH 43210, USA
[4] CFisUC, Departamento de Física, Universidade de Coimbra, 3004-516 Coimbra, Portugal

Monthly Notices of Royal Astronomical Society, in press (2022MNRAS.tmp..156T/arXiv:2112.06584)

The radial velocity method is amongst the most robust and most established means of detecting exoplanets. Yet, it has so far failed to detect circumbinary planets despite their relatively high occurrence rates.
Here, we report velocimetric measurements of Kepler-16A, obtained with the SOPHIE spectrograph, at the Observatoire de Haute-Provence's 193cm telescope, collected during the BEBOP survey for circumbinary planets. Our measurements mark the first radial velocity detection of a circumbinary planet, independently determining the mass of Kepler-16 (AB) b to be $0.313 \pm 0.039\,\mathrm{M_{Jup}}$, a value in agreement with eclipse timing variations. Our observations demonstrate the capability to achieve photon-noise precision and accuracy on single-lined binaries, with our final precision reaching $1.5\,\mathrm{m\,s^{-1}}$ on the binary and planetary signals. Our analysis paves the way for more circumbinary planet detections using radial velocities which will increase the relatively small sample of currently known systems to statistically relevant numbers, using a method that also provides weaker detection biases. Our data also contain a long-term radial velocity signal, which we associate with the magnetic cycle of the primary star.

Download/Website: `https://arxiv.org/abs/2112.06584`

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

A large population study of protoplanetary disks: Explaining the millimeter size-luminosity relation with or without sub-structure

A. Zormpas[1], *T. Birnstiel*[1,2], *G. P. Rosotti*[3,4],*S. M. Andrews*[5]

[1] University Observatory, Faculty of Physics, Ludwig-Maximilians-Universität München, Scheinerstr. 1, 81679 München, Germany
[2] Exzellenzcluster ORIGINS, Boltzmannstr. 2, D-85748 Garching, Germany
[3] Department of Physics and Astronomy, University of Leicester, University Road, Leicester LE1 7RH, UK
[4] Leiden Observatory, Leiden University, PO Box 9513, NL-2300 RA Leiden, the Netherlands
[5] Center for Astrophysics | Harvard & Smithsonian, 60 Garden Street, Cambridge, MA 02138, USA

Astronomy & Astrophysics, accepted (arXiv:2202.01241)

Recent sub-arcsecond resolution surveys of the dust continuum emission from nearby protoplanetary disks showed a strong correlation between the sizes and luminosities of the disks. We aim to explain the origin of the (sub-)millimeter size-luminosity relation (SLR) between the 68% effective radius ($\mathrm{r_{eff}}$) of disks with their continuum luminosity ($\mathrm{L_{mm}}$), with models of gas and dust evolution in a simple viscous accretion disk and radiative transfer calculations.
We use a large grid of models (10^5 simulations) with and without planetary gaps, varying the initial conditions of the key parameters. We calculate the disk continuum emission and the effective radius for all models as a function of time. By selecting those simulations that continuously follow the SLR, we can derive constraints on the input parameters of the models.
We confirm previous results that models of smooth disks in the radial drift regime are compatible with the observed SLR ($\mathrm{L_{mm}} \propto \mathrm{r_{eff}^2}$) but only smooth disks cannot be the reality. We show that the SLR is more widely populated if planets are present. However they tend to follow a different relation than smooth disks, potentially implying that a mixture of smooth and sub-structured disks are present in the observed sample. We derive a SLR ($\mathrm{L_{mm}} \propto \mathrm{r_{eff}^{5/4}}$) for disks with strong sub-structure. To be compatible with the SLR, models need to have an initially high disk mass ($\geq 2.5 \cdot 10^{-2}\mathrm{M_\star}$) and low turbulence-parameter α values ($\leq 10^{-3}$). Furthermore, we find that the grain composition and porosity drastically affects the evolution of disks on the size-luminosity diagram where relatively compact grains that include amorphous carbon are favored. Moreover, a uniformly optically thick disk with high albedo (0.9) that follows the SLR cannot be formed from an evolutionary procedure.

Download/Website: `https://arxiv.org/pdf/2202.01241.pdf`

Contact: `zormpas@usm.lmu.de`

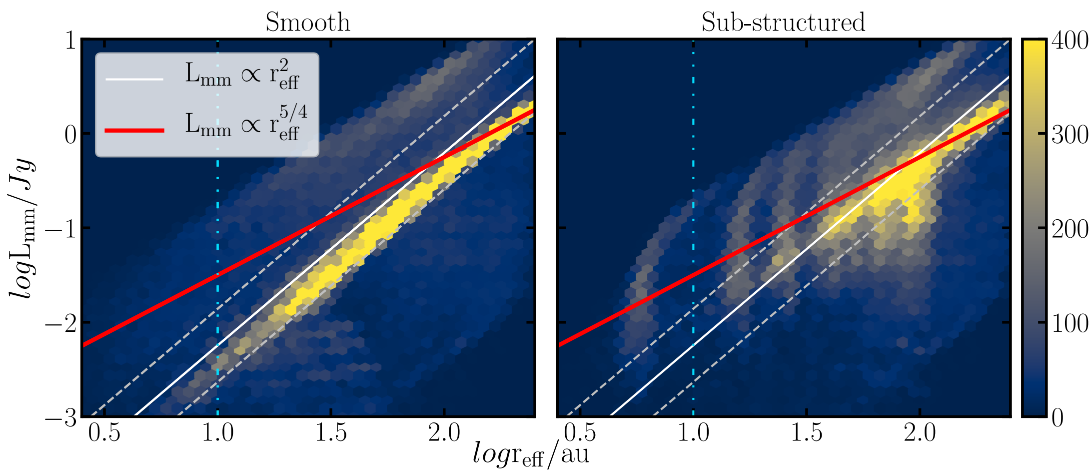

Figure 8: Heat-map for smooth and sub-structured disks. The white line is the observed Size-Luminosity relation (SLR) with 1-σ deviation (dashed line) while the red line is our prediction for sub-structured disks. Smooth disks follow the observed SLR, while disks with sub-structure a flatter relation.

The EXPRES Stellar Signals Project II. State of the Field in Disentangling Photospheric Velocities

L. L. Zhao[1,2], D. A. Fischer[1], E. B. Ford[3,4,5,6], A. Wise[3], M. Cretignier[7] et al. (a complete list of authors can be found on the publication)

[1] Department of Astronomy, Yale University, 52 Hillhouse Ave., New Haven, CT 06511, USA
[2] Center for Computational Astrophysics, Flatiron Institute, Simons Foundation, 162 Fifth Avenue, New York, NY 10010, USA
[3] Department of Astronomy & Astrophysics, 525 Davey Laboratory, The Pennsylvania State University, University Park, PA, 16802, USA
[4] Center for Exoplanets and Habitable Worlds, 525 Davey Laboratory, The Pennsylvania State University, University Park, PA, 16802, USA
[5] Institute for Computational & Data Sciences, The Pennsylvania State University, University Park, PA, 16802, USA
[6] Institute for Advanced Sciences
[7] Astronomy Department of the University of Geneva, 51 Chemin de Pegasi 51, 1290 Versoix, Switzerland

Accepted The Astronomical Journal, published (arXiv:2201.10639)

Measured spectral shifts due to intrinsic stellar variability (e.g., pulsations, granulation) and activity (e.g., spots, plages) are the largest source of error for extreme precision radial velocity (EPRV) exoplanet detection. Several methods are designed to disentangle stellar signals from true center-of-mass shifts due to planets. The EXPRES Stellar Signals Project (ESSP) presents a self-consistent comparison of 22 different methods tested on the same extreme-precision spectroscopic data from EXPRES. Methods derived new activity indicators, constructed models for mapping an indicator to the needed RV correction, or separated out shape- and shift-driven RV components. Since no ground truth is known when using real data, relative method performance is assessed using the total and nightly scatter of returned RVs and agreement between the results of different methods. Nearly all submitted methods return a lower RV RMS than classic linear decorrelation, but no method is yet consistently reducing the RV RMS to sub-meter-per-second levels. There is a concerning lack of agreement between the RVs returned by different methods. These results suggest that continued progress in this field necessitates increased interpretability of methods, high-cadence data to capture stellar signals at all timescales, and continued tests like the ESSP using consistent data sets with more advanced metrics for method performance. Future comparisons should make use of various well-characterized data sets—such as solar data or data with known injected planetary and/or stellar signals—to better understand method performance and whether planetary signals are preserved.

Download/Website: `https://arxiv.org/pdf/2201.10639.pdf`

Contact: `lzhao@flatironinstitute.org`

Warping Away Gravitational Instabilities in Protoplanetary Discs

Sahl Rowther[1,2], Rebecca Nealon[1,2], Farzana Meru[1,2]

[1] Centre for Exoplanets and Habitability, University of Warwick, Coventry CV4 7AL, UK
[2] Department of Physics, University of Warwick, Coventry CV4 7AL, UK

The Astrophysical Journal, Published (arXiv:2110.06227)

We perform 3D SPH simulations of warped, non-coplanar gravitationally unstable discs to show that as the warp propagates through the self-gravitating disc, it heats up the disc rendering it gravitationally stable. Thus losing their spiral structure and appearing completely axisymmetric. In their youth, protoplanetary discs are expected to be massive and self-gravitating, which results in non-axisymmetric spiral structures. However recent observations of young protoplanetary discs with ALMA have revealed that discs with large-scale spiral structure are rarely observed in the midplane. Instead, axisymmetric discs with some also having ring & gap structures are more commonly observed. Our work involving warps, non-coplanar disc structures that are expected to commonly occur in young discs, potentially resolves this discrepancy between observations and theoretical predictions. We demonstrate that they are able to suppress the large-scale spiral structure of self-gravitating protoplanetary discs.

Download/Website: `https://ui.adsabs.harvard.edu/abs/2021arXiv211006227R/abstract`

Contact: `sahl.rowther@warwick.ac.uk`

Figure 9: This figure shows the evolution of a $0.1M_{\odot}$ disc before a warp is introduced to after the warp has dissipated (from left to right). The presence of the warp heats up the disc, suppressing spiral structures due to gravitational instabilities and resulting in an axisymmetric gravitationally stable disc.

Polarization of Rotationally Oblate Self-Luminous Exoplanets with Anisotropic Atmospheres

Aritra Chakrabarty[1,2], *Sujan Sengupta*[1], *Mark S. Marley*[3]

[1] Indian Institute of Astrophysics, Koramangala 2nd Block, Bangalore 560034, India
[2] University of Calcutta, Salt Lake City, JD-2 Kolkata 750098, India
[3] Lunar and Planetary Laboratory, University of Arizona, Tucson, Arizona 85721, USA

The Astrophysical Journal, in press (arXiv:2201.07613)

Young self-luminous giant exoplanets are expected to be oblate in shape owing to the high rotational speeds observed for some objects. Similar to the case of brown dwarfs, the thermal emission from these planets should be polarized by scatterings of molecules and condensate cloud particles, and the rotation-induced asymmetry of the planet's disk would yield to net non-zero detectable polarization. Considering an anisotropic atmosphere, we present here a three-dimensional approach to estimate the disk-averaged polarization that arises due to the oblateness of the planets. We solve the multiple-scattering vector radiative transfer equations at each location on the planetary disk and calculate the local Stokes vectors and then calculate the disk-integrated flux and linear polarization. For a cloud-free atmosphere, the polarization signal is observable only in the visible wavelength region. However, the presence of clouds in the planetary atmospheres leads to a detectable amount of polarization in the infrared wavelength region where the planetary thermal emission peaks. Considering different broad-band filters of the SPHERE-IRDIS instrument of the Very Large Telescope, we present generic models for the polarization at different wavelength bands as a function of their rotation period. We also present polarization models for the Exoplanets β Pic b and ROXs 42B b as two representative cases which can guide future observations. Our insights on the polarization of young giant planets presented here would be useful for the upcoming polarimetric observations of the directly imaged planets.

Download/Website: `https://arxiv.org/abs/2201.07613`

Contact: `aritra@iiap.res.in`

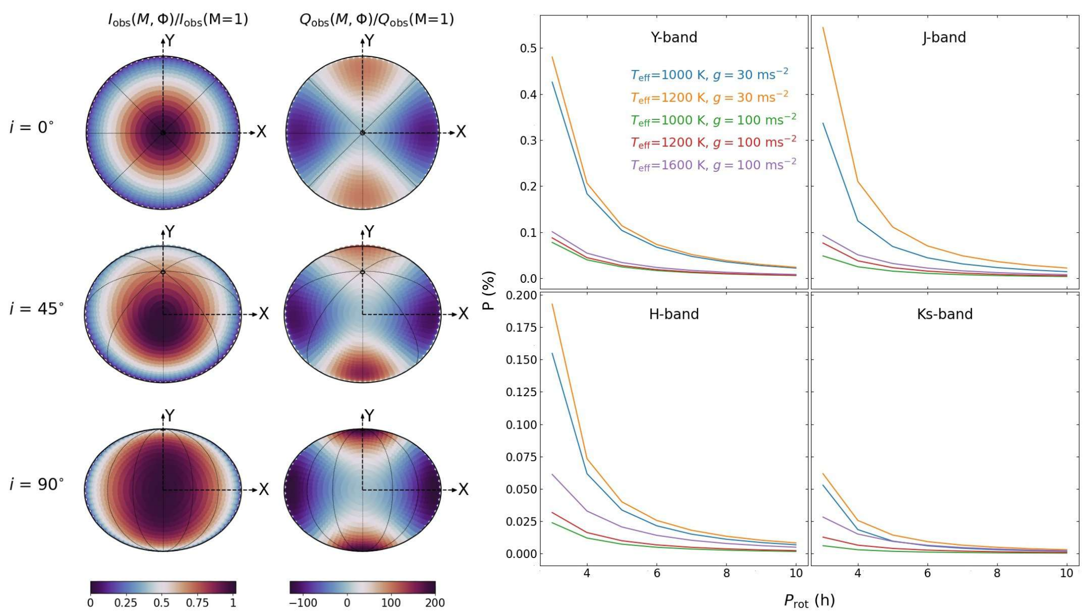

Figure 10: Left- The color maps of total intensity ($I_{\rm obs}$) and the polarized intensity ($Q_{\rm obs}$) over the disk in the direction of the observer normalized with respect to the values at the disk center of a cloudy young oblate self-luminous planet with $T_{\rm eff} = 1000$ K and $g = 30$ ms^{-2}, and rotating with a period of 5h. $I_{\rm obs}$ exhibits limb darkening whereas $Q_{\rm obs}$ exhibits limb brightening. The limb polarization dominates over the polarization from the disk center. At an axial tilt, $i = 90°$, the disk shows maximum asymmetry of $Q_{\rm obs}$ in the azimuth direction causing maximum disk-integrated polarization at $i = 90°$ for a given rotation period. Right- The disk-averaged polarization as a function of rotation period ($P_{\rm rot}$) at different wavelength bands of the SPHERE-IRDIS instrument for an oblate and self-luminous Jupiter-sized planet with different values of $T_{\rm eff}$ and g. The inclination angle of the spin rotation axis is fixed at $i = 90°$.

3 Jobs and Positions

JUNIOR GROUP LEADER (F*M) in Space Instrumentation

at the Space Research Institute, Graz, Austria, deadline: 31 March 2022

The Space Research Institute (IWF) of the Austrian Academy of Sciences (OeAW), Austria's leading non-university research and science institution, is offering a position as Junior Group leader in Space Instrumentation (Job-ID: IWF184JGL121). We invite ambitious candidates who are interested in technology development for new and existing fields of scientific instruments. We strive for a tight collaboration between instrumentation and space science as we understand instrumentation as science enabler

Your profile:

- PhD in engineering or physics/astrophysics
- Experiences in development of space-qualified instrumentation and related engineering disciplines: electrical, electronics, mechanical, software, quality assurance as well as other engineering fields which fit to the scientific activities of the institute
- Proven track record in development of at least one space-borne instrument or in leading subunit development or in being responsible for one of the mentioned engineering fields
- Proven track-record in project and in people management

Your tasks:

- Leading an existing research group with focus on instrument development and development support in direct link with the IWF's research activities
- Management (jointly with senior engineers of the research group) of already existing projects (Router and Data Compression Unit for PLATO and IWF's contribution for SXI aboard SMILE to be finalised; Digital Processing Unit for MANiaC aboard Comet Interceptor and IWF's contribution for the Wide Field Imager aboard ATHENA under preparation)
- Initiation of new developments in accordance with the scientific core activities of IWF
- Technical and financial proposal writing and reporting
- Coordination of all activities to fulfil technical and schedule requirements
- Supervision of group members, incl. PhD students and PostDocs
- Publication activities

The appointment begins as early as September 01, 2022 for initially 4 years with the option for tenure track. More senior applicants can be offered the position of a group leader for an initial duration of 6 years with a tenure-track option. We offer an annual gross salary of 54.661,32 for a junior group leader.
Applications must include a cover letter, their curriculum vitae, list of publications, a statement of the applicant's research experience (2 pages) and a research plan (1 page), certificates for full academic record, and the full contact information for two references letters. Please send the application as one PDF file, to cosima.muck@oeaw.ac.at, mentioning Job ID: IWF184JGL121, no later than 31 March 2022.

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/home/`

Contact: `cosima.muck@oeaw.ac.at`

PHD STUDENT POSITION (F*M) in Exoplanet Atmosphere Modelling

at the Space Research Institute, Graz, Austria, deadline: 20 February 2022

The Space Research Institute (IWF) of the Austrian Academy of Sciences (OeAW), Austria's leading non-university research and science institution, is offering a fully-funded PhD position (Job ID: IWF193DOC121).

The successful candidate will be part of Prof Christiane Helling's newly formed research group *Exoplanets: Weather & Climate (Complex Atmosphere Modelling)* at the IWF which is part of the OeAW's effort to expand the theme of exoplanet research at the Space Research Institute (IWF) Graz. The successful candidate will work on cloud formation modelling in diverse chemical environment, incl. rocky exoplanets, and will be embedded in the newly establishing Young Researcher Program at the YRF @ IWF.

We seek an excellent student with a strong background in natural sciences. Candidates must hold a Master's degree in physics, astrophysics or geoscience or equivalent by the starting date of the position. Previous experience on aspects of exoplanet- or stellar-atmospheres, analysis of astronomical spectra, and/or astro-chemistry and astro-biology, and a track record of team work will be important criteria for the selection, as will experience in computational coding (including Fortran).

The appointment begins September 1, 2022 and will be for 3,5 years with an annual gross salary of 31.326,40 according to the collective agreement of the Austrian Academy of Sciences.

Applicants need to provide a cover letter in addition to
(1) curriculum vitae with a list of publications if applicable,
(2) a statement of interest (max 1 pages), and
(3) names of two references with the full contact information.

Please send the application in one PDF file, mentioning JOB ID: IWF193DOC121 to cosima.muck@oeaw.ac.at no later than February 20, 2022. Inquiries about the position should be directed to Prof Dr Christiane Helling. More information about the institute can be found here: http://www.iwf.oeaw.ac.at.

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/home/`

Contact: `cosima.muck@oeaw.ac.at`

4 Announcements

COSPAR 2022 Scientific Assembly Event D2.2: CONNECTING SOLAR AND STELLAR CORONAL MASS EJECTIONS: LESSONS LEARNED, CHALLENGES AND PERSPECTIVES

Scientific Event Chairs: Spiros Patsourakos, Manolis Georgoulis

COSPAR-22-D2.2 Scientific Event, Athens, Greece, 16-24 July 2022

Scientific Event D2.2: CONNECTING SOLAR AND STELLAR CORONAL MASS EJECTIONS: LESSONS LEARNED, CHALLENGES AND PERSPECTIVES during the upcoming COSPAR-22 44th Scientific Assembly, 16-24 July, Athens, Greece is open for abstracts. The event aims to (i) critically review and bridge our current knowledge on solar and stellar eruptions and their impacts to planets and exoplanets (ii) investigate new avenues in solar-stellar connections pertaining to eruptive phenomena. We solicit contributions related to theoretical/modeling/observational studies of solar and stellar Coronal Mass Ejections and their connections. Abstract submission **deadline is 11 February 2022**, `https://www.cosparathens2022.org/`.

Scientific Organizing Committee: Vladimir Airapetian (NASA GSFC/SEEC, USA), Sergio Dasso (University of Buenos Aires, Argentina), Manolis Georgoulis (Academy of Athens, Greece), Louise Harra (Physikalisch-Meteorologische Observatorium Davos/World Radiation Center, Switzerland), Konstantin Herbst (University of Kiel, Germany), Emilia Kilpua (University of Helsiniki, Finland), Rachel Osten (Space Telescope Science Institute, USA), Stefaan Poedts (KU Leuven, Belgium), Spiros Patsourakos (University of Ioannina, Greece), Shin Toriumi (Institute of Space and Astronautical Science, Japan), Astrid Veronig (University of Graz, Austria), Aline A. Vidotto (Leiden Observatory, Netherlands), Jie Zhang (George Mason University,USA)

Solicited speakers: Ed Cliver (National Solar Observatory, USA), Chuanfei Dong (Princeton University, USA), Jeremy Drake (Smithsonian Astrophysical Observatory, USA), Hugh Hudson (University of Glasgow, UK), Martin Leitzinger (University of Graz, Austria), Ben Lynch (Space Sciences Laboratory, USA), Hiroyuki Maehara (National Astronomical Observatory of Japan, Japan), Athanasios Papaioannou (National Observatory of Athens, Greece), Alexis Rouillard (Institut de Recherche en Astrophysique et Planetologie,France), Kazunari Shibata (Kyoto University, Japan), Evgenya Shkolnik (Arizona State University, USA), Manuela Temmer (University of Graz, Austria), Angelos Vourlidas (Johns Hopkins University Applied Physics Laboratory,USA), Yuming Wang (University of Science & Technology of China, China)

Download/Website: `www.cospar-assembly.org/admin/session_cospar.php?session=1048`

Contact: `spatsour@uoi.gr,manolis.georgoulis@academyofathens.gr`

Forming and Exploring Habitable Worlds

Amy Riches

Edinburgh, UK, 7-13 November 2022

Download/Website: `https://www.habitableworlds.co.uk/`
Contact: `amy.riches@ed.ac.uk`

Cool Stars 21 Splinter Session: Characterising stellar activity in the era of extreme radial velocity surveys of low-mass planets orbiting F-M stars

Nadège Meunier[1], Xavier Delfosse[1], Annelies Mortier[2], Chris Watson[3], Raphaëlle Haywood[4], Heather Cegla[5]

[1] Institut de Planétologie et d'Astrophysique de Grenoble, Université Grenoble Alpes, France
[2] Kavli Institute & Cavendish Laboratory, University of Cambridge, UK
[3] Astrophysics Research Centre, Queen's University Belfast, UK
[4] Astrophysics Group, University of Exeter, Exeter, UK
[5] Centre for Exoplanets and Habitability & Department of Physics, University of Warwick, Coventry, UK

Toulouse, 5th July 2022

We are happy to announce our Cool Stars 21 splinter session surrounding extremely precise radial velocities. During this splinter session, we will focus on the spectroscopic manifestation of stellar variability, covering a large range of spectral types (F-M), where similar processes are present but with different relative impacts on radial velocities. We will also focus on attempting to significantly improve our understanding of RV variability to enable the detection of very low-mass planets.

We welcome abstracts for contributed talks (deadline 1st May 2022) and/or expressions of interest. The form can be found on the website below. We encourage students and early-career researchers to submit an abstract.

Download/Website: `https://cs21-eprv.sciencesconf.org/`

Contact: `cs21-eprv@univ-grenoble-alpes.fr`

EAS Meeting 2022 - SS22: A magnifying glass on circumbinary exoplanets

Matthew Standing, Camilla Danielski, Jacques Kluska, Amaury Triaud, Mariangela Bonavita, Wilhelm Kley, Rebecca Martin

Valencia, 27 June - 01 July 2022

Dear Colleagues,

This year's European Astronomical Society annual meeting (EAS 2022) will be held 27 June – 1 July 2022 in Valencia, Spain. Below is a link to the full program for the conference:
EAS : https://eas.unige.ch/EAS_meeting/program.jsp

On the Friday 01/07/22 we will be hosting a special session titled: **"A magnifying glass on circumbinary exoplanets: their formation and evolution throughout the H-R diagram"**

The session is dedicated to Prof. Dr. Wilhelm ("Willy") Kley who recently passed away, while preparing the organisation of this session.

The session aims to gather specialists from all sub-fields in circumbinary planet science, and will be split into three blocks:
-Circumbinary planet formation
-Main sequence circumbinary planets
-Circumbinary planets beyond the main sequence

We invite applications for talks and scientific posters that fall into any of these categories, including any other work which could be applied to circumbinary planet science. **The deadline for abstract submission is 01/03/22.**

Registration is **open now** with the deadline for regular registration of the 26/06/22, there are also discounted very early bird (20/02/22) and early bird (29/04/22) registrations available. The ability to apply for fee waivers and/or grants for the conference is available with the same deadline as for abstract submissions (01/03/22).

Further details and can be found on the session's webpage:
https://eas.unige.ch/EAS_meeting/session.jsp?id=SS22
(Please ensure that any copied URL's contain 'EAS_meeting' with the underscore.)

All the best,
Matthew Standing
On behalf of the SOC

Download/Website: `https://eas.unige.ch/EAS_meeting/session.jsp?id=SS22`

Contact: `cdanielski@iaa.es, jacques.kluska@kuleuven.be, mariangela.bonavita@open.ac.uk`

Opportunities for Exoplanet projects at Sunspot Solar Observatory

McAteer, R.T.J.[1,2]
[1] New Mexico State University
[2] Sunspot Solar Observatory

Sunspot, NM, Feb 4, 2022

Sunspot Solar Observatory is seeking partners to lead Sun as a Star projects using the Dunn Solar Telescope. We have already started a project to provide wide coverage optical spectroscopy mapping out multiple solar features at multiple viewing angles, both during quiet Sun and solar flares.
We are now interested in opportunities to work with new partners to design, collect data, and acquire joint funding for new multi year projects, where we can run the solar telescope in a full disk mode to
- collect data that can assist with stellar decontamination for EPRV measurements
- collect data that can assist with asteroseismology studies

We will collect Expressions of Interest until 30 March 2022. This 1-page document should be sent to Dr McAteer (mcateer@nmsu.edu) and include a brief discussion of the science goals, telescope time that may be required, and a brief description of potential fundings streams that we could approach jointly.

Download/Website: `sunspot.solar`

Contact: `mcateer@nmsu.edu`

2022 Sagan Summer Hybrid Workshop: Exoplanet Science in the Gaia Era

E. Furlan, D. Gelino
NASA Exoplanet Science Institute, California Institute of Technology, Pasadena, CA, USA

Hybrid Workshop, July 25-29, 2022

The 2022 Sagan Summer Workshop will take place July 25-29, 2022. We are expecting that this will be a hybrid workshop with both in-person and on-line attendance. In-person attendance may be limited due to L. A. County, City of Pasadena, and California Institute of Technology COVID safety guidelines at the time of the workshop. The workshop website will be updated with this information going forward.

The 2022 Sagan Summer Workshop will focus on the topic of exoplanet science in the Gaia era. The ESA Gaia mission has been mapping the Galaxy for over seven years, measuring very accurate positions and motions of over 1 billion stars. It has already greatly contributed to exoplanet science through the determination of more accurate stellar parameters, which in turn improve planet parameters, the detection of stellar companions, and the identification and characterization of young moving groups. In the near future, the unprecedented astrometric accuracy will result in the discovery of new exoplanets, as well as the characterization of known planets. The workshop will introduce the basics of astrometry, the impact of Gaia astrometry on astrophysics, and the astrometric detection and characterization of exoplanets. The synergy between the different planet detection techniques of astrometry, transits, radial velocities, and imaging will be discussed, as well as future advances in astrometry.

The workshop will cover the topics listed below. Please visit the workshop website for the preliminary agenda and list of confirmed speakers.

- Astrometry Fundamentals
- Impact of Astrometry on Stellar Astrophysics with Implications for Exoplanet Science
- Astrometry and Companion Detectionl
- Characterizing Directly Imaged Planets and Young Brown Dwarfs
- Next Steps in Astrometry

There is no registration fee for this workshop and registration will open in mid-February 2022. In person attendees will be required to verify their COVID vaccination and booster status before their registration is confirmed. Additionally, in person attendees must comply with any mask mandates and public health guidelines in place at the time of the workshop.

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

Download/Website: `http://nexsci.caltech.edu/workshop/2022`
Contact: `sagan_workshop@ipac.caltech.edu`

CHEOPS AO-2

Kate Isaak
ESA CHEOPS Project Scientist, European Space Agency/ESTEC, the Netherlands

,

"SAVE THE DATE - CHEOPS AO-3 for the Guest Observers Programme opens 15 February 2022"

Dear Colleagues,
The third Annual Announcement of Opportunity (AO-3) for participation in the CHEOPS Guest Observers Programme, postponed from 9 November 2021, will come open 15 February 2022 and close 4 weeks later.
AO-3 will be the final call in the nominal mission, and will cover the period from the very end of June 2022 to 24 September 2023

The timeline for the Call is available on the ESA CHEOPS Guest Observers Programme webpage:
https://www.cosmos.esa.int/web/cheops-guest-observers-programme/

Documents, tools and webpages are available so that you can familiarise yourselves with the capabilities of CHEOPS. These are available from the following webpage:
https://www.cosmos.esa.int/web/cheops-guest-observers-programme/ao-3

The Discretionary Programme remains open, with further details available at:
https://www.cosmos.esa.int/web/cheops-guest-observers-programme/discretionary-programme

Don't hesitate to get in touch with me (at the email address below) directly in case of any questions, small or big.

Best,

Kate Isaak
(kate.isaak@esa.int)

Download/Website:

Contact: `kate.isaak@esa.int`

5 Exoplanet Archives

January 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, February 8, 2022

Note: *Unless otherwise noted, all planetary and stellar data mentioned in the news are in the Planetary Systems Table (`http://bit.ly/2Pt0tM1`), which provides a single location for all self-consistent planetary solutions, and its companion table the Planetary Systems Composite Parameters (`https://bit.ly/2Fer9NU`), which offers a more complete table of parameters combined from multiple references and calculations. Data can also be found in the Microlensing Planets Table (`https://bit.ly/3urUyZU`) or Direct Imaging Planets Table (`http://bit.ly/3ayD185`).*

January 27, 2022

5 Planets and New ExoClock Ephemerides

One of this week's five new planets is b Cen AB b, an imaged planet that orbits two stars, each more massive than any other star known to host planets. Read the ESO media release (`https://bit.ly/3IYrdwK`) and the Janson et al. discovery paper (`https://rdcu.be/cFL9Z`) for details. The other four planets are OGLE-2018-BLG-0383L b, KMT-2021-BLG-0322L b, OGLE-2018-BLG-0532L b, and LTT 1445 A c.

We've also added orbital ephemerides for 180 transiting planets from the ExoClock project (`https://bit.ly/3ITwZzU`), which is part of the Atmospheric Remote-sensing Infrared Exoplanet Large-survey (ARIEL) space mission.

January 13, 2022

Happy New Year!

We're starting 2022 with 19 new planets, including two with media releases: the longest-period TESS planet found to date, and a new Kepler planet that may have its own moon!

Discovered by citizen scientists, TOI-2180 b is a TESS giant with a 261-day orbit. Learn more in the NASA web feature (`https://go.nasa.gov/3ujHmcm`), the media release by the University California, Riverside (`https://bit.ly/3IVrRLz`), and the discovery paper (`https://bit.ly/3ojOL7H`).

Kepler-1708 b is a newly validated planet orbited by a credible exomoon candidate called Kepler-1708 b i. This is the second exomoon candidate ever detected—the first was found orbiting Kepler-1625 b. Note that neither exomoon candidate is currently in the archive (yet). Read the Columbia University media release (`https://bit.ly/3HssGeM`) and the discovery paper (`https://go.nature.com/3rjiUG0`) about Kepler-1708 b.

The other new planets added to the archive this week are: KOI-4777.01 (a.k.a. Kepler-1971 b), Kepler-1705 b & c, BD+60 1417 b, HIP 75056 A b, HD 360 b, HD 10975 b, HD 79181 b, HD 99283 b, ups Leo b, HD 161178 b, HD 219139 b, gam Psc b, HIP 5763 b, HIP 34222 b, HIP 86221 b, and OGLE-2019-BLG-0960L b.

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

6 As seen on Exoplanet-talks.org

Download/Website: `http://exoplanet-talks.org`
Contact: `info@exoplanet-talks.org`

Instruction video: http://exoplanet-talks.org/talk/164

Rapid-then-slow migration reproduces mass distribution of TRAPPIST-1 system *by Masahiro Ogihara -talk/401*

7 As seen on astro-ph

The following list contains exoplanet related entries appearing on astro-ph in January 2021.

January 2021

astro-ph/2201.00037: ***The influence of a fluid core and a solid inner core on the Cassini sate of Mercury*** *by Mathieu Dumberry*

astro-ph/2201.00778: ***Planetary Terrestrial Analogues Library Project: 3. Characterization of Samples with MicrOmega*** *by Loizeau Damien et al.*

astro-ph/2201.00781: ***Viscous dissipation in the fluid core of the Moon*** *by Jiarui Zhang, Mathieu Dumberry*

astro-ph/2201.00786: ***Viscoelastic relaxation within the Moon and the phase lead of its Cassini state*** *by Olivier Organowski, Mathieu Dumberry*

astro-ph/2201.00795: ***A past lunar dynamo thermally driven by the precession of its inner core*** *by Christopher Stys, Mathieu Dumberry*

astro-ph/2201.00803: ***The Cassini State of the Moon's inner core*** *by Christopher Stys, Mathieu Dumberry*

astro-ph/2201.00825: ***Mapping the Surface of Partially Cloudy Exoplanets is Hard*** *by Lucas Teinturier et al.*

astro-ph/2201.00829: ***Towards RNA life on Early Earth: From atmospheric HCN to biomolecule production in warm little ponds*** *by Ben K. D. Pearce et al.*

astro-ph/2201.00862: ***Thermal Processing of Solids Encountering a Young Jovian Core*** *by Megan N. Barnett, Fred J. Ciesla*

astro-ph/2201.00918: ***The Breakthrough Listen Search for Intelligent Life: Technosignature Search of Transiting TESS Targets of Interest*** *by Noah Franz et al.*

astro-ph/2201.00935: ***Detection of HC18O+ in a protoplanetary disk: exploring oxygen isotope fractionation of CO*** *by Kenji Furuya et al.*

astro-ph/2201.01332: ***The Influence of Temperature and Photobleaching on Irradiated Sodium Chloride at Europa-like Conditions*** *by William T.P. Denman, Samantha K. Trumbo, Michael E. Brown*

astro-ph/2201.01333: ***A New UV Spectral Feature on Europa: Confirmation of NaCl in Leading-hemisphere Chaos Terrain*** *by Samantha K. Trumbo et al.*

astro-ph/2201.01335: ***The mid-UV spectrum of irradiated NaCl at Europa-like conditions*** *by Michael E. Brown, William T.P. Denman, Samantha K. Trumbo*

astro-ph/2201.01478: ***Dust entrainment in magnetically and thermally driven disk winds*** *by Peter J. Rodenkirch, Cornelis P. Dullemond*

astro-ph/2201.01528: ***CORALIE radial-velocity search for companions around evolved stars (CASCADES). I. Sample definition and first results: Three new planets orbiting giant stars*** *by G. Ottoni et al.*

astro-ph/2201.01553: ***Coralie radial-velocity search for companions around evolved stars (CASCADES) III. A new Jupiter host-star: in-depth analysis of HD 29399 using TESS data*** *by C. Pezzotti et al.*

astro-ph/2201.01571: ***Features of the Dynamical Evolution of a Massive Disk of Trans-Neptunian Objects*** *by V. V. Emel'yanenko*

astro-ph/2201.01653: ***Do we need to consider electron kinetic effects to properly model a planetary magnetosphere: the case of Mercury*** *by Giovanni Lapenta et al.*

astro-ph/2201.01725: ***Secular evolution of resonant small bodies: semi-analytical approach for arbitrary eccentricities in the coplanar case*** *by Juan Pons, Tabaré Gallardo*

astro-ph/2201.01730: ***Influence of the projectile geometry on the momentum transfer from a kinetic impactor and implications for the DART mission*** *by S. D. Raducan et al.*

astro-ph/2201.01794: ***The Perkins INfrared Exosatellite Survey (PINES) I. Survey Overview, Reduction Pipeline, and Early Results*** *by Patrick Tamburo et al.*

astro-ph/2201.01977: ***Estimating photoevaporative mass loss of exoplanets with PLATYPOS*** *by Laura Ketzer, Katja Poppenhaeger*

astro-ph/2201.02032: ***Binary companions triggering fragmentation in self-gravitating discs*** *by James Cadman et* al.

astro-ph/2201.02086: ***Why is it So Hot in Here? Exploring Population Trends in Spitzer Thermal Emission Observations of Hot Jupiters using Planet-Specific Self-Consistent Atmospheric Models*** *by Jayesh M Goyal et al.*

astro-ph/2201.02125: ***New Perspectives on the Exoplanet Radius Gap from a Mathematica Tool and Visualized Water Equation of State*** *by Li Zeng et al.*

astro-ph/2201.02133: ***On the parameter refinement of inflated exoplanets with large radius uncertainty based on TESS observations*** *by Xanthippi Alexoudi*

astro-ph/2201.02195: ***An algorithm for coalescence of classical objects and formation of planetary systems*** *by Søren Toxvaerd*

astro-ph/2201.02212: ***LRG-BEASTS: sodium absorption and Rayleigh scattering in the atmosphere of WASP-94A b using NTT/EFOSC2*** *by E. Ahrer et al.*

astro-ph/2201.02261: ***Strong H2O and CO emission features in the spectrum of KELT-20b driven by stellar UV irradiation*** *by Guangwei Fu et al.*

astro-ph/2201.02440: ***Efficient modeling of correlated noise. III. Scalable methods for jointly modeling several observables' time series with Gaussian processes*** *by J.-B. Delisle et al.*

astro-ph/2201.02515: ***The transiting planetary system WASP-86/KELT-12: TESS provides the casting vote*** *by John Southworth, Francesca Faedi*

astro-ph/2201.02652: ***ExoVista: A Suite of Planetary System Models for Exoplanet Studies*** *by Christopher C. Stark*

astro-ph/2201.02685: ***An Energy Balance Model for Rapidly and Synchronously Rotating Terrestrial Planets*** *by Jacob Haqq-Misra, Benjamin P.C. Hayworth*

astro-ph/2201.02686: ***The First Near-Infrared Transmission Spectrum of HIP 41378 f, a Low-Mass Temperate Jovian World in a Multi-Planet System*** *by Munazza K. Alam et al.*

astro-ph/2201.02696: ***Unsupervised Machine Learning for Exploratory Data Analysis of Exoplanet Transmission Spectra*** *by Konstantin T. Matchev, Katia Matcheva, Alexander Roman*

astro-ph/2201.02794: ***A Framework for Characterizing Transmission Spectra of Exoplanets with Circumplanetary Rings*** *by Kazumasa Ohno, Jonathan J. Fortney*

astro-ph/2201.02879: ***Gravity-Assist as a Solution to Save Earth from Global Warming*** *by Sohrab Rahvar*

astro-ph/2201.02976: ***On the structure and long-term evolution of ice-rich bodies*** *by Stephan Loveless, Dina Prialnik, Morris Podolak*

astro-ph/2201.03024: ***Eccentric dust ring formation in Kozai-Lidov gas disks*** *by Rebecca G. Martin, Stephen H. Lubow*

astro-ph/2201.03094: ***MAGRATHEA: an open-source spherical symmetric planet interior structure code*** *by Chenliang Huang, David R. Rice, Jason H. Steffen*

astro-ph/2201.03328: ***Detection of the tidal deformation of WASP-103b at 3 with CHEOPS*** *by S. C. C. Barros et al.*

astro-ph/2201.03383: ***Constraining giant planet formation with synthetic ALMA images of the Solar System's natal protoplanetary disk*** *by C. Bergez-Casalou et al.*

astro-ph/2201.03532: ***AURA-3D: A Three-dimensional Atmospheric Retrieval Framework for Exoplanet Transmission Spectra*** *by Matthew C. Nixon, Nikku Madhusudhan*

astro-ph/2201.03570: ***A pair of Sub-Neptunes transiting the bright K-dwarf TOI-1064 characterised with CHEOPS*** *by Thomas G. Wilson et al.*

astro-ph/2201.03586: ***The chaotic history of the retrograde multi-planet system in K2-290A driven by distant stars*** *by Sergio Best, Cristobal Petrovich*

astro-ph/2201.03588: ***Observational constraints on disc sizes in protoplanetary discs in multiple systems in the Taurus region. II. Gas disc sizes*** *by A. A. Rota et al.*

astro-ph/2201.03600: ***Black Mirror: The impact of rotational broadening on the search for reflected light from 51 Pegasi b with high resolution spectroscopy*** *by E. F. Spring et al.*

astro-ph/2201.03653: ***Tidal erasure of stellar obliquities constrains the timing of hot Jupiter formation*** *by Christopher Spalding, Joshua N. Winn*

astro-ph/2201.03780: ***FIESTA II. Disentangling stellar and instrumental variability from exoplanetary Doppler shifts in Fourier domain*** *by Jinglin Zhao, Eric B. Ford*

astro-ph/2201.03782: ***The intrinsic multiplicity distribution of exoplanets revealed from the radial velocity method*** *by Wei Zhu*

astro-ph/2201.04025: ***Relative abundance constraints from high-resolution optical transmission spectroscopy of WASP-121b, and a fast model-filtering technique for accelerating retrievals*** *by Neale P. Gibson et al.*

astro-ph/2201.04089: ***Tracing pebble drift and trapping using radial carbon depletion profiles in protoplanetary disks*** *by J.A. Sturm et al.*

astro-ph/2201.04140: ***TESS Giants Transiting Giants II: The hottest Jupiters orbiting evolved stars*** *by Samuel K. Grunblatt et al.*

astro-ph/2201.04146: ***The TESS-Keck Survey. VIII. Confirmation of a Transiting Giant Planet on an Eccentric 261 day Orbit with the Automated Planet Finder Telescope*** *by Paul A. Dalba et al.*

astro-ph/2201.04154: ***Variable and super-sonic winds in the atmosphere of an ultra-hot giant planet*** *by Anusha Pai Asnodkar et al.*

astro-ph/2201.04197: ***A Mirage or an Oasis? Water Vapor in the Atmosphere of the Warm Neptune TOI-674 b*** *by Jonathan Brande et al.*

astro-ph/2201.04285: ***Characterization of exoplanetary atmospheres through a model-unbiased spectral survey methodology*** *by A. Lira-Barria, P. M. Rojo, R. A. Mendez*

astro-ph/2201.04299: ***The importance of silicate vapor in determining the structure, radii, and envelope mass fractions of sub-Neptunes*** *by William Misener, Hilke E. Schlichting*

astro-ph/2201.04312: ***OGLE-2016-BLG-1093Lb: A Sub-Jupiter-mass Spitzer Planet Located in Galactic Bulge*** *by In-Gu Shin et al.*

astro-ph/2201.04413: ***The impact of faculae on the radius determination of exoplanets: The case of the M-star GJ1214*** *by Eike W. Guenther*

astro-ph/2201.04431: ***The vertical shear instability in poorly ionised, magnetized protoplanetary discs*** *by Henrik N. Latter, Matthew W. Kunz*

astro-ph/2201.04508: ***Identifying interesting planetary systems for future X-ray observations*** *by Grace Foster, Katja Poppenhaeger*

astro-ph/2201.04516: ***Hazy blue worlds: A holistic aerosol model for Uranus and Neptune, including Dark Spots*** *by Patrick G.J. Irwin et al.*

astro-ph/2201.04518: ***The atmosphere and architecture of WASP-189 b probed by its CHEOPS phase curve*** *by A. Deline et al.*

astro-ph/2201.04643: ***An Exomoon Survey of 70 Cool Giant Exoplanets and the New Candidate Kepler-1708 b-i*** *by David Kipping et al.*

astro-ph/2201.04711: ***Let the Great World Spin: Revealing the Stormy, Turbulent Nature of Young Giant Exoplanet Analogs with the Spitzer Space Telescope*** *by Johanna M. Vos et al.*

astro-ph/2201.05311: ***An alternative explanation of the orbital expansion of Titan and other bodies in the Solar system*** *by Michal Křížek, Vesselin G. Gueorguiev, André Maeder*

astro-ph/2201.05507: ***Monte Carlo Simulation of Dust Particles in a Protoplanetary Disk: Crystalline to Amorphous Silicate Ratio in Comets*** *by Tamami Okamoto, Shigeru Ida*

astro-ph/2201.05636: ***Blue marble, stagnant lid: Could dynamic topography avert a waterworld?*** *by Claire Marie Guimond, John Rudge, Oliver Shorttle*

astro-ph/2201.05714: ***Collisional fragmentation and bulk composition tracking in REBOUND*** *by Anna C. Childs, Jason H. Steffen*

astro-ph/2201.06404: ***Maximum Temperatures in Evolving Protoplanetary Discs and Composition of Planetary Building Blocks*** *by Min Li et al.*

astro-ph/2201.06531: ***CaRM: Exploring the chromatic Rossiter-McLaughlin effect. The cases of HD 189733b***

and WASP-127b *by E. Cristo et al.*

astro-ph/2201.06702: ***Building Terrestrial Planets: Why results of perfect-merging simulations are not quantitatively reliable approximations to accurate modeling of terrestrial planet formation*** *by Nader Haghighipour, Thomas I. Maindl*

astro-ph/2201.06732: ***A Material-based Panspermia Hypothesis: The Potential of Polymer Gels and Membraneless Droplets*** *by Mahendran Sithamparam et al.*

astro-ph/2201.06743: ***Machine learning prediction for mean motion resonance behaviour – The planar case*** *by Xin Li et al.*

astro-ph/2201.07008: ***Why hot Jupiters can be large but not too large*** *by Qiang Hou, Xing Wei*

astro-ph/2201.07337: ***Effects of Charge Exchange on the Evaporative Wind of HD 209458b*** *by Alex Debrecht et al.*

astro-ph/2201.07481: ***A model for spin-orbit commensurability and synchronous starspot activity in stars with close-by planets*** *by A. F. Lanza*

astro-ph/2201.07613: ***Polarization of Rotationally Oblate Self-Luminous Exoplanets with Anisotropic Atmospheres*** *by Aritra Chakrabarty, Sujan Sengupta, Mark S. Marley*

astro-ph/2201.07727: ***Investigating the architecture and internal structure of the TOI-561 system planets with CHEOPS, HARPS-N and TESS*** *by G. Lacedelli et al.*

astro-ph/2201.08092: ***Terrestrial planet formation from lost inner solar system material*** *by Christoph Burkhardt et al.*

astro-ph/2201.08209: ***On the Shallowness of Circulation in Hot Jupiters – Advancing the Ohmic Dissipation Model*** *by Henrik Knierim, Konstantin Batygin, Bertram Bitsch*

astro-ph/2201.08350: ***Accurate modeling of grazing transits using umbrella sampling*** *by Gregory J. Gilbert*

astro-ph/2201.08359: ***Photochemical Runaway in Exoplanet Atmospheres: Implications for Biosignatures*** *by Sukrit Ranjan et al.*

astro-ph/2201.08369: ***Planet populations inferred from debris discs: insights from 178 debris systems in the ISPY, LEECH and LIStEN planet-hunting surveys*** *by Tim D. Pearce et al.*

astro-ph/2201.08370: ***TESS Revisits WASP-12: Updated Orbital Decay Rate and Constraints on Atmospheric Variability*** *by Ian Wong et al.*

astro-ph/2201.08423: ***Prospects for water vapor detection in the atmospheres of temperate and arid rocky exoplanets around M-dwarf stars*** *by Feng Ding, Robin D. Wordsworth*

astro-ph/2201.08508: ***Evidence that the Hot Jupiter WASP-77 A b Formed Beyond Its Parent Protoplanetary Disk's H2O Ice Line*** *by Henrique Reggiani et al.*

astro-ph/2201.08529: ***H2-dominated Atmosphere as an Indicator of Second-generation Rocky White Dwarf Exoplanets*** *by Zifan Lin et al.*

astro-ph/2201.08759: ***Detection of iron emission lines and a temperature inversion on the dayside of the ultra-hot Jupiter KELT-20b*** *by F. Yan et al.*

astro-ph/2201.08805: ***Effects of UV stellar spectral uncertainty on the chemistry of terrestrial atmospheres*** *by D. J. Teal et al.*

astro-ph/2201.08840: ***Rapid-then-slow migration reproduces mass distribution of TRAPPIST-1 system*** *by Masahiro Ogihara et al.*

astro-ph/2201.08867: ***LBT search for companions and sub-structures in the (pre)transitional disk of AB Aurigae*** *by Sebastián Jorquera et al.*

astro-ph/2201.08868: ***Detection of Near-Infrared Water Ice at the Surface of the (pre)Transitional Disk of AB Aur: Informing Icy Grain Abundance, Composition, and Size*** *by S. K. Betti et al.*

astro-ph/2201.08997: ***Is the Hubble crisis connected with the extinction of dinosaurs?*** *by Leandros Perivolaropoulos*

astro-ph/2201.09038: ***The saturation of the VSI in protoplanetary disks via parametric instability*** *by Can Cui, Henrik Latter*

astro-ph/2201.09241: ***A global two-layer radiative transfer model for axisymmetric, shadowed protoplanetary***

disks *by Satoshi Okuzumi, Takahiro Ueda, Neal J. Turner*

astro-ph/2201.09349: ***Large Impacts onto the Early Earth: Planetary Sterilization and Iron Delivery*** *by Robert I. Citron, Sarah T. Stewart*

astro-ph/2201.09459: ***Dippers from TESS Full-frame Images. II. Spectroscopic Characterization of Four Young Dippers*** *by Yui Kasagi et al.*

astro-ph/2201.09797: ***ExoCAM: A 3D Climate Model for Exoplanet Atmospheres*** *by Eric Wolf et al.*

astro-ph/2201.09804: ***Estimates of the change rate of solar mass and gravitational constant based on the dynamics of the Solar System*** *by E. V. Pitjeva et al.*

astro-ph/2201.09889: ***The Maximum Mass-Loss Efficiency for a Photoionization-Driven Isothermal Parker Wind*** *by Shreyas Vissapragada et al.*

astro-ph/2201.09898: ***Creating the Radius Gap without Mass Loss*** *by Eve J. Lee, Amalia Karalis, Daniel P. Thorngren*

astro-ph/2201.09900: ***A novel way of measuring the gas disk mass of protoplanetary disks using N2H+ and C18O*** *by L. Trapman et al.*

astro-ph/2201.09963: ***Two gas giants transiting M dwarfs confirmed with HPF and NEID*** *by Caleb I. Cañas et al.*

astro-ph/2201.10020: ***The California-Kepler Survey. X. The Radius Gap as a Function of Stellar Mass, Metallicity, and Age*** *by Erik A. Petigura et al.*

astro-ph/2201.10058: ***GENGA II: GPU planetary N-body simulations with non-Newtonian forces and high number of particles*** *by Simon L. Grimm et al.*

astro-ph/2201.10226: ***The DRAKE mission: finding the frequency of life in the Cosmos*** *by Subhajit Sarkar*

astro-ph/2201.10327: ***Discerning between different 'Oumuamua models by optical and infrared observations*** *by Eirik Grude Flekkøy, Joachim Brodin*

astro-ph/2201.10639: ***The EXPRES Stellar Signals Project II. State of the Field in Disentangling Photospheric Velocities*** *by Lily L. Zhao et al.*

astro-ph/2201.10663: ***Don't Forget To Look Up*** *by Philip Lubin, Alexander N. Cohen*

astro-ph/2201.11120: ***A tentative detection of He I in the atmosphere of GJ 1214b*** *by J. Orell-Miquel et al.*

astro-ph/2201.11459: ***Alleviating the Transit Timing Variations bias in transit surveys. II. RIVERS: Twin resonant Earth-sized planets around Kepler-1972 recovered from Kepler's false positive*** *by A. Leleu et al.*

astro-ph/2201.11488: ***Thermal structure and aerosols in Mars' atmosphere from TIRVIM/ACS onboard the ExoMars Trace Gas Orbiter : validation of the retrieval algorithm*** *by Sandrine Guerlet et al.*

astro-ph/2201.11532: ***Water content trends in K2-138 and other low-mass multiplanetary systems*** *by Lorena Acuña et al.*

astro-ph/2201.11768: ***Origins of Hot Jupiters from the Stellar Obliquity Distribution*** *by Malena Rice, Songhu Wang, Gregory Laughlin*

astro-ph/2201.11771: ***A spatially-resolved large cavity of the J0337 protoplanetary disk in Perseus*** *by Taichi Uyama et al.*

astro-ph/2201.12108: ***Dust entrainment in photoevaporative winds: Synthetic observations of transition disks*** *by R. Franz et al.*

astro-ph/2201.12205: ***Conditions for visual and high-resolution bistatic radar observations of Apophis in 2029*** *by Agustín Vallejo, Jorge I. Zuluaga, Germán Chaparro*

astro-ph/2201.12313: ***Three-Body Resonances in the Saturnian System*** *by Matija Ćuk, Maryame El Moutamid*

astro-ph/2201.12405: ***YETI follow-up observations of the T Tauri star CVSO30 with transit-like dips*** *by R. Bischoff et al.*

astro-ph/2201.12661: ***Validation of 13 Hot and Potentially Terrestrial TESS Planets*** *by Steven Giacalone et al.*

astro-ph/2201.12687: ***Confirming the 3:2 Resonance Chain of K2-138*** *by Mariah G. MacDonald et al.*

astro-ph/2201.12836: ***NEID Rossiter-McLaughlin Measurement of TOI-1268b: A Young Warm Saturn Aligned with Its Cool Host Star*** *by Jiayin Dong et al.*

astro-ph/2201.13155: ***A population of transition disks around evolved stars: Fingerprints of planets? Catalog of***

disks surrounding Galactic post-AGB binaries *by Jacques Kluska et al.*

astro-ph/2201.13274: ***TOI-1442 b and TOI-2445 b: two ultra-short period super-Earths around M dwarfs*** *by G. Morello et al.*

astro-ph/2201.13341: ***TOI-1268b: the youngest hot Saturn-mass transiting exoplanet*** *by J. Šubjak et al.*

astro-ph/2201.13342: ***Magnitude-squared coherence: A powerful tool for disentangling Doppler planet discoveries from stellar activity*** *by Sarah E. Dodson-Robinson et al.*

astro-ph/2201.01156: ***Focusing of nonlinear eccentric waves in astrophysical discs. II. Excitation and damping of tightly-wound waves*** *by Elliot M. Lynch*

astro-ph/2201.01530: ***Coralie radial velocity search for companions around evolved stars (CASCADES) II. Seismic masses for three red giants orbited by long-period massive planets*** *by G. Buldgen et al.*

astro-ph/2201.01713: ***TIC-320687387 B: a long-period eclipsing M-dwarf close to the hydrogen burning limit*** *by Samuel Gill et al.*

astro-ph/2201.03467: ***First images of phosphorus molecules towards a proto-Solar analog*** *by Jennifer B. Bergner et al.*

astro-ph/2201.03670: ***Searching for TESS Photometric Variability of Possible JWST Spectrophotometric Standard Stars*** *by Susan E. Mullally et al.*

astro-ph/2201.03897: ***First eROSITA-TESS results for M dwarfs: Mass dependence of the X-ray activity rotation relation and an assessment of sensitivity limits*** *by E. Magaudda, B. Stelzer, St. Raetz*

astro-ph/2201.04079: ***The protoplanetary disk population in the rho-Ophiuchi region L1688 and the time evolution of Class II YSOs*** *by L. Testi et al.*

astro-ph/2201.06472: ***Scattering and sublimation: a multi-scale view of m-sized dust in the inclined disc of HD 145718*** *by Claire L. Davies et al.*

astro-ph/2201.06502: ***The ODYSSEUS Survey. Motivation and First Results: Accretion, Ejection, and Disk Irradiation of CVSO 109*** *by C. C. Espaillat et al.*

astro-ph/2201.06745: ***The Sun to planetary center of mass distance is coherent with solar activity on the decade, centennial and millennium time scales when Planet 9 is included in the solar system*** *by Ian R. Edmonds*

astro-ph/2201.07268: ***Successive deuteration in low-mass star-forming regions: the case of D2-methanol (CHD2OH) in IRAS 16293-2422*** *by Maria N. Drozdovskaya et al.*

astro-ph/2201.07355: ***High spatial resolution spectral imaging method for space interferometers and its application to formation-flying small satellites*** *by Taro Matsuo et al.*

astro-ph/2201.07491: ***Ariel mission planning. Scheduling the survey of a thousand exoplanets*** *by J.C. Morales et al.*

astro-ph/2201.07512: ***Thermal desorption of interstellar ices. A review on the controlling parameters and their implications fromsnowlines to chemical complexity*** *by Marco Minissale et al.*

astro-ph/2201.09416: ***Discovery of a Long-Duration Superflare on a Young Solar-Type Star EK Draconis with Nearly Similar Time Evolution for Hα and White-Light Emissions*** *by Kosuke Namekata et al.*

astro-ph/2201.09905: ***Final Report for SAG 21: The Effect of Stellar Contamination on Space-based Transmission Spectroscopy*** *by Benjamin V. Rackham et al.*

astro-ph/2201.10465: ***RW Aur A : SpeX Spectral Evidence for Differentiated Planetesimal Formation, Migration and Destruction in an 3 Myr Old Excited CTTS System*** *by C.M. Lisse et al.*

astro-ph/2201.12149: ***The X-ray variability of HD 189733 across eight years of XMM-Newton observations*** *by I. Pillitteri et al.*

astro-ph/2201.13219: ***The Extreme-ultraviolet Stellar Characterization for Atmospheric Physics and Evolution (ESCAPE) Mission: Motivation and Overview*** *by K. France et al.*