ExoPlanet News
An Electronic Newsletter

No. 142, 13 April 2021

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

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

Contents

1 Editorial

Welcome to Edition 142 of the ExoPlanet News!

In this April issue you will find abstracts of scientific papers, Exoplanet Archive updates, job postings, announcements for a workshop, the latest exoplanet talks, 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 or additional packages
- 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 May 11, 2021.

Julia Venturini
Daniel Angerhausen
Holly Capelo
Lokesh Mishra
Timm-Emanuel Riesen

2 Abstracts of refereed papers

The Hubble PanCET program: Long-term chromospheric evolution and flaring activity of the M dwarf host GJ 3470

V. Bourrier[1], L. A. dos Santos[1], J. Sanz-Forcada[2], A. García Muñoz[7], G. W. Henry[6], P. Lavvas[10], A. Lecavelier[9], M. López-Morales[11], T. Mikal-Evans[8], D. K. Sing[4,5], H. R. Wakeford[3], D. Ehrenreich[1],

[1] Observatoire Astronomique de l'Université de Genève, Chemin Pegasi 51b, CH-1290 Versoix, Switzerland
[2] Centro de Astrobiologia (CSIC-INTA), ESAC Campus, P.O. Box 78, E-28691 Villanueva de la Canada, Madrid, Spain
[3] School of Physics, University of Bristol, HH Wills Physics Laboratory, Tyndall Avenue, Bristol BS8 1TL, UK
[4] Department of Earth & Planetary Sciences, Johns Hopkins University, Baltimore, MD, USA
[5] Department of Physics & Astronomy, Johns Hopkins University, Baltimore, MD, USA
[6] Center of Excellence in Information Systems, Tennessee State University, Nashville, TN 37209, USA
[7] AIM, CEA, CNRS, Université Paris-Saclay, Université de Paris, F-91191 Gif-sur-Yvette, France
[8] Kavli Institute for Astrophysics and Space Research, Massachusetts Institute of Technology, Cambridge, MA, USA
[9] Sorbonne Université, CNRS, UMR 7095, Institut d'Astrophysique de Paris, 98bis bd Arago, 75014 Paris, France
[10] Groupe de Spectrométrie Moleculaire et Atmosphérique, Université de Reims Champagne Ardenne, Reims, France
[11] Center for Astrophysics, Harvard & Smithsonian, 60 Garden Street, Cambridge, MA 01238, USA

Astronomy & Astrophysics, in press / arXiv:2103.09864

Neptune-size exoplanets seem particularly sensitive to atmospheric evaporation, making it essential to characterize the stellar high-energy radiation that drives this mechanism. This is particularly important with M dwarfs, which emit a large and variable fraction of their luminosity in the ultraviolet and can display strong flaring behavior.
The warm Neptune GJ 3470b, hosted by an M2 dwarf, was found to harbor a giant exosphere of neutral hydrogen thanks to three transits observed with the Hubble Space Telescope Imaging Spectrograph (HST/STIS). Here we report on three additional transit observations from the Panchromatic Comparative Exoplanet Treasury (PanCET) program, obtained with the HST Cosmic Origin Spectrograph (COS). These data confirm the absorption signature from GJ 3470b's exosphere in the stellar Lyman-α line and demonstrate its stability over time. No planetary signatures are detected in other stellar lines, setting a 3σ limit on GJ 3470b's far-ultraviolet (FUV) radius at 1.3 times its Roche lobe radius.
We detect three flares from GJ 3470. They show different spectral energy distributions but peak consistently in the SiIII line, which traces intermediate-temperature layers in the transition region. These layers appear to play a particular role in GJ 3470's activity as emission lines that form at lower or higher temperatures than SiIII evolved differently over the long term. Based on the measured emission lines, we derive synthetic X-ray and extreme-ultraviolet (X+EUV, or XUV) spectra for the six observed quiescent phases, covering one year, as well as for the three flaring episodes. Our results suggest that most of GJ 3470's quiescent high-energy emission comes from the EUV domain, with flares amplifying the FUV emission more strongly. The neutral hydrogen photoionization lifetimes and mass loss derived for GJ 3470b show little variation over the epochs, in agreement with the stability of the exosphere.
Simulations informed by our XUV spectra are required to understand the atmospheric structure and evolution of GJ 3470b and the role played by evaporation in the formation of the hot-Neptune desert.

Download/Website: `http://arxiv.org/abs/2103.09864`

Contact: `vincent.bourrier@unige.ch`

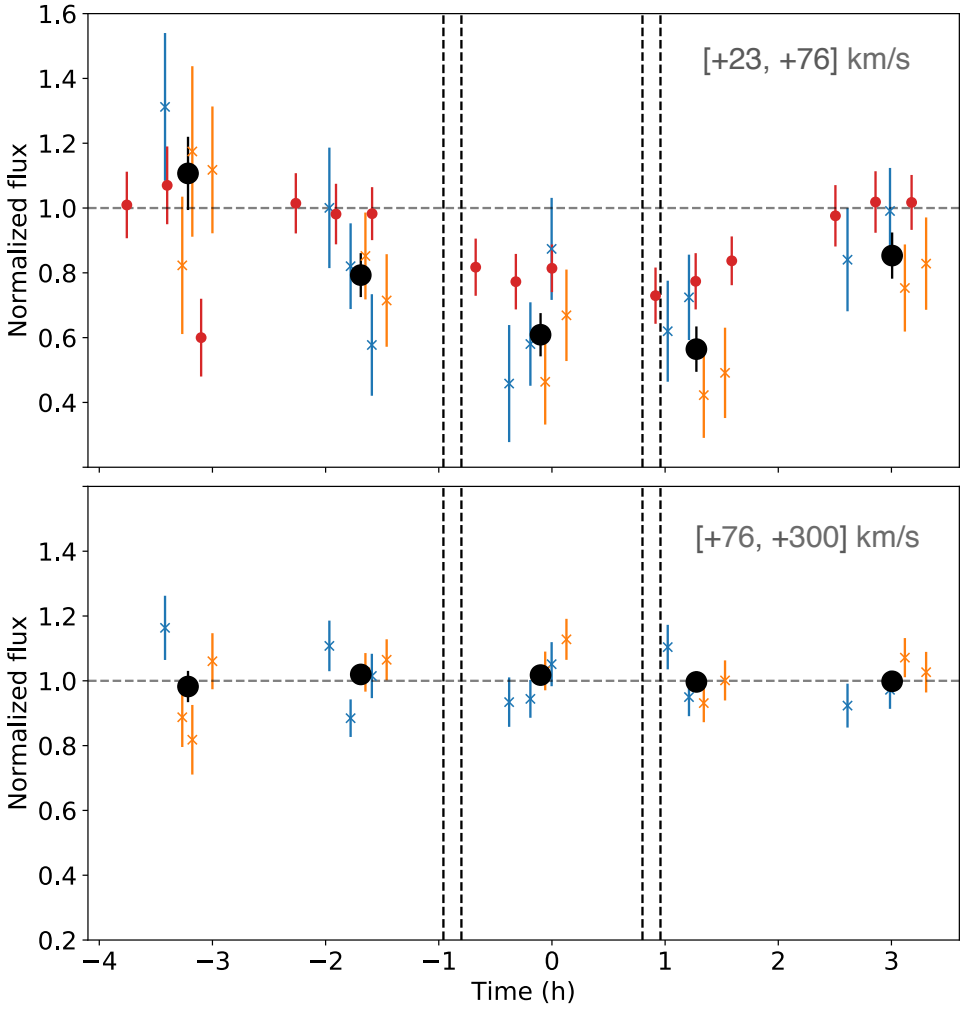

Figure 1: Light curves of GJ 3470 in the red wing of the Lyman-α line. The top and bottom panels show the flux integrated, respectively, over [+23, +76] and [+76, +300] km s^{-1} in the stellar rest frame. Red points correspond to STIS exposures in Visits A, B, and C (Bourrier et al. 2018b). Blue and orange points correspond to COS exposures in Visits D and E, binned over the phase window of each HST orbit into the black points (geocoronal contamination could not be sufficiently corrected for in Visit F). All data were normalized by the fluxes in the first and last HST orbits. Vertical dashed lines indicate the transit contacts. The exospheric transit light curve has the same shape in the STIS data and in both COS visits, showing the stability of the exosphere over tens of planetary orbits.

The GAPS Programme at TNG XXVIII
A pair of hot-Neptunes orbiting the young star TOI-942

I. Carleo[1,2], S. Desidera[2], D. Nardiello[3,2], L. Malavolta[4], et al. (a complete list of authors can be found in the paper)

[1] Astronomy Department and Van Vleck Observatory, Wesleyan University, Middletown, CT 06459, USA
[2] INAF - Osservatorio Astronomico di Padova, Vicolo dell'Osservatorio 5, I-35122, Padova, Italy
[3] Aix Marseille Univ, CNRS, CNES, LAM, Marseille, France
[4] Dipartimento di Fisica e Astronomia Galileo Galilei, Universitá di Padova, Vicolo dellOsservatorio 3, I-35122, Padova, Italy

Astronomy & Astrophysics, published (2021A&A...645A..71C)

Young stars and multi-planet systems are two types of primary objects that allow us to study, understand, and constrain planetary formation and evolution theories. We validate the physical nature of two Neptune-sized planets transiting TOI-942 (TYC 5909-319-1), a previously unacknowledged young star (50^{+30}_{-20} Myr) observed by the *TESS* space mission in Sector 5. Thanks to a comprehensive stellar characterization, *TESS* light curve modeling and precise radial-velocity measurements, we validated the planetary nature of the *TESS* candidate and detected an additional transiting planet in the system on a larger orbit. From photometric and spectroscopic observations we performed an exhaustive stellar characterization and derived the main stellar parameters. TOI-942 is a relatively active K2.5V star ($\log \mathrm{R'_{HK}}$ = -4.17 $\pm$ 0.01) with rotation period $\mathrm{P_{rot}}$ = 3.39 $\pm$ 0.01 days, a projected rotation velocity $v \sin i_\star$=13.8 $\pm$ 0.5 km s^{-1}, and a radius of $\sim$0.9 $R_\odot$. We found that the inner planet, TOI-942 b, has an orbital period P_b=4.3263 $\pm$ 0.0011 days, a radius R_b=$4.242^{+0.376}_{-0.313} R_\oplus$, and a mass upper limit of 16 $M_\oplus$ at 1σ confidence level. The outer planet, TOI-942 c, has an orbital period P_c=$10.1605^{+0.0056}_{-0.0053}$ days, a radius R_c=$4.793^{+0.410}_{-0.351} R_\oplus$, and a mass upper limit of 37 $M_\oplus$ at 1σ confidence level.

Contact: icarleo@wesleyan.edu

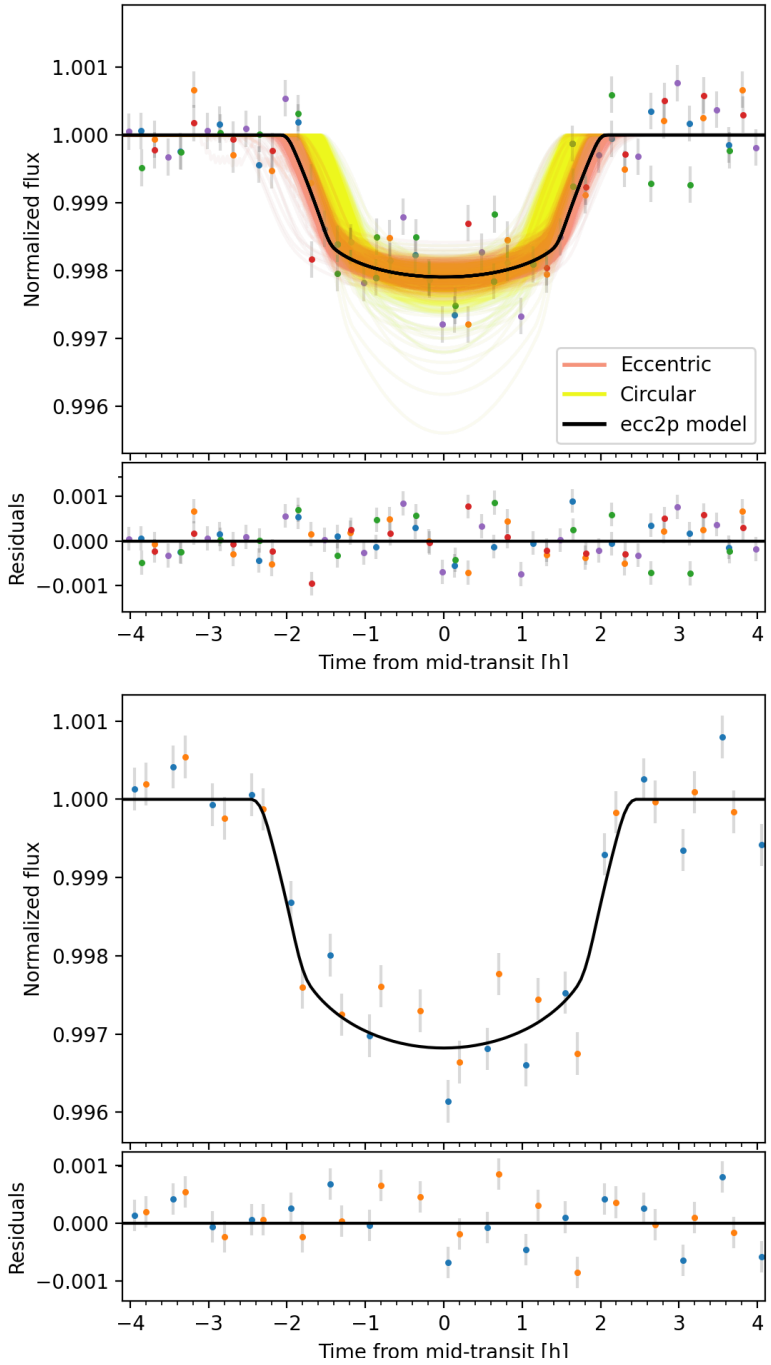

Figure 2: *Upper panel*: *TESS* light curve around the transit with residuals of TOI-942 b. The black fit is the inferred ecc2p (eccentric with 2 planets) transit model, while the orange and yellow fits are respectively the eccentric and circular models obtained by randomly varying all the orbital parameters. Different dot colors indicate the five different transits for TOI-942 b. *Bottom panel*: *TESS* light curve around the two transits of TOI-942 c, with the ecc2p model overplotted.

A multi-wavelength look at the GJ 9827 system No evidence of extended atmospheres in GJ 9827 b and d from *HST* and CARMENES data

I. Carleo[1,2], A. Youngblood[3], S. Redfield[1], N. Casasayas Barris[4,5], et al. (a complete list of authors can be found in the paper)

[1] Astronomy Department and Van Vleck Observatory, Wesleyan University, Middletown, CT 06459, USA
[2] INAF - Osservatorio Astronomico di Padova, Vicolo dell'Osservatorio 5, I-35122, Padova, Italy
[3] Laboratory for Atmospheric and Space Physics, University of Colorado, Boulder, CO 80303, USA
[4] Instituto de Astrofísica de Canarias, C/ Vía Láctea s/n, 38205 La Laguna, Spain
[5] Departamento de Astrofísica, Universidad de La Laguna, 38206 La Laguna, Spain

AJ, published (2021AJ....161..136C)

GJ 9827 is a bright star hosting a planetary system with three transiting planets. As a multi-planet system with planets that sprawl within the boundaries of the radius gap between terrestrial and gaseous planets, GJ 9827 is an optimal target to study the evolution of the atmospheres of close-in planets with a common evolutionary history and their dependence from stellar irradiation. Here, we report on the *Hubble Space Telescope (HST)* and CARMENES transit observations of GJ 9827 planets b and d. We performed a stellar and interstellar medium characterization from the ultraviolet *HST* spectra, obtaining fluxes for Lyα and MgII of $F(\mathrm{Ly}\alpha)$ = $(5.42^{+0.96}_{-0.75}) \times 10^{-13}$ erg cm^{-2} s^{-1} and $F(\mathrm{MgII})$ = (5.64$\pm$ 0.24) $\times$ 10^{-14} erg cm^{-2} s^{-1}. We also investigated a possible absorption signature in Lyα in the atmosphere of GJ 9827 b during a transit event from *HST* spectra, as well as Hα and He1 signature for the atmosphere of GJ 9827 b and d from CARMENES spectra. We found no evidence of an extended atmosphere in either of the planets. This result is also supported by our analytical estimations of mass-loss based on the measured radiation fields for all the three planets of this system, which led to a mass-loss rate of 0.4, 0.3, and 0.1 planetary masses per Gyr, for GJ 9827 b, c, and d respectively. These values indicate that the planets could have lost their volatiles quickly in their evolution and probably do not retain an atmosphere at the current stage.

Contact: icarleo@wesleyan.edu

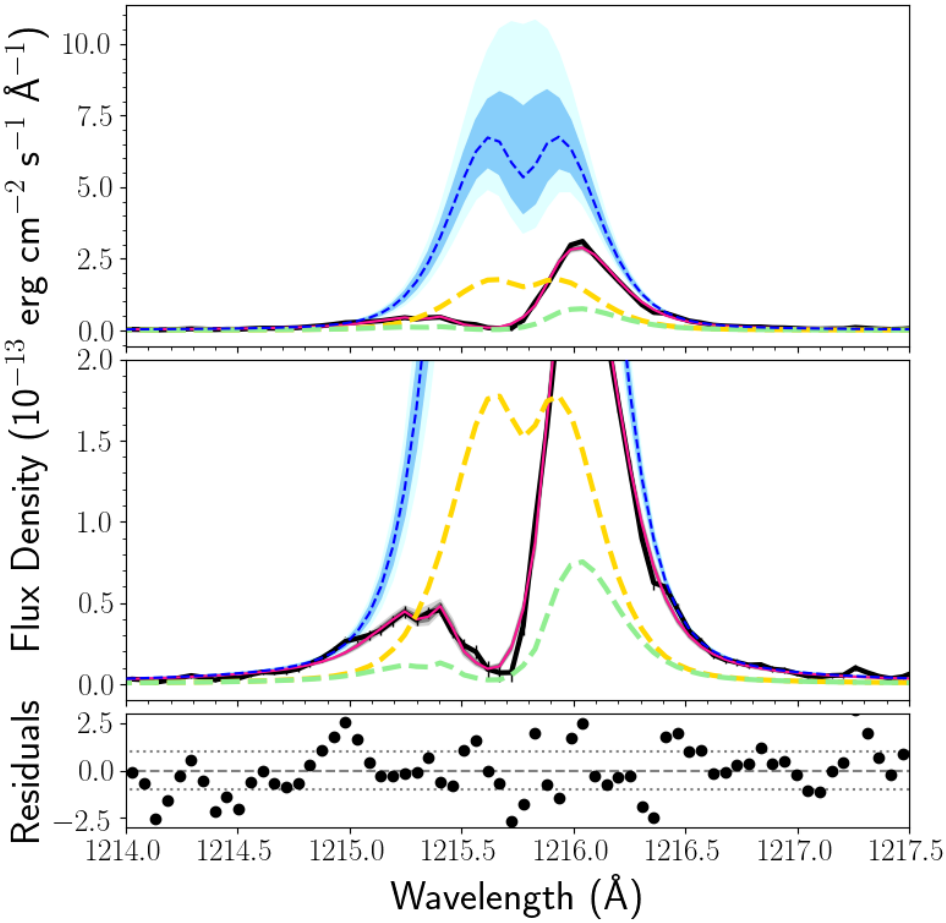

Figure 3: The reconstruction of the Lyα profile is shown in the top two panels (the middle panel is a zoomed version of the top panel with no changes). The STIS spectrum is represented in black with error bars (the error bars are generally smaller than the black line width). The best-fit model and 68% and 95% confidence intervals is shown as the pink line, dark gray shading, and light gray shading, respectively (the confidence intervals are also generally thinner than the width of the pink line). The intrinsic stellar emission line corresponding to the best-fit model is shown as the dashed blue line, with the 68% and 95% confidence intervals shown as dark-blue and light-blue shading, respectively. The bottom panel shows the residuals (data-model)/(data uncertainty). The dashed gold and green lines show how the intrinsic and observed (ISM attenuated) spectra would respectively appear if the intrinsic fluxes were consistent with Mg II - Lyα fluxes from the literature.

Five carbon- and nitrogen-bearing species in a hot giant planet's atmosphere

Paolo Giacobbe[1] *Matteo Brogi*[2,3,1] *Siddharth Gandhi*[2,3] *Patricio E. Cubillos*[4] *et al. (a complete list of authors can be found in the paper)*

[1] INAF – Osservatorio Astronomico di Torino, Pino Torinese, Italy
[2] Department of Physics, University of Warwick, Coventry, UK
[3] Centre for Exoplanets and Habitability, University of Warwick, Coventry, UK
[4] Space Research Institute, Austrian Academy of Sciences, Graz, Austria.

Nature, 592, 205-208 published, doi:10.1038/s41586-021-03381-x

The atmospheres of gaseous giant exoplanets orbiting close to their parent stars (hot Jupiters) have been probed for nearly two decades. They allow us to investigate the chemical and physical properties of planetary atmospheres under extreme irradiation conditions. Previous observations of hot Jupiters as they transit in front of their host stars have revealed the frequent presence of water vapour4 and carbon monoxide in their atmospheres; this has been studied in terms of scaled solar composition under the usual assumption of chemical equilibrium. Both molecules as well as hydrogen cyanide were found in the atmosphere of HD 209458b, a well studied hot Jupiter (with equilibrium temperature around 1,500 kelvin), whereas ammonia was tentatively detected there and subsequently refuted. Here we report observations of HD 209458b that indicate the presence of water (H_2O), carbon monoxide (CO), hydrogen cyanide (HCN), methane (CH_4), ammonia (NH_3) and acetylene (C_2H_2), with statistical significance of 5.3 to 9.9 standard deviations per molecule. Atmospheric models in radiative and chemical equilibrium that account for the detected species indicate a carbon-rich chemistry with a carbon-to-oxygen ratio close to or greater than 1, higher than the solar value (0.55). According to existing models relating the atmospheric chemistry to planet formation and migration scenarios, this would suggest that HD 209458b formed far from its present location and subsequently migrated inwards. Other hot Jupiters may also show a richer chemistry than has been previously found, which would bring into question the frequently made assumption that they have solar-like and oxygen-rich compositions.

Contact: paolo.giacobbe@inaf.it

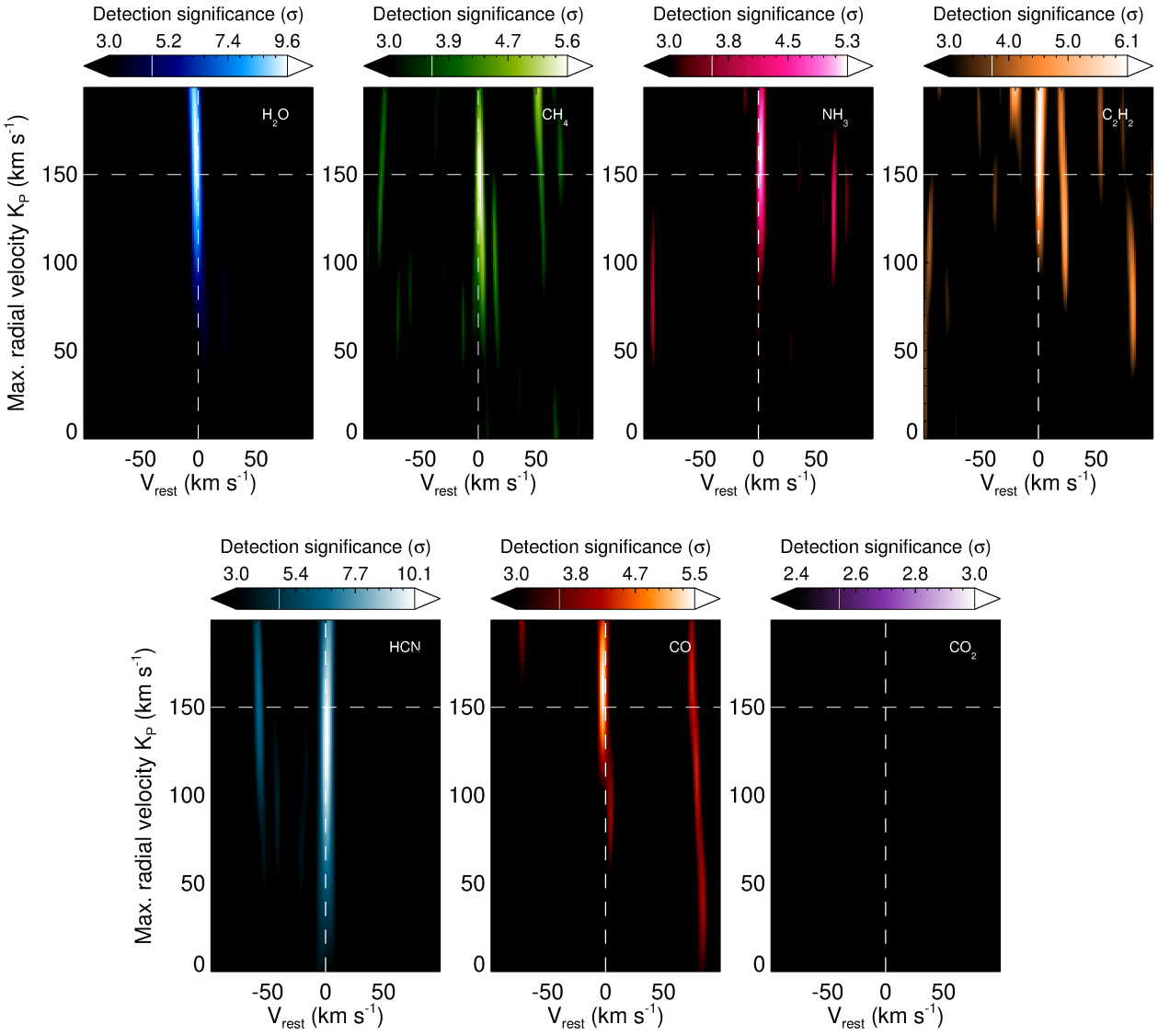

Figure 4: Detection significance for H_2O, CH_4, NH_3, C_2H_2, HCN, CO and CO_2. Each panel shows the significance of the cross-correlation of the GIANO-B spectra with isothermal atmospheric models, as a function of the planet's maximum radial velocity ($K_{\rm P}$) and the planet's rest-frame velocity ($V_{\rm rest}$). White dashed lines denote the known velocity of HD 209458b, that is ($K_{\rm P}$, $V_{\rm rest}$) = (145, 0) km s^{-1}. The significance was computed with a Welch *t*-test on two samples of cross-correlation values, that is, far from and near to the planet radial velocity, respectively.

Planet-induced radio emission from the coronae of M dwarfs: the case of Prox Cen and AU Mic

Robert D. Kavanagh[1]*, Aline A. Vidotto*[1]*, Baptiste Klein*[2]*, Moira M. Jardine*[3]*, Jean-François Donati*[4]*, Dúalta Ó Fionnagáin*[5]

[1] School of Physics, Trinity College Dublin, The University of Dublin, Dublin 2, Ireland
[2] Sub-department of Astrophysics, Department of Physics, University of Oxford, Oxford OX1 3RH, UK
[3] SUPA, School of Physics and Astronomy, University of St Andrews, St Andrews KY16 9SS, UK
[4] Université de Toulouse, CNRS, IRAP, 14 av. Belin, 31400 Toulouse, France
[5] Centre for Astronomy, National University of Ireland, Galway, Ireland

Monthly Notices of the Royal Astronomical Society, in press (arXiv:2103.16318)

There have recently been detections of radio emission from low-mass stars, some of which are indicative of star-planet interactions. Motivated by these exciting new results, in this paper we present Alfvén wave-driven stellar wind models of the two active planet-hosting M dwarfs Prox Cen and AU Mic. Our models incorporate large-scale photospheric magnetic field maps reconstructed using the Zeeman-Doppler Imaging method. We obtain a mass-loss rate of $0.25\ \dot{M}_\odot$ ($\dot{M}_\odot = 2 \times 10^{-14}\ M_\odot\ \mathrm{yr}^{-1}$) for the wind of Prox Cen. For the young dwarf AU Mic, we explore two cases: a low and high mass-loss rate. Depending on the properties of the Alfvén waves which heat the corona in our wind models, we obtain mass-loss rates of 27 and $590\ \dot{M}_\odot$ for AU Mic. We use our stellar wind models to assess the generation of electron cyclotron maser instability emission (ECMI) in both systems, through a mechanism analogous to the sub-Alfvénic Jupiter-Io interaction. For Prox Cen we do not find any feasible scenario where the planet can induce radio emission in the star's corona, as the planet orbits too far from the star in the super-Alfvénic regime. However, in the case that AU Mic has a stellar wind mass-loss rate of $27\ \dot{M}_\odot$, we find that both planets b and c in the system can induce radio emission from $\sim$ 10 MHz – 3 GHz in the corona of the host star for the majority of their orbits, with peak flux densities of $\sim$ 10 mJy. Detection of such radio emission would allow us to place an upper limit on the mass-loss rate of the star.

Download/Website: `https://arxiv.org/abs/2103.16318`

Contact: `kavanar5@tcd.ie`

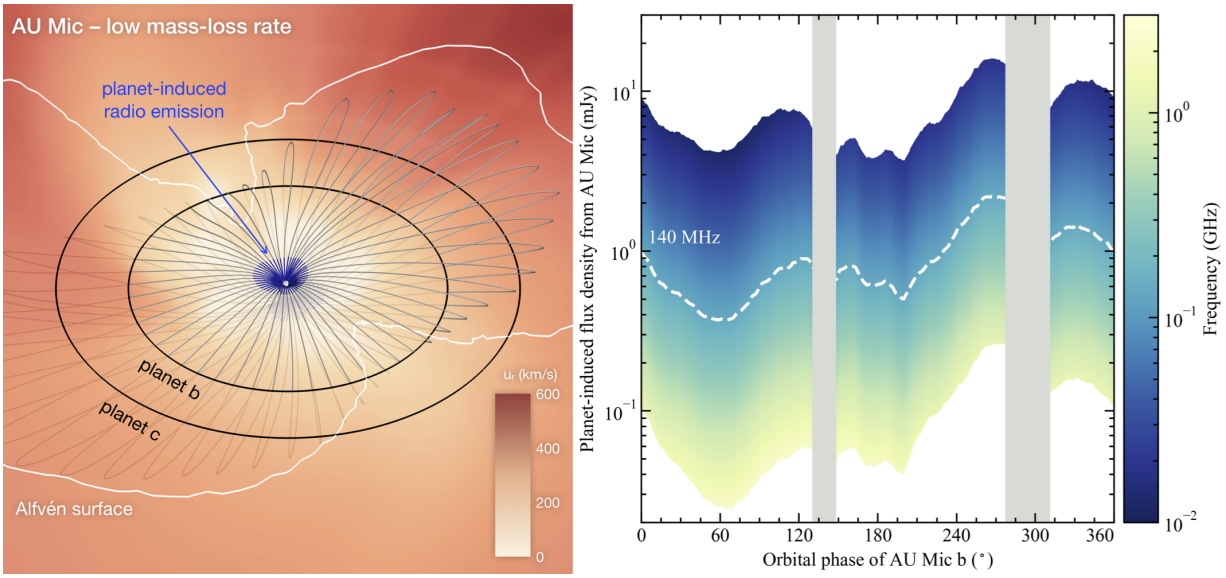

Figure 5: *Left*: Stellar wind model of AU Mic with a mass-loss rate of 27 $\dot{M}_{\odot}$. The orbits of planets b and c are shown as black circles, and the white line corresponds to the Alfvén surface. The contour in the orbital plane is coloured by the wind radial velocity (u_r), and the grey lines show the stellar magnetic field lines that connect to the orbit of planet b. Inside the Alfvén surface, both planets b and c can induce radio emission in the corona of the star via ECMI. For planet b, the blue shaded regions of the stellar magnetic field lines illustrate where it induces radio emission. *Right*: Radio spectrum of AU Mic induced by planet b in the corona of the star. The grey shaded areas illustrate the region where planet b orbits in the super-Alfvénic regime. No emission can generate in these regions. Emission generated at 140 MHz is highlighted with a white dashed line. This is the middle frequency of the observing band at which radio emission was recently detected from the M dwarf GJ 1151 by Vedantham et al. (2020), which is suspected of being induced by an orbiting planet. At 140 MHz, our predicted emission bears a striking resemblance to that reported for GJ 1151.

HST PanCET program: Non-detection of atmospheric escape in the warm Saturn-sized planet WASP-29 b

L. A. dos Santos [1], *V. Bourrier* [1], *D. Ehrenreich* [1], *J. Sanz-Forcada* [2], *M. López-Morales* [3], *D. K. Sing* [4,5], *A. García Muñoz* [6], *G. W. Henry* [7], *P. Lavvas* [8], *A. Lecavelier des Etangs* [9], *T. Mikal-Evans* [10], *A. Vidal-Madjar* [9], *H. R. Wakeford* [11]

[1] Observatoire astronomique de l'Université de Genève, Chemin Pegasi 51b, 1290 Versoix, Switzerland
[2] Centro de Astrobiología (CSIC-INTA), E-28692 Villanueva de la Cañada, Madrid, Spain
[3] Center for Astrophysics — Harvard & Smithsonian, 60 Garden Street, Cambridge, MA 02138, USA
[4] Department of Earth & Planetary Sciences, Johns Hopkins University, Baltimore, MD, USA
[5] Department of Physics & Astronomy, Johns Hopkins University, Baltimore, MD, USA
[6] AIM, CEA, CNRS, Université Paris-Saclay, Université de Paris, F-91191 Gif-sur-Yvette, France
[7] Tennessee State University, Center of Excellence in Information Systems, Nashville, TN 37203, USA
[8] Groupe de Spectrométrie Moléculaire et Atmosphérique, Université de Reims, Champagne-Ardenne, CNRS UMR F-7331, France
[9] Institut d'Astrophysique de Paris, CNRS, UMR 7095 & Sorbonne Universités UPMC Paris 6, 98 bis bd Arago, 75014 Paris, France
[10] Kavli Institute for Astrophysics and Space Research, Massachusetts Institute of Technology, Cambridge, MA, USA
[11] School of Physics, University of Bristol, HH Wills Physics Laboratory, Tyndall Avenue, Bristol BS8 1TL, UK

Astronomy & Astrophysics, in press (arXiv:2103.15688)

Short-period gas giant exoplanets are susceptible to intense atmospheric escape due to their large scale heights and strong high-energy irradiation. This process is thought to occur ubiquitously, but to date we have only detected direct evidence of atmospheric escape in hot Jupiters and warm Neptunes. The latter planets are particularly more sensitive to escape-driven evolution as a result of their lower gravities with respect to Jupiter-sized planets. But the paucity of cases for intermediate, Saturn-sized exoplanets at varying levels of irradiation precludes a detailed understanding of the underlying physics in atmospheric escape of hot gas giants. Aiming to address this issue, our objectives here are to assess the high-energy environment of the warm ($T_{\rm eq} = 970$ K) Saturn WASP-29 b and search for signatures of atmospheric escape. We used far-ultraviolet (FUV) observations from the *Hubble Space Telescope* to analyze the flux time series of HI, CII, SiIII, SiIV, and NV during the transit of WASP-29 b. At 3σ confidence, we rule out any in-transit absorption of HI larger than 92% in the Lyman-α blue wing and 19% in the red wing. We found an in-transit flux decrease of $39\%^{+12\%}_{-11\%}$ in the ground-state CII emission line at 1334.5 Å. But due to this signal being significantly present in only one visit, it is difficult to attribute a planetary or stellar origin to the ground-state CII signal. We place 3σ absorption upper limits of 40%, 49%, and 24% on SiIII, SiIV, and for excited-state CII at 1335.7 Å, respectively. Low activity levels and the faint X-ray luminosity suggest that WASP-29 is an old, inactive star. Nonetheless, an energy-limited approximation combined with the reconstructed EUV spectrum of the host suggests that the planet is losing its atmosphere at a relatively large rate of 4×10^9 g s^{-1}. The non-detection at Lyman-α could be partly explained by a low fraction of escaping neutral hydrogen, or by the state of fast radiative blow-out we infer from the reconstructed Lyman-α line.

Download/Website: `https://arxiv.org/abs/2103.15688`

Contact: `Leonardo.dosSantos@unige.ch`

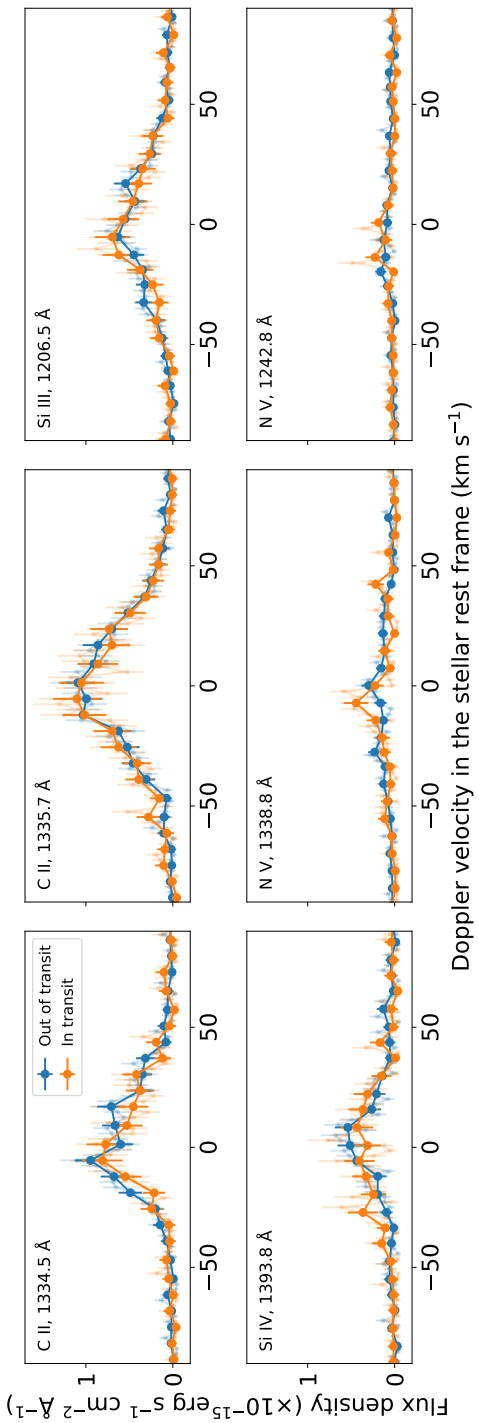

Figure 6: Far-ultraviolet spectroscopy of WASP-29 in- and out of transit using *HST*/COS. The fluxes are stable during the transit in three different epochs, and we do not significantly detect atmospheric signatures.

A Comprehensive Reanalysis of *Spitzer*'s 4.5 μm Phase Curves, and the Phase Variations of the Ultra-hot Jupiters MASCARA-1b and KELT-16b

T. J. Bell[1,2], *L. Dang*[1,2], *N. B. Cowan*[1,2,3], *J. Bean*[4], *J.-M. Désert*[5], *J. J. Fortney*[6], *D. Keating*[1,2], *E. Kempton*[7], *L. Kreidberg*[8], *M. R. Line*[9], *M. Mansfield*[10], *V. Parmentier*[11], *K. B. Stevenson*[12], *M. Swain*[13], *R. T. Zellem*[13]

[1] Department of Physics, McGill University, 3600 rue University, Montréal, QC H3A 2T8, Canada
[2] McGill Space Institute; Institute for Research on Exoplanets; Centre for Research in Astrophysics of Quebec
[3] Department of Earth & Planetary Sciences, McGill University, 3450 rue University, Montréal, QC H3A 0E8, Canada
[4] Department of Astronomy & Astrophysics, University of Chicago, Chicago, IL 60637, USA
[5] Anton Pannekoek Institute for Astronomy, University of Amsterdam, 1090 GE Amsterdam, The Netherlands
[6] Other Worlds Laboratory, Department of Astronomy and Astrophysics, University of California, Santa Cruz, California 95064, USA
[7] Department of Astronomy, University of Maryland, College Park, MD 20742, USA
[8] Max-Planck-Institut für Astronomie, Königstuhl 17, 69117 Heidelberg, Germany
[9] School of Earth & Space Exploration, Arizona State University, Tempe AZ 85287, USA
[10] Department of Geophysical Sciences, University of Chicago, Chicago, IL 60637, USA
[11] Atmospheric, Ocean, and Planetary Physics, Clarendon Laboratory, Department of Physics, University of Oxford, Oxford OX1 3PU, UK
[12] Johns Hopkins University Applied Physics Laboratory, 11100 Johns Hopkins Rd, Laurel, MD 20723, USA
[13] Jet Propulsion Laboratory, California Institute of Technology, 4800 Oak Grove Drive, Pasadena, CA 91109, USA

Monthly Notices of the Royal Astronomical Society, accepted, in press (2020arXiv201000687B)

We have developed an open-source pipeline for the analysis of *Spitzer*/IRAC channel 1 and 2 time-series photometry, incorporating some of the most popular decorrelation methods. We applied this pipeline to new phase curve observations of ultra-hot Jupiters MASCARA-1b and KELT-16b, and we performed the first comprehensive reanalysis of 15 phase curves. We find that MASCARA-1b and KELT-16b have phase offsets of 6^{+11}_{-11} °W and 38^{+16}_{-15} °W, dayside temperatures of 2952^{+100}_{-97} K and 3070^{+160}_{-150} K, and nightside temperatures of 1300^{+340}_{-340} K and 1900^{+430}_{-440} K, respectively. We confirm a strong correlation between dayside and irradiation temperatures with a shallower dependency for nightside temperature. We also find evidence that the normalized phase curve amplitude (peak-to-trough divided by eclipse depth) is correlated with stellar effective temperature. In addition, while our different models often retrieve similar parameters, significant differences occasionally arise between them, as well as between our preferred model and the literature values. Nevertheless, our preferred models are consistent with published phase offsets to within -8 ± 21 degrees (-1.6 ± 3.2 sigma), and normalized phase curve amplitudes are on average reproduced to within -0.01 ± 0.24 (-0.1 ± 1.6 sigma). Finally, we find that BLISS performs best in most cases, but not all; we therefore recommend future analyses consider numerous detector models to ensure an optimal fit and to assess model dependencies.

Download/Website: `https://ui.adsabs.harvard.edu/abs/2020arXiv201000687B`

Contact: `taylor.bell@mail.mcgill.ca`

3 Jobs and Positions

Postdoctoral Position in High-Contrast Imaging

Olivier Absil
STAR Institute, University of Liège, Liège, Belgium

University of Liège, April 2021

The Space Sciences, Technologies, and Astrophysics Research (STAR) Institute of the University of Liège is inviting applications for a postdoctoral research position in the field of adaptive optics and high-contrast imaging. This position is open within the framework of the ERC Consolidator Grant EPIC, which aims to advance high-contrast imaging techniques with the help of machine learning, and to contribute to the development of the ELT/METIS instrument. The successful applicant will work within the Planetary System Imaging Laboratory (PSILab) of the STAR Institute on the development and integration of predictive control techniques for the METIS single-conjugate adaptive optics (SCAO) system, under the supervision of Drs Olivier Absil and Gilles Orban de Xivry, and in collaboration with the Max Planck Institute for Astronomy (MPIA, Heidelberg) where the SCAO module is developed. S/he will more specifically investigate with end-to-end simulations the performance gain provided by various predictive control algorithms for the METIS high-contrast imaging modes, and explore the compatibility of these algorithms with the SCAO control system under development at MPIA. A contribution to the deployment of predictive control on the VLT/SPHERE instrument within its planned upgrade is also considered. In parallel with these two instrument-oriented projects, the successful applicant will explore the application of machine learning techniques to predictive control in a more theoretical framework, in collaboration with the Montefiore Institute for Electrical Engineering and Computer Science (ULiège). The validation of new algorithms in the lab and/or on sky will also be possible, either using our in-house testbed, or in collaborations with ESO or the Subaru/SCExAO team. The successful applicant is expected to spend about 70% of his/her time on this project, while the rest of the time can be spent on a personal research subject, which should preferably be related to the PSILab activities (extrasolar planetary systems, high-contrast imaging, adaptive optics, stellar interferometry).

Applicants must hold a PhD in astronomy, physics (optics/instrumentation), computer science, or a related field by the starting date of the position. A strong background in programming is required. Previous experience in control and/or machine learning would be an asset. Applications should include:

- a cover letter,
- a curriculum vitae and a list of publications,
- a statement of current and future research interests (up to 2 pages).

The application, merged into one single pdf file, should be sent by email to Olivier Absil (`olivier.absil@uliege.be`). The applicants should also provide the names and contact details of three referees who could be contacted for reference letters.

Complete applications received by **1 May 2021** will receive full consideration. The preferred starting date of the appointment is September 2021, although we would accept starting dates up to early 2022. The appointment is initially for two years, with renewals for a third and fourth year contingent upon satisfactory progress.

The position comes with full benefits and a competitive salary. Informal enquiries are welcome and should be sent to the address provided above.

Download/Website: `https://jobregister.aas.org/ad/533a1907` value)

Contact: `olivier.absil@uliege.be`

Exoplanets PhD positions in Geneva

François Bouchy, Stéphane Udry, Damien Ségransan

Department of Astronomy of Geneva University, positions open for 2021 July 1st

The exoplanet team of the University of Geneva has an opening for two PhD positions to work on detection and characterization of exoplanets through high-precision radial velocity (RV) measurements. Focusing on the low-mass range of exoplanets and using high-precision spectrographs, Geneva exoplanets team is strongly involved in blind radial-velocity surveys as well as in the follow-up of transiting candidates from NGTS, K2 and TESS photometric surveys.

One PhD project, supervised by Prof. F. Bouchy, is linked to the study of the properties of transiting planets with a specific focus on warm-transiting planets orbiting low-mass red dwarfs (M-type stars). The PhD student will be involved in the radial velocity follow-up, mass and density measurement of TESS and K2 transiting candidates using HARPS and the Near-InfraRed Planet Searcher (NIRPS), a new near-infrared spectrograph which will be soon installed on the 3.6m ESO telescope. The PhD assistant will be in charge to establish the performances of NIRPS, to select and to vet transiting candidates, to schedule NIRPS observations, to model and analyze the data, and to interpret planets properties. The second PhD project, supervised by Prof. S. Udry and Prof. D. Ségransan, is linked to the blind search for exoplanets using RV technique with both of CORALIE and NIRPS. The PhD assistant will work on the improvement of the detection capacities of the historical CORALIE survey by implementing latest generation of data reduction tools. In addition to monitoring the progresses of the ongoing survey, the candoc will search for giant planets and brown dwarfs on a subsample of active stars for which the data analysis will be fine-tuned. Finally, the candidate will participate to the operations and exploitation of the NIRPS program.

The selected applicants are expected to work on: the optimization of the data-reduction, calibration and RV-extraction from both visible and near-infrared high-resolution spectrographs; the mitigation of the stellar activity; the combination of RV data with photometric and astrometric measurements. They will be strongly involved in the science exploitation of large programs and guarantee observing time of aforementioned spectrographs and in the development of specific tools for the Data and Analysis Center for Exoplanets (DACE) for validation and combined analysis of exoplanets.

The Department of Astronomy of the University of Geneva offers a modern and vibrant work environment, with a wide range of activities including theory, numerical simulations, observations and instrumental developments in the domains of exoplanets, stellar physics, galactic dynamics, observational cosmology and high-energy astrophysics. The exoplanet team is especially well renown, with strong involvement in planet detection, the determination of the planet physical properties, the characterization of planet atmospheres, and the development of an associated world-class instrumentation. We are also co-leading the Swiss-wide National Centre of Competence in Research (NCCR) PlanetS, dedicated to the study of the origin, evolution, and characterization of planets inside and outside our Solar System. The applicant will also have the opportunity to develop collaborations with members of PlanetS.

The applicants are required to have a Master in Astrophysics. Proficiency in Python programming, signal processing and strong interest in data sciences and applied mathematics are considered as a plus. These four-year PhD positions are founded by Swiss National Science Foundation with a gross salary around 50,000 CHF a year. The positions are available 1st July 2021. The University is actively seeking to increase the numbers of women in physics and hence women are strongly encouraged to apply. Interested applicants should send (in a single pdf file) a curriculum vitae, academic transcripts, a motivation letter including information on skills and previous experience, names of people who can be contacted for a letter of recommendation, and the contact details to Prof. François Bouchy and Prof. Stéphane Udry, at the Astronomy Department of Geneva University, before 10th May 2021.

Download/Website: `http://nccr-planets.ch/ http://www.exoplanets.ch.ch/`

Contact: `francois.bouchy@unige.ch - stephane.udry@unige.ch - damien.segransan@unige.ch`

4 Announcements

2021 Sagan Summer Virtual Workshop: Circumstellar Disks and Young Planets

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

Online Workshop, July 19-23, 2021

Free registration and the agenda for the 2021 Sagan Summer Workshop are available on the workshop website.

The 2021 Sagan Summer Workshop will focus on young planets and the circumstellar disks from which they form during the first few million years of a star's lifetime. The workshop will address how transformational new datasets are allowing us to address key questions about the formation and evolution of planets and their potential habitability. The preliminary agenda is available on the workshop website.

The workshop will be held via Zoom webinar and Slack will be used to facilitate discussion before, during, and after the workshop. The workshop will consist of live and pre-recorded talks, live discussions, hands-on sessions, contributed online posters and poster sessions, and virtual 'lunches with speakers'. As in previous years, all talks will be recorded and posted on the Sagan Summer Workshop YouTube channel.

The Sagan Summer Workshops are aimed at advanced undergraduates, grad students, and postdocs, however all are welcome to attend. Please visit the workshop website to register and to view the agenda.

Download/Website: `http://nexsci.caltech.edu/workshop/2021`
Contact: `sagan_workshop@ipac.caltech.edu`

5 Exoplanet Archives

March Updates at the NASA Exoplanet Archive

The NASA Exoplanet Archive team
Caltech/IPAC-NASA Exoplanet Science Institute, MC 100-22 Pasadena CA 91125

Pasadena CA USA, April 11, 2021

March 18, 2021

Three New Planets

Three planets have been added this week, all of them from the Gliese-Jahreiss (GJ) catalog and found using the radial velocity method. One planet in particular, GJ 486 b, has been identified as a hot, rocky super-Earth that has possibly retained some of its original atmosphere, making it a good candidate for atmospheric follow-up studies. See the media release for details (`https://bit.ly/39PNC08`). The other new planets are GJ 414 A b & c.

See the new planetary data in the Planetary Systems Table (gamma) (`http://bit.ly/2Pt0tM1`) and its companion table, Planetary Systems Composite Parameters (gamma) (`https://bit.ly/2Fer9NU`), which offers a more complete table of planet parameters combined from multiple references and calculations.

New Transmission Spectra for GJ 1132 b

We've updated the Transmission Spectroscopy table with data from Swain et al. (2021) on GJ 1132 b, a known, rocky sub-Neptune located 41 light-years away that may have lost its atmosphere and regenerated a new one from volcanic activity. See NASA's media release for details (`https://go.nasa.gov/39N3TmL`).

March 4, 2021

Gamma Leaps for New Overview Pages and Planetary Systems Composite Parameters Table

The redesigned system overview pages and the Planetary Systems Composite Parameters (PSCP) table (`https://bit.ly/2Fer9NU`) have both been upgraded from beta to gamma versions this week. The changes, which are described in the Archive 2.0 Release Notes (`https://bit.ly/3rVQPTx`), include:

- **PSCP**: Update to include stellar parameters that were not published as part of the planetary solutions, providing a more complete view of the properties of the host stars.
- **System Overviews:**
  - Implemented overviews for candidate-only systems (e.g., KOI-753: `https://exoplanetarchive.ipac.caltech.edu/overview/KOI-753`).
  - Archive services and interfaces that link to overviews now default to new overviews. For example, entering a planet, candidate, or host name in the home page **Explore the Archive** search displays the new overview, as well as clicking a planet name in the PS and PSCP interactive tables.

For more information about the changes to the archive's tools and services, please see this Transition document and the Archive 2.0 Release Notes.

Thirteen New Planets

There are 13 new planets this week—more than half of them discovered by NASA's TESS! The new planets are K2-138 g, GJ 251 b, HD 238090 b, NGTS-14 A b, HD 13808 b & c, HD 183579 b, HD 110082 b, TOI-628 b, TOI-640 b, TOI-1333 b, TOI-1478 b, and TOI-1601 b. (The last seven in this list are the TESS planets.)

One of this week's new planets, K2-138 g, was discovered by Caltech/IPAC-NExScI postdoc Kevin Hardegree-Ullman, with help from citizen scientists in the Zooniverse Exoplanet Explorers project (`https://bit.ly/3mrrChr`). Congratulations to Kevin and team!

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

Instrumentation & Observational techniques

What can NGTS do for me? by *Peter Wheatley* – talk/350
Photometry from Antarctica by *Georgina Dransfield* – talk/348
Background Subtraction Methods with NGTS by *Beth Henderson* – talk/339
A data driven approach to transit spectroscopy calibration by *Jeroen Bouwman* – talk/271

Formation & Evolution

Stellar dependence of planet formation - UKEXOM 2021 by *Olja Panic* – talk/347
How planets grow by pebble accretion by *Marc Brouwers* – talk/341
The inner regions of protoplanetary discs by *Marija Jankovic* – talk/328
Planetary Embryo Collisions and the Wiggly Nature of Extreme Debris Disks by *Lewis Watt* – talk/325
Impact of differential rotation on tidal inertial waves in exoplanetary systems by *Aurelie Astoul* – talk/323
Predictions for exozodiacal dust dragged in from an exo-Kuiper belt by *Jessica Rigley* – talk/320
The Polydisperse Streaming Instability by *Francesco Lovascio* – talk/319
The influence of convection on tidal flows by *Craig Duguid* – talk/310
Reduced Atmospheres of Post-Impact Worlds by *Jonathan Itcovitz* – talk/292
Radial structure of exoKuiper belts - UKEXOM21 by *Sebastian Marino* – talk/287
On the origin of the eccentricity dichotomy displayed by compact super-Earths: dynamical heating by cold giants by *Sanson Poon* – talk/286
Giant Planets Can Suppress Gravitational Instabilities In Protoplanetary Discs by *Sahl Rowther* – talk/284
Evolution of dust in gravitoviscous protoplanetary disks by *Vardan Elbakyan* – talk/281
Tracing Exoplanets Through Time with TESS by *Matthew Battley* – talk/280

System architectures and dynamics

Obliquities of cold stars with transiting planets by *Vedad Kunovac Hodzic* – talk/346
Exoplanet demographics and detection: transiting planets as probes of stellar variability and planetary architectures by *Lauren Doyle* – talk/317
Characterising Multi-Planet Systems with CHEOPS by *Thomas Wilson* – talk/299
Tidal dissipation in stars with predictions for planetary orbital decay by *Adrian Barker* – talk/276
The post-main-sequence fate of the HR 8799 planetary system by *Dimitri Veras* – talk/269

Atmospheric theory

Extreme weather on close-in gas giants by *Xianyu Tan* – talk/345
3D simulations of warm and hot Jupiter atmospheres: the role of 3D mixing in shaping CH4-to-CO conversion pathways by *Maria Zamyatina* – talk/343
Atmospheric photochemistry and the potential impacts of stellar flares by *Robert Ridgway* – talk/334
Rotational and divergent components of atmospheric circulation on tidally locked planets by *Neil Lewis* – talk/316

Venus as an Exoplanet: Photochemistry around K- and M-Dwarfs by *Sean Jordan* – talk/312
Effects of thermal emission on Chandrasekhar's semi-infinite diffuse reflection problem by *Soumya Sengupta* – talk/311
Thermal and Radiative Conditions in Mini-Neptune Atmospheres by *Anjali Piette* – talk/306
Studying the atmospheres of temperate mini-Neptunes using 3D GCM simulations by *Hamish Innes* – talk/289
Predicting The Equatorial Jet Speed on Terrestrial Tidally Locked Planets by *Mark Hammond* – talk/275

Atmospheric characterization

Transmission spectroscopy with VLT FORS2: a featureless transmission spectrum for the low-density transiting exoplanet WASP-88b by *Petros Spyratos* – talk/344
Variability in Exoplanet Atmospheres by *Niall Owens* – talk/342
Mapping the helium outflow of WASP 107b by *Admin Team* – talk/338
GCMs, Clouds, and Synthetic Observations by *Duncan Christie* – talk/335
Decomposing the Iron Absorption Signal of the Ultra-Hot Jupiter WASP-76b Using 3D Monte-Carlo Radiative Transfer by *Joost Wardenier* – talk/331
Using Doppler Tomography for the Characterisation of Exoplanet Atmospheres by *Shannon Matthews* – talk/321
An irradiated inflated brown dwarf by *Sarah Casewell* – talk/294
LRG-BEASTS: A Transmission Spectrum of the hot Jupiter WASP-94A b by *Eva-Maria Ahrer* – talk/290
The Pitfalls of Bayes: On the Use of Statistical Goodness of Fit Criteria in the Evaluation of Transmission Spectra by *Tom J Wilson* – talk/285
Detecting molecules in giant planet atmospheres with the MIRI-MRS onboard JWST by *Polychronis Patapis* – talk/274
LRG-BEASTS: Sodium in the Atmosphere of the Hot-Saturn WASP-21b by *Lili Alderson* – talk/272

Planet interiors

Islands in a black sky: Towards scaling relationships for dynamic topography and land propensity on rocky planets by *Claire Marie Guimond* – talk/326
Planet Formation and the Composition of Rocky Planets by *Amy Bonsor* – talk/315
Constraining the size of White Dwarf pollutants by *Andrew Buchan* – talk/300
bf Tidal Dissipation in Dual-Body, Highly Eccentric, and Non-synchronously Rotating Systems by *Joe Renaud* – talk/268

Planet detection

NGTS 15b, 16b, 17b and 18b: four hot Jupiters from the Next Generation Transit Survey by *Rosanna Tilbrook* – talk/322
Mass and density of the super-Earth LHS 1478 b (TOI-640 b) by *Maritza Soto* – talk/318
TOI-431: a super-Earth and sub-Neptune transiting a bright, early K-Dwarf, with an additional RV planet (UKEXOM21) by *Ares Osborn* – talk/305
Exploring the variety of small planets with HARPS-N by *Annelies Mortier* – talk/291
Probing mantle redox with planetary atmospheres by *Philippa Liggins* – talk/279
The BEBOP RV Search for Circumbinary Planets by *Matthew Standing* – talk/278

Host star characterzation

Mapping magnetic activity indicators across the M dwarf domain by *Marina Lafarga Magro* – talk/313

Low Mass Eclipsing Binaries from NGTS by *Jack Acton* – talk/298
Are Jupiter hosting stars younger? A Gaia kinematic study of exoplanet host stars. by *Mayank Narang* – talk/293

Future missions & observatories

Terra Hunting Experiment: Finding another Earth with HARPS3 by *Samantha Thompson* – talk/303
The ExoClock Project: an open integrated platform for maintaining the Ariel target ephemerides with contributions from the public by *Anastasia Kokori* – talk/295

Habitability & biosignatures

Oxygen's 2.4 billion year control on Earth's atmosphere with consequences for exoplanet biosignatures by *Gregory Cooke* – talk/277
Methane's non-linear effect on climate in three-dimensional Archean-like atmospheres by *Jake Eager* – talk/273

7 As seen on astro-ph

astro-ph/2103.00010: **Atmospheric characterization of hot Jupiters using hierarchical models of Spitzer observations** by *Dylan Keating, Nicolas B. Cowan*

astro-ph/2103.00016: **The theory of kinks – I. A semi-analytic model of velocity perturbations due to planet-disc interaction** by *Francesco Bollati et al.*

astro-ph/2103.00554: **Effects of thermal emission on Chandrasekhar's semi-infinite diffuse reflection problem** by *Soumya Sengupta*

astro-ph/2103.00568: **A new sample of warm extreme debris disks from the ALLWISE catalog** by *Attila Moor et al.*

astro-ph/2103.01016: **An ultra-short-period transiting super-Earth orbiting the M3 dwarf TOI-1685** by *P.Bluhm et al.*

astro-ph/2103.01236: **Survival of ALMA Rings in the Absence of Pressure Maxima** by *Haochang Jiang, Chris W. Ormel*

astro-ph/2103.01239: **Rapid Formation of Super-Earths Around Low-Mass Stars** by *Brianna Zawadzki, Daniel Carrera, Eric Ford*

astro-ph/2103.01316: **Increased isolation mass for pebble accreting planetary cores in pressure maxima of protoplanetary discs** by *Zsolt Sandor, Zsolt Regaly*

astro-ph/2103.01410: **Implications of an improved water equation of state for water-rich planets** by *Chenliang Huang et al.*

astro-ph/2103.01536: **Concepts for future missions to search for technosignatures** by *Hector Socas-Navarro et al.*

astro-ph/2103.01601: **ExoMol line lists – XLI. High-temperature molecular line lists for the alkali metal hydroxides KOH and NaOH** by *A. Owens, J. Tennyson, S. N. Yurchenko*

astro-ph/2103.01896: **An Earth-mass Planet in a Time of Covid-19: KMT-2020-BLG-0414Lb** by *Weicheng Zang et al.*

astro-ph/2103.01974: **The Impact of Stellar Clustering on the Observed Multiplicity and Orbital Periods of Planetary Systems** by *Steven N. Longmore et al.*

astro-ph/2103.02127: **Exoplanet Statistics and Theoretical Implications** by *Wei Zhu, Subo Dong*

astro-ph/2103.02374: **Hemispheric Tectonics on super-Earth LHS 3844b** by *Tobias G. Meier et al.*

astro-ph/2103.02392: **A super-resolution analysis of the DSHARP survey: Substructure is common in the inner 30 au** by *Jeff Jennings et al.*

astro-ph/2103.02566: **The Effect of the Approach to Gas Disk Gravitational Instability on the Rapid Formation of Gas Giant Planets. II. Quadrupled Spatial Resolution** by *Alan P. Boss*

astro-ph/2103.02571: **Quantitative estimates of impact induced crustal erosion during accretion and its influence on the Sm/Nd ratio of the Earth** by *Laetitia Allibert et al.*

astro-ph/2103.02627: **The JADE code: Coupling secular exoplanetary dynamics and photo-evaporation** by *O. Attia et al.*

astro-ph/2103.02673: **Closed-formed ab initio solutions of geometric albedos and reflected light phase curves of exoplanets** by *Kevin Heng, Brett M. Morris, Daniel Kitzmann*

astro-ph/2103.02685: **A transiting warm giant planet around the young active star TOI-201** by *Melissa J. Hobson et al.*

astro-ph/2103.02694: **The future lifespan of Earth's oxygenated Atmosphere** by *K. Ozaki, C. Reinhard*

astro-ph/2103.02709: **A Gaussian Process Regression Reveals No Evidence for Planets Orbiting Kapteyn's Star** by *Anna Bortle et al.*

astro-ph/2103.02868: **The role of post-shock heating by plastic deformation during impact devolatilization of calcite** by *Kosuke Kurosawa et al.*

astro-ph/2103.03094: **First Detection of Hydroxyl Radical Emission from an Exoplanet Atmosphere: High-dispersion Characterization of WASP-33b using Subaru/IRD** by *Stevanus K. Nugroho et al.*

astro-ph/2103.03259: **Revisiting the Kepler field with TESS: Improved ephemerides using TESS 2min data** by *Matthew P. Battley et al.*

astro-ph/2103.03268: **The HOSTS survey: evidence for an extended dust disk and constraints on the presence of giant planets in the Habitable Zone of β Leo** by *D. Defrere et al.*

astro-ph/2103.03455: **On the Detection of Habitable Trojan Planets in the Kepler Circumbinary Systems** by *Jeffrey J. Sudol, Nader Haghighipour*

astro-ph/2103.03881: **Near-IR observations of the young star [BHB2007]-1: A sub-stellar companion opening the gap in the disk** by *Alice Zurlo et al.*

astro-ph/2103.03976: **The SPHERE infrared survey for exoplanets (SHINE) – II. Observations, Data reduction and analysis Detection performances and early-results** by *M. Langlois et al.*

astro-ph/2103.04342: **Detectability of Rocky-Vapour Atmospheres on Super-Earths with Ariel** by *Yuichi Ito et al.*

astro-ph/2103.04366: **The SPHERE infrared survey for exoplanets (SHINE)- I Sample definition and target characterization** by *S. Desidera et al.*

astro-ph/2103.04476: **Pebble trapping in vortices: three-dimensional simulations** by *Natalie Raettig, Wladimir Lyra, Hubert Klahr*

astro-ph/2103.04806: **Homogeneous model for the TRAPPIST-1e planet with an icy layer** by *Yeva Gevorgyan*

astro-ph/2103.04950: **A nearby transiting rocky exoplanet that is suitable for atmospheric investigation** by *T. Trifonov et al.*

astro-ph/2103.04977: **Fomalhaut b could be massive and sculpting the narrow, eccentric debris disc, if in mean-motion resonance with it** by *Tim D. Pearce et al.*

astro-ph/2103.04996: **Spatially resolved spectroscopy across stellar surfaces. V. Observational prospects: Toward Earth-like exoplanet detection** by *Dainis Dravins (Lund), Hans-Guenter Ludwig (Heidelberg), Bernd Freytag (Uppsala)*

astro-ph/2103.05148: **A Harsh Test of Far-Field Scrambling with the Habitable Zone Planet Finder and the Hobby Eberly Telescope** by *Shubham Kanodia et al.*

astro-ph/2103.05377: **Perturbers: SPHERE detection limits to planetary-mass companions in protoplanetary disks** by *R. Asensio-Torres et al.*

astro-ph/2103.05449: **Assessing the Formation of Solid Hydrogen Objects in Starless Molecular Cloud Cores** by *W. Garrett Levine, Gregory Laughlin*

astro-ph/2103.05647: **NEMESIS: Exoplanet Transit Survey of Nearby M-Dwarfs in TESS FFIs I** by *Dax L. Feliz et al.*

astro-ph/2103.05654: **CO isotopolog line fluxes of viscously evolving disks: cold CO conversion insufficient to explain observed low fluxes** by *Leon Trapman et al.*

astro-ph/2103.05657: **Detection of an Atmosphere on a Rocky Exoplanet** by *Mark R. Swain et al.*

astro-ph/2103.05698: **Gemini/GMOS Optical Transmission Spectroscopy of WASP-121b: signs of variability in an ultra-hot Jupiter?** by *Jamie Wilson et al.*

astro-ph/2103.05713: **Bayesian constraints on the origin and geology of exo-planetary material using a population of externally polluted white dwarfs** by *John H. D. Harrison et al.*

astro-ph/2103.06045: **Gravitoviscous protoplanetary disks with a dust component. V. The dynamic model for freeze-out and sublimation of volatiles** by *Tamara Molyarova et al.*

astro-ph/2103.06275: **Analytic Light Curves in Reflected Light: Phase Curves, Occultations, and Non-Lambertian Scattering for Spherical Planets and Moons** by *Rodrigo Luger et al.*

astro-ph/2103.06330: **Triggering A Climate Change Dominated "Anthropocene": Is It Common Among Exo-civilizations?** by *Ethan Savitch et al.*

astro-ph/2103.06349: **Evidence for differentiation of the most primitive small bodies** by *B. Carry et al.*

astro-ph/2103.06736: **A coupled model of episodic warming, oxidation and geochemical transitions on early Mars** by *Robin Wordsworth et al.*

astro-ph/2103.07023: **Chemical variation with altitude and longitude on exo-Neptunes: Predictions for Ariel phase-curve observations** by *Julianne I. Moses et al.*

astro-ph/2103.07185: **Evidence for disequilibrium chemistry from vertical mixing in hot Jupiter atmospheres. A comprehensive survey of transiting close-in gas giant exoplanets with warm-Spitzer/IRAC** by *C. Baxter et al.*

astro-ph/2103.07602: **New Measurement of the Vertical Atmospheric Density Profile from Occultations of the Crab Nebula with X-Ray Astronomy Satellites Suzaku and Hitomi** by *Satoru Katsuda et al.*

astro-ph/2103.07673: **Photoevaporative Dispersal of Protoplanetary Disks around Evolving Intermediate-mass Stars** by *Masanobu Kunitomo et al.*

astro-ph/2103.07753: **Water on Hot Rocky Exoplanets** by *Edwin S. Kite, Laura Schaefer*

astro-ph/2103.08462: **HD142527: Quantitative disk polarimetry with SPHERE** by *S. Hunziker et al.*

astro-ph/2103.08600: **Aurora: A Generalised Retrieval Framework for Exoplanetary Transmission Spectra** by *Luis Welbanks, Nikku Madhusudhan*

astro-ph/2103.08604: **When the Peas Jump around the Pod: How Stellar Clustering Affects the Observed Correlations between Planet Properties in Multi-Planet Systems** by *Melanie Chevance (Heidelberg University), J. M. Diederik Kruijssen (Heidelberg University), Steven N. Longmore (LJMU)*

astro-ph/2103.08785: **Caught in the Act: Core-powered Mass-loss Predictions for Observing Atmospheric Escape** by *Akash Gupta, Hilke E. Schlichting*

astro-ph/2103.09201: **Circumbinary habitable zones in the presence of a giant planet** by *Nikolaos Georgakarakos, Siegfried Eggl, Dobbs-Dixon*

astro-ph/2103.09212: **To cool is to keep: Residual H/He atmospheres of super-Earths and sub-Neptunes** by *William Misener, Hilke E. Schlichting*

astro-ph/2103.09239: **Exploiting the transit timing capabilities of Ariel** by *L. Borsato et al.*

astro-ph/2103.09254: **Puffed up Edges of Planet-opened Gaps in Protoplanetary Disks. I. hydrodynamic simulations** by *Jiaqing Bi*

astro-ph/2103.09264: **Life as the Only Reason for the Existence of N2-O2-Dominated Atmospheres** by *Laurenz Spross et al.*

astro-ph/2103.09313: **Water Ice Cloud Variability Multi-Epoch Transmission Spectra of TRAPPIST-1e** by *E. M. May et al.*

astro-ph/2103.09359: **Starshade Exoplanet Data Challenge** by *Renyu Hu et al.*

astro-ph/2103.09505: **The role of planetary interior in the long-term evolution of atmospheric CO2 on Earth-like exoplanets** by *M. Oosterloo et al.*

astro-ph/2103.09643: **HADES RV Programme with HARPS-N at TNG XIII. A sub-Neptune around the M dwarf GJ 720 A** by *E. Gonzalez-Alvarez et al.*

astro-ph/2103.09746: **TESS re-observes the young multi-planet system TOI-451: refined ephemeris and activity evolution** by *Oscar Barragan et al.*

astro-ph/2103.09864: **The Hubble PanCET program: Long-term chromospheric evolution and flaring activity of the M dwarf host GJ 3470** by *V. Bourrier et al.*

astro-ph/2103.10155: **Exploring terrestrial lightning parameterisations for exoplanets and brown dwarfs** by *G. Hodosan, Ch. Helling, I. Vorgul*

astro-ph/2103.10177: **First 3-D grid-based gas-dust simulations of circumstellar disks with an embedded planet** by *Fabian Binkert, Judit Szulagyi, Til Birnstiel*

astro-ph/2103.10216: **The CARMENES search for exoplanets around M dwarfs, No evidence for a super-Earth in a 2-day orbit around GJ 1151** by *M. Perger et al.*

astro-ph/2103.10301: **3-D Global modelling of the early martian climate under a dense CO2+H2 atmosphere and for a wide range of surface water inventories** by *Martin Turbet, Francois Forget*

astro-ph/2103.10302: **NGTS 15b, 16b, 17b and 18b: four hot Jupiters from the Next Generation Transit Survey** by *Rosanna H. Tilbrook et al.*

astro-ph/2103.10395: **The GAPS programme at TNG XXX. Atmospheric Rossiter-McLaughlin effect and atmospheric dynamics of KELT-20b** by *M. Rainer et al.*

astro-ph/2103.10398: **Lightning on exoplanets and brown dwarfs: Modelling and detection of lightning signatures throughout the electromagnetic spectrum** by *Gabriella Hodosan*

astro-ph/2103.10465: **A bright inner disk and structures in the transition disk around the very low-mass star CIDA 1** by *P. Pinilla et al.*

astro-ph/2103.10971: **Evidence for a Cosmic Ray Gradient in the IM Lup Protoplanetary Disk** by *Richard A. Seifert et al.*

astro-ph/2103.11150: **ESPRESSO Mass determination of TOI-263b: An extreme inhabitant of the brown dwarf desert** by *E. Palle et al.*

astro-ph/2103.11880: **Systematic KMTNet Planetary Anomaly Search, Paper I: OGLE-2019-BLG-1053Lb, A Buried Terrestrial Planet** by *Weicheng Zang et al.*

astro-ph/2103.11995: **The growth of super-Earths: the importance of a self-consistent treatment of disc structures and pebble accretion** by *Sofia Savvidou, Bertram Bitsch*

astro-ph/2103.12076: **SOAR TESS Survey. II: The impact of stellar companions on planetary populations** by *Carl Ziegler et al.*

astro-ph/2103.12084: **Dynamical dust traps in misaligned circumbinary discs: analytical theory and numerical simulations** by *Cristiano Longarini et al.*

astro-ph/2103.12128: **Meridional Circulation of Dust and Gas in the Circumstellar Disk: Delivery of Solids onto the Circumplanetary Region** by *J. SzulÃ¡gyi, F. Binkert, C. Surville*

astro-ph/2103.12139: **TransitFit: an exoplanet transit fitting package for multi-telescope datasets and its application to WASP-127 b, WASP-91 b, and WASP-126 b** by *J.J.C. Hayes et al.*

astro-ph/2103.12484: **The Onset of Chaos in Permanently Deformed Binaries from Spin-Orbit and Spin-Spin Coupling** by *Darryl Seligman, Konstantin Batygin*

astro-ph/2103.12538: **The TESS Objects of Interest Catalog from the TESS Prime Mission** by *Natalia M. Guerrero et al.*

astro-ph/2103.12644: **The effect of the streaming instability on protoplanetary disc emission at millimetre wavelengths** by *Chiara E. Scardoni, Richard A. Booth, Cathie J. Clarke*

astro-ph/2103.12760: **Two Bright M Dwarfs Hosting Ultra-Short-Period Super-Earths with Earth-like Compositions** by *Teruyuki Hirano et al.*

astro-ph/2103.12790: **TOI-1634 b: an Ultra-Short Period Keystone Planet Sitting Inside the M Dwarf Radius Valley** by *R. Cloutier et al.*

astro-ph/2103.12824: **Discovery of an Edge-on Circumstellar Debris Disk Around BD+45 598: a Newly Identifed Member of the β Pictoris Moving Group** by *Sasha Hinkley et al.*

astro-ph/2103.12858: **A Spectral Survey of WASP-19b with ESPRESSO** by *Elyar Sedaghati et al.*

astro-ph/2103.12877: **Biases in orbit fitting of directly-imaged exoplanets with small orbital coverage** by *Rodrigo Ferrer-Chavez, Jason J. Wang, Sarah Blunt*

astro-ph/2103.12922: **Constraints on the mass and atmospheric composition and evolution of the low-density young planet DS Tuc A b** by *S. Benatti et al.*

astro-ph/2103.12963: **On the Period-Ratio-Mass-Ratio Correlation of Extra-Solar Multi-Planet Systems** by *Sridhar Gajendran et al.*

astro-ph/2103.13012: **Anoxic Atmospheres on Mars Driven by Volcanism: Implications for Past Environments and Life** by *Steven F. Sholes et al.*

astro-ph/2103.13117: **How does the mass and activity history of the host star affect the population of low-mass planets?** by *Daria Kubyshkina, Aline A. Vidotto*

astro-ph/2103.13366: **Formation of giant planets with large metal masses and metal fractions via giant impacts in a rapidly dissipating disk** by *Masahiro Ogihara et al.*

astro-ph/2103.13474: **Vortex-like kinematic signal, spirals, and beam smearing effect in the HD 142527 disk** by *Y. Boehler et al.*

astro-ph/2103.14228: **Assessment of Isoprene as a Possible Biosignature Gas in Exoplanets with Anoxic Atmospheres** by *Zhuchang Zhan et al.*

astro-ph/2103.14566: **An exploration of model degeneracies with a unified phase curve retrieval analysis: The light and dark sides of WASP-43 b** by *Quentin Changeat et al.*

astro-ph/2103.14945: **AB Aurigae: Possible evidence of planet formation through the gravitational instability** by *James Cadman, Ken Rice, Cassandra Hall*

astro-ph/2103.15124: **A new approach to spectroscopic phase curves: The emission spectrum of WASP-12b observed in quadrature with HST/WFC3** by *J. Arcangeli et al.*

astro-ph/2103.15146: **Streaming instability in a global patch simulation of protoplanetary disks** by *Mario Flock, Andrea Mignone*

astro-ph/2103.15688: **HST PanCET program: Non-detection of atmospheric escape in the warm Saturn-sized planet WASP-29 b** by *L. A. dos Santos et al.*

astro-ph/2103.15720: **A transmission spectrum of the planet candidate WD 1856+534 b and a lower limit to its mass** by *R. Alonso et al.*

astro-ph/2103.15823: **Hot Jupiters, cold kinematics: High phase space densities of host stars reflect an age bias** by *Alexander J. Mustill, Michiel Lambrechts, Melvyn B. Davies*

astro-ph/2103.15833: **Trends in Spitzer Secondary Eclipses** by *Nicole L. Wallack, Heather A. Knutson, Drake Deming*

astro-ph/2103.15843: **Tilting Planets During Planet Scattering** by *Gongjie Li*

astro-ph/2103.15902: **Spin Dynamics of Extrasolar Giant Planets in Planet-Planet Scattering** by *Yu-Cian Hong et al.*

astro-ph/2103.16213: **HD 143006: circumbinary planet or misaligned disc?** by *G.Ballabio et al.*

astro-ph/2103.16315: **The influence of surface CO2 condensation on the evolution of warm and cold rocky planets orbiting Sun-like stars** by *Irene Bonati, Ramses M. Ramirez*

astro-ph/2103.16539: **Simulations of starspot anomalies within TESS exoplanetary transit light curves – II** by *J. Tregloan-Reed, E. Unda-Sanzana*

astro-ph/2103.16636: **Detection of Rotational Variability in Floofy Objects at Optical Wavelengths** by *L. C. Mayorga et al.*

astro-ph/2103.16676: **The Dark World: A Tale of WASP-43b in Reflected Light with HST WFC3/UVIS** by *Jonathan Fraine et al.*

astro-ph/2103.16731: **An asymmetric dust ring around a very low mass star ZZ Tau IRS** by *Jun Hashimoto, Ruobing Dong, Takayuki Muto*

astro-ph/2103.16875: **Modification of icy planetesimals by early thermal evolution and collisions: Constraints for formation time and initial size of comets and small KBOs** by *Gregor Golabek, Martin Jutzi*

astro-ph/2103.00062: **Revisiting the analysis of HW Vir eclipse timing data I. A frequentist data modeling approach and a dynamical stability analysis** by *Ekrem M. Esmer et al.*

astro-ph/2103.01993: **A test of the planet-star unipolar inductor for magnetic white dwarfs** by *N. Walters et al.*

astro-ph/2103.02273: **On-sky measurements of atmospheric dispersion: II. Atmospheric models characterization** by *B. Wehbe. et al.*

astro-ph/2103.02665: **The Anatomy of an Unusual Edge-on Protoplanetary Disk I. Dust Settling in a Cold Disk** by *S. Wolff et al.*

astro-ph/2103.02666: **The Anatomy of an Unusual Edge-on Protoplanetary Disk. II. Gas temperature and a warm outer region** by *Christian Flores et al.*

astro-ph/2103.02923: **Longevity is the key factor in the search for technosignatures** by *Amedeo Balbi, Milan M. Circovic*

astro-ph/2103.03609: **Experimental study of clusters in dense granular gas and implications for the particle stopping time in protoplanetary disks** by *Niclas Schneider et al.*

astro-ph/2103.03880: **Spatially resolved spectroscopy across stellar surfaces. IV. F, G, K-stars: Synthetic 3D spectra at hyper-high resolution** by *Dainis Dravins (Lund), Hans-GÃnter Ludwig (Heidelberg), Bernd Freytag (Uppsala)*

astro-ph/2103.03950: **Warm millimetre dust in protoplanetary discs near massive stars** by *T. J. Haworth*

astro-ph/2103.04713: **Amplitude and frequency modulation of super-Nyquist frequency from Kepler photometric sampling** by *Weikai Zong, Stephane Charpinet*

astro-ph/2103.04819: **Self-scattering on large, porous grains in protoplanetary disks with dust settling** by *Robert Brunngraeber, Sebastian Wolf*

astro-ph/2103.05326: **Near real-time precipitable water vapour monitoring for correcting near-infrared observations using satellite remote sensing** by *E.A. Meier Valdes, B.M. Morris, B.-O. Demory*

astro-ph/2103.05508: **A two-step gravitational cascade for the fragmentation of self-gravitating discs** by *Noe Brucy, Patrick Hennebelle*

astro-ph/2103.06193: **Sparse Box-fitting Least Squares** by *Aviad Panahi, Shay Zucker*

astro-ph/2103.06898: **SCExAO/MEC and CHARIS Discovery of a Low Mass, 6 AU-Separation Companion to HIP 109427 using Stochastic Speckle Discrimination and High-Contrast Spectroscopy** by *Sarah Steiger et al.*

astro-ph/2103.08456: **Broadband stability of the Habitable Zone Planet Finder Fabry-Perot etalon calibration system: evidence for chromatic variation** by *Ryan C Terrien et al.*

astro-ph/2103.08481: **Ariel Planetary Interiors White Paper** by *Ravit Helled et al.*

astro-ph/2103.09216: **Temperature and Distance Dependence of Tidal Circularization in Close Binaries: A Catalog of Eclipsing Binaries in the Southern Hemisphere Observed by the TESS Satellite** by *Anders B. Justesen, Simon Albrecht*

astro-ph/2103.09251: **Orbital Evolution of Equal-Mass Eccentric Binaries Due to a Gas Disk: Eccentric Inspirals and Circular Outspirals** by *Daniel J. D'Orazio, Paul C. Duffell*

astro-ph/2103.09252: **Improved Contrast in Images of Exoplanets using Direct SNR Optimization** by *William Thompson, Christian Marois*

astro-ph/2103.09601: **Ancillary science with Ariel: Feasibility and scientific potential of young stellar object observations** by *Boldizsar I. Gyürüs et al.*

astro-ph/2103.10285: **LcTools II: The QuickFind Method for Finding Signals and Associated TTVs in Light Curves from NASA Space Missions** by *Allan Schmitt, Andrew Vanderburg (University of Wisconsin-Madison)*

astro-ph/2103.10593: **Mass-velocity dispersion relation using Gaia data and its effect on interpreting short-duration microlensing events** by *Sedighe Sajadian, Sohrab Rahvar, Fatemeh Kazemian*

astro-ph/2103.12135: **Modeling chemistry during star formation: Water deuteration in dynamic star-forming regions** by *S. S. Jensen et al.*

astro-ph/2103.12722: **Science Commissioning of NIHTS: The Near-infrared High Throughput Spectrograph on the Lowell Discovery Telescope** by *Annika Gustafsson et al.*

astro-ph/2103.13706: **New binaries from the SHINE survey** by *M. Bonavita et al.*

astro-ph/2103.14335: **The future influence of six exoplanets on the envelope properties of their parent stars on the giant branches** by *Ivan Rapoport et al.*

astro-ph/2103.15460: **Stellar versus Galactic: The intensity of cosmic rays at the evolving Earth and young exoplanets around Sun-like stars** by *D. Rodgers-Lee et al.*

astro-ph/2103.15921: **On the multiscale behaviour of stellar activity and rotation of the planet host Kepler-30** by *D. B. de Freitas et al.*

astro-ph/2103.16318: **Planet-induced radio emission from the coronae of M dwarfs: the case of Prox Cen and AU Mic** by *Robert D. Kavanagh et al.*

astro-ph/2103.16453: **An ALMA Survey of Protoplanetary Disks in Lynds 1641** by *Sierra L. Grant et al.*

astro-ph/2103.16745: **The Planetary Ephemeris Program: Capability, Comparison, and Open Source Availability** by *John F. Chandler et al.*

astro-ph/2103.00013: **A canonical transformation to eliminate resonant perturbations I** by *Barnabas Deme, Bence Kocsis*

astro-ph/2103.09035: **Predicting the phase behaviors of superionic water at planetary conditions** by *Bingqing Cheng et al.*

astro-ph/2103.12062: **Evolution and mass extinctions as lognormal stochastic processes** by *Claudio Maccone*

astro-ph/2103.15071: **The Curious Case of Argon** by *Margarita Safonova, Alfia Saini*

astro-ph/2103.15829: **Kepler's Goat Herd: An Exact Solution for Elliptical Orbit Evolution** by *Oliver H. E. Philcox, Jeremy Goodman, Zachary Slepian*

astro-ph/2103.16737: **I Knew You Were Trouble: Emotional Trends in the Repertoire of Taylor Swift** by *Megan Mansfield, Darryl Seligman*

astro-ph/2103.17079: **The Existential Threat of Future Exoplanet Discoveries** by *Michael B. Lund*