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1 Editorial

Dear readers,

Welcome to Edition 134 of the ExoPlanet News!

In this August issue you will find abstracts of scientific papers, conference announcements/updates, Exoplanet Archive updates, job postings, a proposal call, and an overview of exoplanet-related articles on astro-ph.

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

The next issue will appear on 15 September 2020.

Thanks again for your support.
Best healthy wishes from the editorial team,

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

2 Abstracts of refereed papers

An astrometric planetary companion candidate to the M9 Dwarf TVLM 513−46546

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The Astronomical Journal, 160, 97 (12pp) (https://iopscience.iop.org/article/10.3847/1538-3881/ab9e6e)

Astrometric observations of the M9 dwarf TVLM 513−46546 taken with the VLBA reveal an astrometric signature consistent with a period of 221 $\pm$ 5 days. The orbital fit implies that the companion has a mass m_p = 0.35−0.42 M_J, a circular orbit ($e \simeq 0$), a semi-major axis a = 0.28−0.31 AU and an inclination angle i = 71−88°. The detected companion, TVLM 513b, is one of the few giant-mass planets found associated to UCDs. The presence of a Saturn-like planet on a circular orbit, 0.3 AU from a 0.06−0.08 $M_\odot$ star, represents a challenge to planet formation theory.

Figure 4. Astrometric fit of the UCD TVLM 513−46546 using our recent VLBA data. The upper two panels show the parallax fit of the source after subtracting proper motions and the astrometric signal of the companion. The middle panels show the astrometric fit of the companion after removing parallax and proper motions. The lower panels show the residuals of the astrometric fit.

Download/Website: `https://iopscience.iop.org/article/10.3847/1538-3881/ab9e6e / arXiv:2008.01595v1`

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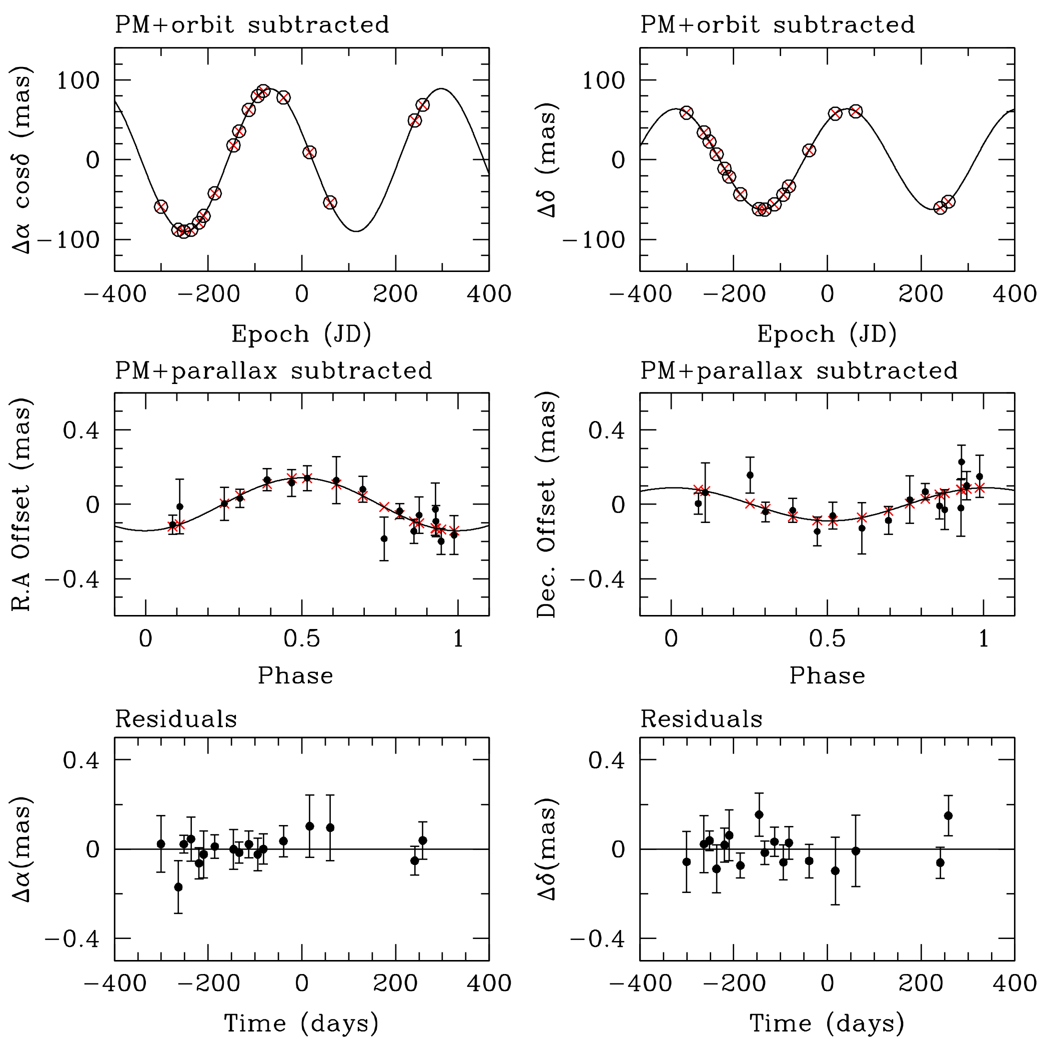

Figure 1: Figure 4. Astrometric fit of the UCD TVLM 513−46546 using our recent VLBA data. The upper two panels show the parallax fit of the source after subtracting proper motions and the astrometric signal of the companion. The middle panels show the astrometric fit of the companion after removing parallax and proper motions. The lower panels show the residuals of the astrometric fit

Search for helium in the upper atmosphere of the hot Jupiter WASP-127 b using Gemini/Phoenix

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Astronomy & Astrophysics, published (2020A&A...640A..29D)

Large-scale exoplanet search surveys have shown evidence that atmospheric escape is a ubiquitous process that shapes the evolution and demographics of planets. However, we lack a detailed understanding of this process because very few exoplanets that have been discovered to date could be probed for signatures of atmospheric escape. Recently, the metastable helium triplet at 1.083 μm has been shown to be a viable window for the presence of He-rich escaping envelopes around short-period exoplanets. Our objective is to use, for the first time, the Phoenix spectrograph to search for helium in the upper atmosphere of the inflated hot Jupiter WASP-127 b. We observed one transit and reduced the data manually since no pipeline is available. We did not find a significant in-transit absorption signal indicative of the presence of helium around WASP-127 b, and we set a 90% confidence upper limit for excess absorption at 0.87% in a 0.75 Å passband covering the He triplet. Given the large scale height of this planet, the lack of a detectable feature is likely due to unfavorable photoionization conditions for populating the metastable HeI triplet. This conclusion is supported by the inferred low coronal and chromospheric activity of the host star and the old age of the system, which result in a relatively mild high-energy environment around the planet. Transmission spectrum of WASP-127 b around the He triplet. Absorption is positive. The vertical dashed lines represent the positions of each line of the He triplet.

Download/Website: https://doi.org/10.1051/0004-6361/202038802

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Detection of Na in WASP-21b's lower and upper atmosphere

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Astronomy & Astrophysics, in press (arXiv:2007.13429)

Optical transmission spectroscopy provides crucial constraints on the reference pressure levels and scattering properties for the atmospheres of hot Jupiters. For certain planets, where alkali atoms are detected in the atmosphere, their line profiles could serve as a good probe to link upper and lower atmospheric layers. The planet WASP-21b is a Saturn-mass hot Jupiter orbiting a thick-disk star, with a low density and an equilibrium temperature of 1333 K, which makes it a good target for transmission spectroscopy. Here, we present a low-resolution transmission spectrum for WASP-21b based on one transit observed by the OSIRIS spectrograph at the 10.4 m Gran Telescopio Canarias (GTC), and a high-resolution transmission spectrum based on three transits observed by HARPS-N at Telescopio Nazinale Galileo (TNG) and HARPS at the ESO 3.6 m telescope. We performed spectral retrieval analysis on GTC's low-resolution transmission spectrum and report the detection of Na at a confidence level of >3.5-σ. The Na line exhibits a broad line profile that can be attributed to pressure broadening, indicating a mostly clear planetary atmosphere. The spectrum shows a tentative excess absorption at the K D_1 line. Using HARPS-N and HARPS, we spectrally resolved the Na doublet transmission spectrum. An excess absorption at the Na doublet is detected during the transit, and shows a radial velocity shift consistent with the planet orbital motion. We proposed a metric to quantitatively distinguish hot Jupiters with relatively clear atmospheres from others, and WASP-21b has the largest metric value among all the characterized hot Jupiters. The detection of Na both in the lower and upper atmospheres of WASP-21b reveals that it is an ideal target for future follow-up observations, providing the opportunity to understand the nature of its atmosphere across a wide range of pressure levels.

Download/Website: `https://ui.adsabs.harvard.edu/abs/2020arXiv200713429C/abstract`

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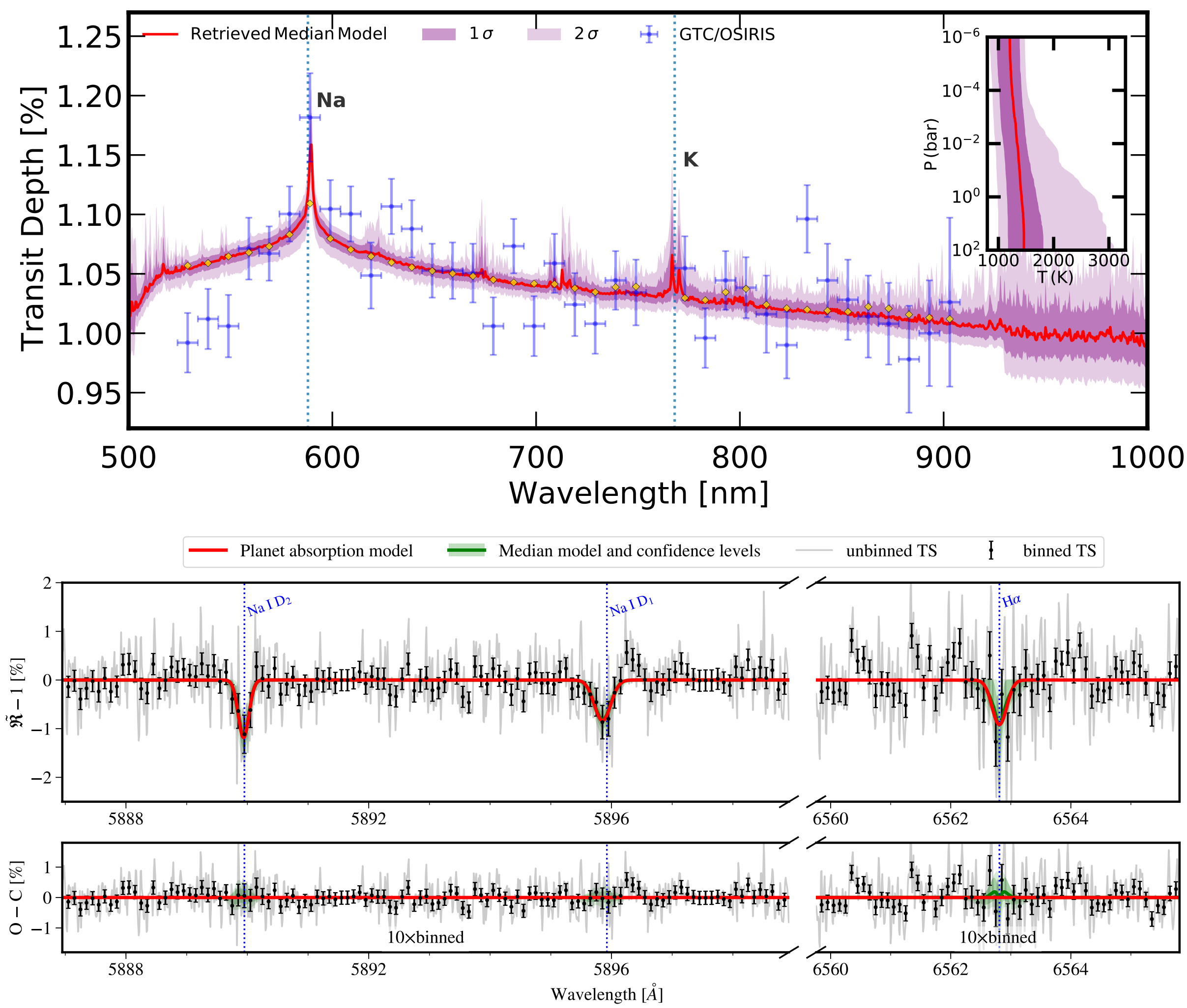

Figure 2: *Top row:* Low-resolution transmission spectrum of WASP-21b observed by GTC/OSIRIS and retrieved models. It shows a strong absorption peak at ∼589 nm, which is preferentially explained by the retrieval models by including the opacity resulting from Na. *Bottom row:* High-resolution transmission spectrum of WASP-21b observed by ESO/HARPS and TNG/HARPS-N. The Na doublet is clearly resolved.

Colour-magnitude diagrams of transiting Exoplanets - III. A public code, nine strange planets, and the role of Phosphine.

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Monthly Notices of the Royal Astronomical Society, in press (arXiv:2008.00995)

Colour-Magnitude Diagrams provide a convenient way of comparing populations of similar objects. When well populated with precise measurements, they allow quick inferences to be made about the bulk properties of an astronomic object simply from its proximity on a diagram to other objects. We present here a Python toolkit which allows a user to produce colour-magnitude diagrams of transiting exoplanets, comparing planets to populations of ultra-cool dwarfs, of directly imaged exoplanets, to theoretical models of planetary atmospheres, and to other transiting exoplanets. Using a selection of near- and mid-infrared colour-magnitude diagrams, we show how outliers can be identified for further investigation, and how emerging sub-populations can be identified. Additionally, we present evidence that observed differences in the *Spitzer*'s 4.5μm flux, between irradiated Jupiters, and field brown dwarfs, might be attributed to phosphine, which is susceptible to photolysis. The presence of phosphine in low irradiation environments may negate the need for thermal inversions to explain eclipse measurements. We speculate that the anomalously low 4.5μm flux flux of the nightside of HD 189733b and the daysides of GJ 436b and GJ 3470b might be caused by phosphine absorption. Finally, we use our toolkit to include *Hubble* WFC3 spectra, creating a new photometric band called the 'Water band' (W_{JH}-band) in the process. We show that the colour index [W_{JH}-H] can be used to constrain the C/O ratio of exoplanets, showing that future observations with *JWST* and *Ariel* will be able to distinguish these populations if they exist, and select members for future follow-up.

Download/Website: `https://arxiv.org/pdf/2008.00995.pdf`

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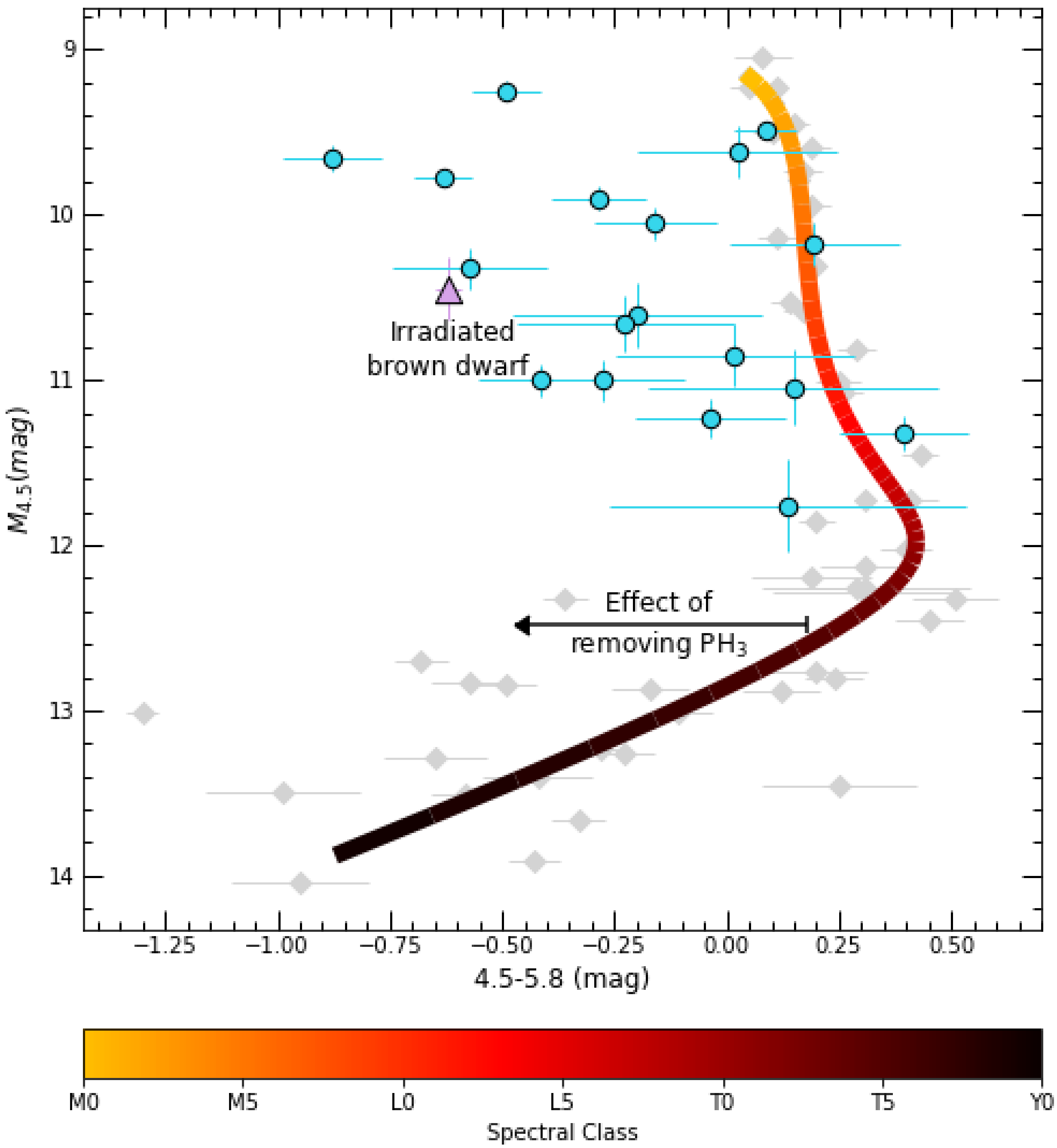

Figure 3: Colour-magnitude diagram showing the comparative blueness of planets with respect to brown dwarfs of similar brightness. Planets are plotted as blue circles in the foreground, while brown dwarfs are grey diamonds in the background. The polynomial shows the mean position of the brown dwarf sequence and is coloured according to their spectral type. The planetary absolute magnitudes have been scaled to a size of $0.9R_J$ for better comparison with brown dwarfs. Additionally, we have plotted the position of the irradiated brown dwarf WD0137-349B as a lilac triangle. The black arrow indicates the effect on this colour of removing phosphine.

Planetary Systems in a Star Cluster II: intermediate-mass black holes and planetary systems

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MNRAS, in press (https://arxiv.org/abs/2007.11999)

Most stars form in dense stellar environments. It is speculated that some dense star clusters may host intermediate-mass black holes (IMBHs), which may have formed from runaway collisions between high-mass stars, or from the mergers of less massive black holes. Here, we numerically explore the evolution of populations of planets in star clusters with an IMBH. We study the dynamical evolution of single-planet systems and free-floating planets, over a period of 100 Myr, in star clusters without an IMBH, and in clusters with a central IMBH of mass 100 $M_{\odot}$ or 200 $M_{\odot}$. In the central region ($r \leq 0.2$ pc), the IMBH's tidal influence on planetary systems is typically 10 times stronger than the average neighbour star. For a star cluster with a $200 M_{\odot}$ IMBH, the region in which the IMBH's influence is stronger within the virial radius (~ 1 pc). The IMBH quenches mass segregation, and the stars in the core tend to move towards intermediate regions. The ejection rate of both stars and planets is higher when an IMBH is present. The rate at which planets are expelled from their host star rate is higher for clusters with higher IMBH masses, for $t < 0.5 t_{\rm rh}$, while remains mostly constant while the star cluster fills its Roche lobe, similar to a star cluster without an IMBH. The disruption rate of planetary systems is higher in initially denser clusters, and for wider planetary orbits, but this rate is substantially enhanced by the presence of a central IMBH

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Search for TiO and Optical Nightside Emission from the Exoplanet WASP-33b

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The Astronomical Journal, published (2020AJ....160...93H)

With a temperature akin to an M-dwarf, WASP-33b is among the hottest Jupiters known, making it an ideal target for high-resolution optical spectroscopy. By analyzing both transmission and emission spectra, we aim to substantiate previous reports of atmospheric TiO and a thermal inversion within the planet's atmosphere. We observed two transits and six arcs of the phase curve with ESPaDOns on the Canada-France-Hawaii Telescope and HIRES on the Keck telescope, which provide high spectral resolution and ample wavelength coverage. We employ the Doppler cross-correlation technique to search for the molecular signatures of TiO and H_2O in these spectra, using models based on the TiO line list of Plez. Though we cannot exclude line-list-dependent effects, our data do not corroborate previous indications of a thermal inversion. Instead we place a 3σ upper limit of 10^{-9} on the volume mixing ratio of TiO for the T-P profile we consider. While we are unable to constrain the volume mixing ratio of water, our strongest constraint on TiO comes from dayside emission spectra. This apparent absence of a stratosphere sits in stark contrast to previous observations of WASP-33b as well as theoretical predictions for the atmospheres of highly irradiated planets. The discrepancy could be due to variances between line lists, and we stress that detection limits are only as good as the line list employed, and are only valid for the specific T-P profile considered due to the strong degeneracy between lapse rate ($dT/d\log P$) and molecular abundance.

Download/Website: `https://doi.org/10.3847/1538-3881/ab9e77`

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The Transit and Light Curve Modeller

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Monthly Notices of the Royal Astronomical Society, published (ADS-Bibcode: 2020MNRAS.496.4442C)

Transit and Light Curve Modeller (TLCM), a computer code with the purpose of analysing photometric time series of transits simultaneously with the out-of-transit light variations and radial velocity curves of transiting/eclipsing binary systems, is presented here. Joint light-curve and radial velocity fits are possible with it. The code is based on the combination of a genetic algorithm and simulated annealing. Binning, beaming, reflection, and ellipsoidal effects are included. Both objects may have their own luminosities and therefore one can use TLCM to analyse the eclipses of both exoplanet and well-detached binary systems. A simplified RossiterMcLaughlin effect is included in the radial velocity fit, and drifts and offsets of different instruments can also be fitted. The impact of poorly known limb darkening on the RossiterMcLaughlin effect is shortly studied. TLCM is able to manage red-noise effects via wavelet analysis. It is also possible to add parabolic or user-defined baselines and features to the code. I also predict that light variations due to beaming in some systems exhibiting radial velocity drift should be observed by, e.g. PLATO. The fit of the beaming effect is improved by invoking a physical description of the ellipsoidal effects, which has an impact on the modelling of the relativistic beaming; I also point out the difficulties that are stemming from the fact that beaming and first-order reflection effects have the same form of time dependence. Recipe is given, which describes how to analyse grazing transit events. The code is freely available.

Download/Website: `https://doi.org/10.1093/mnras/staa349`

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The EBLM project. VII. Spin–orbit alignment for the circumbinary planet host EBLM J0608-59 A/TOI-1338 A

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Monthly Notices of the Royal Astronomical Society, in press (2020MNRAS.497.1627K)

A dozen short-period detached binaries are known to host transiting circumbinary planets. In all circumbinary systems so far, the planetary and binary orbits are aligned within a couple of degrees. However, the obliquity of the primary star, which is an important tracer of their formation, evolution, and tidal history, has only been measured in one circumbinary system until now. EBLM J0608-59/TOI-1338 is a low-mass eclipsing binary system with a recently discovered circumbinary planet identified by *TESS*. Here, we perform high-resolution spectroscopy during primary eclipse to measure the projected stellar obliquity of the primary component. The obliquity is low, and thus the primary star is aligned with the binary and planetary orbits with a projected spin–orbit angle $\beta = 2.8 \pm 17.1$ deg. The rotation period of 18.1 ± 1.6 d implied by our measurement of $v \sin i_\star$ suggests that the primary has not yet pseudo-synchronized with the binary orbit, but is consistent with gyrochronology and weak tidal interaction with the binary companion. Our result, combined with the known coplanarity of the binary and planet orbits, is suggestive of formation from a single disc. Finally, we considered whether the spectrum of the faint secondary star could affect our measurements. We show through simulations that the effect is negligible for our system, but can lead to strong biases in $v \sin i_\star$ and β for higher flux ratios. We encourage future studies in eclipse spectroscopy test the assumption of a dark secondary for flux ratios $\geq$1 ppt.

Download/Website: `https://arxiv.org/abs/2007.05514`

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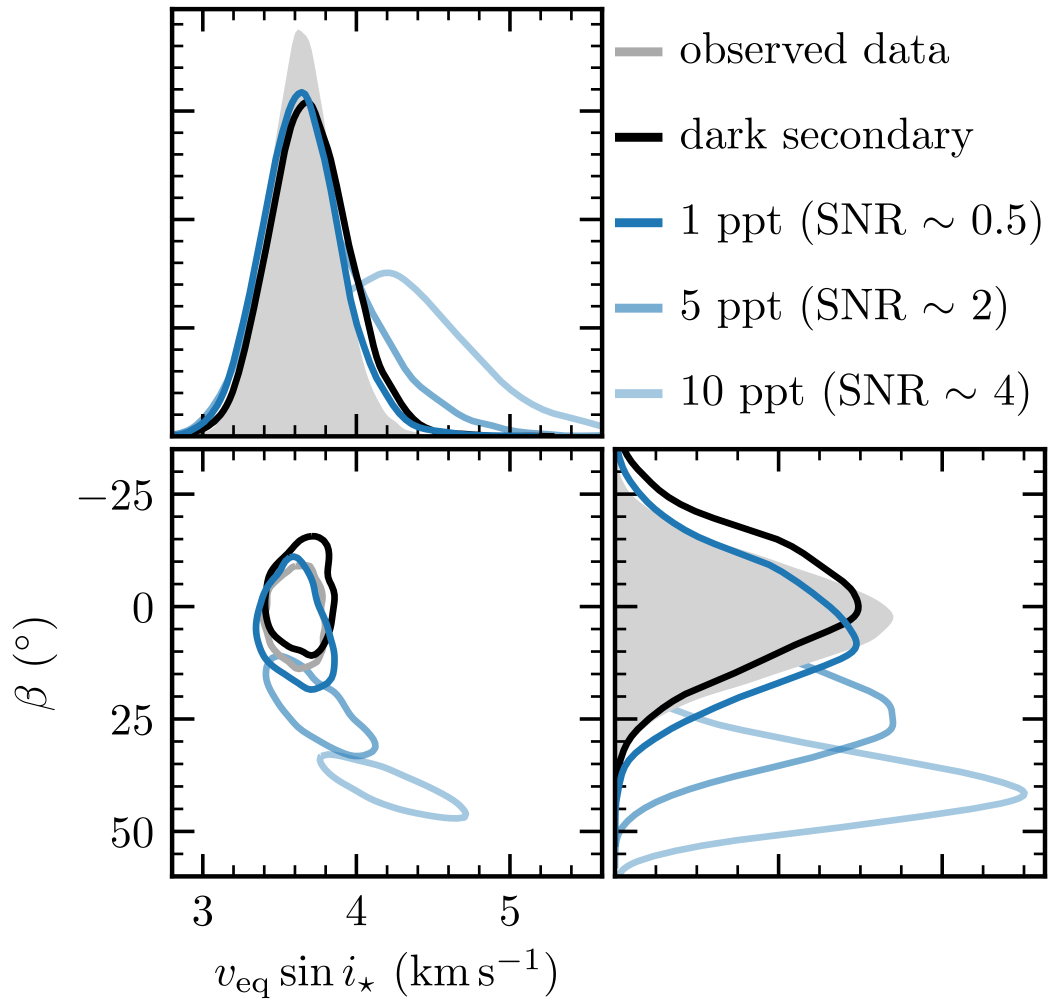

Figure 4: Simulation of the impact of varying levels of emission flux from the secondary star on the retrieved values for $v \sin i_\star$ and β. The posterior distribution for the observed data is shown in grey, and is compared to the simulation with no contamination from a secondary spectrum in black. The coloured lines show the simulated effect for increasing relative flux contribution from the occulting body. The estimated flux contamination for J0608-59 is $\sim$1 ppt, which agrees very well with the simulated data. The lower left panel shows the 1σ contours.

Global Analysis of the TRAPPIST Ultra-Cool Dwarf Transit Survey

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Monthly Notices of the Royal Astronomical Society, in press (arXiv:2007.07278)

We conducted a global analysis of the TRAPPIST Ultra-Cool Dwarf Transit Survey – a prototype of the SPECULOOS transit search conducted with the TRAPPIST-South robotic telescope in Chile from 2011 to 2017 – to estimate the occurrence rate of close-in planets such as TRAPPIST-1b orbiting ultra-cool dwarfs. For this purpose, the photometric data of 40 nearby ultra-cool dwarfs were reanalysed in a self-consistent and fully automated manner starting from the raw images. The pipeline developed specifically for this task generates differential light curves, removes non-planetary photometric features and stellar variability, and searches for transits. It identifies the transits of TRAPPIST-1b and TRAPPIST-1c without any human intervention. To test the pipeline and the potential output of similar surveys, we injected planetary transits into the light curves on a star-by-star basis and tested whether the pipeline is able to detect them. The achieved photometric precision enables us to identify Earth-sized planets orbiting ultra-cool dwarfs as validated by the injection tests. Our planet-injection simulation further suggests a lower limit of 10 per cent on the occurrence rate of planets similar to TRAPPIST-1b with a radius between 1 and 1.3 $R_\oplus$ and the orbital period between 1.4 and 1.8 days.

Download/Website: `https://arxiv.org/abs/2007.07278`

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Interpreting high spatial resolution line observations of planet-forming disks with gaps and rings - The case of HD 163296

Ch. Rab[1,5], *I. Kamp*[1], *C. Dominik*[2], *C. Ginski*[2,3], *G. A. Muro-Arena*[2], *W.-F. Thi*[5], *L. B. F. M. Waters*[4,2], *P. Woitke*[6,7]

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Astronomy & Astrophysics, in press (arXiv:2008.05941)

Context. Spatially resolved continuum observations of planet-forming disks show prominent ring and gap structures in their dust distribution. However, the picture from gas observations is much less clear and constraints on the radial gas density structure (i.e. gas gaps) remain rare and uncertain.
Aims. We want to investigate the importance of thermo-chemical processes for the interpretation of high-spatial-resolution gas observations of planet-forming disks and their impact on derived gas properties.
Methods. We apply the radiation thermo-chemical disk code ProDiMo (PROtoplanetary DIsk MOdel) to model self-consistently the dust and gas disk of HD 163296, using the DSHARP (Disk Substructure at High Angular Resolution) gas and dust observations. With this model we investigate the impact of dust gaps and gas gaps, considering chemistry and heating/cooling processes, on the observables and the derived gas properties.
Results. We find distinct peaks in the radial line intensity profiles of the CO line data of HD 163296 at the location of the dust gaps. Our model indicates that those peaks are not only a consequence of a gas temperature increase within the gaps but are mainly caused by the absorption of line emission from the back side of the disk by the dust rings. For two of the three prominent dust gaps in HD 163296, we find that thermo-chemical effects are negligible for deriving density gradients via measurements of the rotation velocity. However, for the gap with the highest dust depletion, the temperature gradient can be dominant and needs to be considered to derive accurate gas density profiles.
Conclusions. Self-consistent gas and dust thermo-chemical modelling in combination with high-quality observations of multiple molecules are necessary to accurately derive gas gap depths and shapes. This is crucial to determine the origin of gaps and rings in planet-forming disks and to improve the mass estimates of forming planets if they are the cause of the gap.

Download/Website: `https://arxiv.org/abs/2008.05941/`

Contact: `rab@mpe.mpg.de`

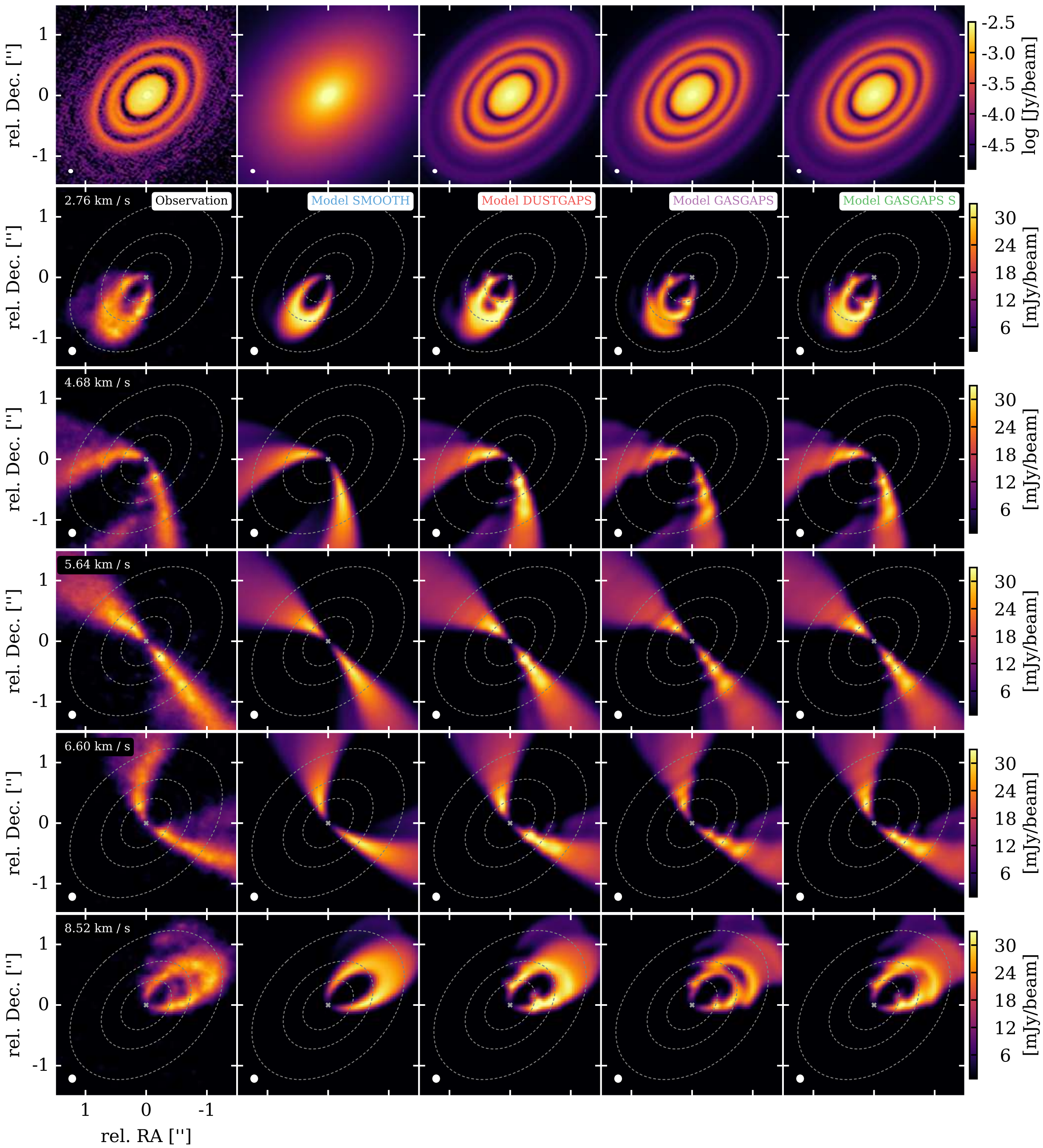

Figure 5: Dust continuum images and channel maps for the model series in comparison to the observations for the disk of HD 163296. Each row shows, from left to right the observations, the model without any gaps (SMOOTH), the model with dust gaps only (DUSTGAPS), the model with dust and gas gaps (GASGAPS) and the model with dust and shallow gas gaps (GASGAPS S). In the top row the dust continuum (note the logarithmic scale) is shown for comparison, the five remaining rows show the ^{12}CO $J = 2 - 1$ emission for selected velocity channels. The velocity is given in the top left corner of each row. The dashed ellipses in the channel maps indicate the location of the dust gaps for reference. The filled white ellipses in the bottom left corner of each panel indicate beam size of the observations.

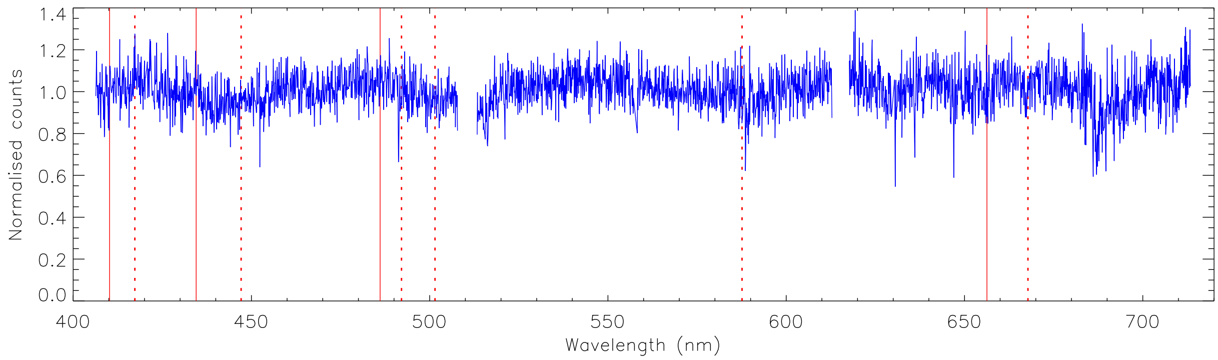

Figure 6: **Figure 3.** SALT/RSS spectrum of the white dwarf WASP-98 B. The spectrum has been rectified to a continuum level of unity by dividing by a quadratic function. The positions of the hydrogen Balmer lines are indicated using vertical solid lines. The positions of a selection of helium lines typically strong in DB atmospheres are shown using vertical dotted lines.

A white dwarf bound to the transiting planetary system WASP-98

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MNRAS, in press (arXiv:2008.02533)

WASP-98 is a planetary system containing a hot Jupiter transiting a late-G dwarf. A fainter star 12″ distant has previously been identified as a white dwarf, with a distance and proper motion consistent with a physical association with the planetary system. We present spectroscopy of the white dwarf, with the aim of determining its mass, radius and temperature and hence the age of the system. However, the spectra show the featureless continuum and lack of spectral lines characteristic of the DC class of white dwarfs. We therefore fitted theoretical white dwarf spectra to the $ugriz$ apparent magnitudes and *Gaia* DR2 parallax of this object in order to determine its physical properties and the age of the system. We find that the system is old, with a lower limit of 3.6 Gyr, but theoretical uncertainties preclude a precise determination of its age. Its kinematics are consistent with membership of the thick disc, but do not allow us to rule out the thin-disc alternative. The old age and low metallicity of the system suggest it is subject to an age-metallicity relation, but analysis of the most metal-rich and metal-poor transiting planetary systems yields only insubstantial evidence of this. We conclude that the study of bound white dwarfs can yield independent ages to planetary systems, but such analysis may be better-suited to DA and DB rather than DC white dwarfs.
Figure 3. SALT/RSS spectrum of the white dwarf WASP-98 B. The spectrum has been rectified to a continuum level of unity by dividing by a quadratic function. The positions of the hydrogen Balmer lines are indicated using vertical solid lines. The positions of a selection of helium lines typically strong in DB atmospheres are shown using vertical dotted lines.

Download/Website: `https://arxiv.org/abs/2008.02533`

Contact: `astro.js@keele.ac.uk`

The SPHERE infrared survey for exoplanets (SHINE) III. The demographics of young giant exoplanets below 300 au with SPHERE

A. Vigan[1], C. Fontanive[2,3], M. Meyer[4,5], B. Biller[6,7,8], M. Bonavita[6], M. Feldt[8], S. Desidera[3], G.-D. Marleau[9,2,8], A. Emsenhuber[10,2], R. Galicher[11], K. Rice[7,12], D. Forgan[13], C. Mordasini[2,8], R. Gratton[3], H. Le Coroller[1], A.-L. Maire[14,8], F. Cantalloube[8], G. Chauvin[15,16], A. Cheetham[17], J. Hagelberg[17], A.-M. Lagrange[15], M. Langlois[18,1], M. Bonnefoy[15], J.-L. Beuzit[1,15], A. Boccaletti[11], V. D'Orazi[3], P. Delorme[15], C. Dominik[19], Th. Henning[8], M. Janson[8,20], E. Lagadec[21], C. Lazzoni[3], R. Ligi[22], F. Menard[15], D. Mesa[3], S. Messina[23], C. Moutou[24,1], A. Müller[8], C. Perrot[11,25,26], M. Samland[8,20], H. M. Schmid[5], T. Schmidt[11], E. Sissa[3], M. Turatto[3], S. Udry[17], A. Zurlo[1,27,28], L. Abe[21], J. Antichi[3], R. Asensio-Torres[8], A. Baruffolo[3], P. Baudoz[11], J. Baudrand[11], A. Bazzon[5], P. Blanchard[1], A. J. Bohn[29], S. Brown Sevilla[8], M. Carbillet[21], M. Carle[1], E. Cascone[3], J. Charton[15], R. Claudi[3], A. Costille[1], V. De Caprio[30], A. Delboulbé[15], K. Dohlen[1], N. Engler[5], D. Fantinel[3], P. Feautrier[15], T. Fusco[31,1], P. Gigan[11], J. H. Girard[25,15], E. Giro[3], D. Gisler[5], L. Gluck[15], C. Gry[1], N. Hubin[33], E. Hugot[1], M. Jaquet[1], M. Kasper[33,15], D. Le Mignant[1], M. Llored[1], F. Madec[1], Y. Magnard[15], P. Martinez[21], D. Maurel[15], O. Möller-Nilsson[8], D. Mouillet[15], T. Moulin[15], A. Origné[1], A. Pavlov[8], D. Perret[11], C. Petit[31], J. Pragt[15], P. Puget[15], P. Rabou[15], J. Ramos[15], E. L. Rickman[17], F. Rigal[15], S. Rochat[15], R. Roelfsema[32], G. Rousset[11], A. Roux[15], B. Salasnich[3], J.-F. Sauvage[31,1], A. Sevin[11], C. Soenke[33], E. Stadler[15], M. Suarez[33], Z. Wahhaj[34,1], L. Weber[17], F. Wildi[17]

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Astronomy & Astrophysics, published (arXiv:2007.06573)

The SpHere INfrared Exoplanet (SHINE) project is a 500-star survey performed with VLT/SPHERE for the purpose of directly detecting new sub-stellar companions and understand their formation and early evolution. Here we present an initial statistical analysis for a sub-sample of 150 stars spanning spectral types from B to M representative of the full SHINE sample. Our goal is to constrain the frequency of sub-stellar companions with masses between 1 and 75 $\mathrm{M_{Jup}}$ and semi-major axes between 5 and 300 au. For this purpose, we adopt detection limits as a function of angular separation from the survey data for all stars converted into mass and projected orbital separation using the BEX-COND-hot evolutionary tracks and known distance to each system. Based on the results obtained for each star and the 13 detections in the sample, we use an Markov chain Monte Carlo (MCMC) tool to compare our observations to two different types of models. The first is a parametric model based on observational constraints, while the second type are numerical models that combines state-of-the-art core accretion and gravitational instability planet population synthesis. Using the parametric model, we show that the frequencies of systems with at least one sub-stellar companion are $23.0^{+13.5}_{-9.7}\%$, $5.8^{+4.7}_{-2.8}\%$ and $12.6^{+12.9}_{-7.1}\%$ for BA, FGK and M stars respectively. We also demonstrate that a planet-like formation pathway probably dominates the mass range from 1–75 $\mathrm{M_{Jup}}$ for companions around BA stars, while for M dwarfs brown dwarf binaries dominate detections. On the contrary, for FGK stars a combination of binary star-like and planet-like formation is required to best fit the observations. Using our population model, and restricting our sample to FGK stars, we derive a frequency of $5.7^{+3.8}_{-2.8}\%$, consistent with predictions from the parametric model. More generally, the frequency values that we derive are in excellent agreement with values obtained in previous studies.

3 Conferences

Matter under Extreme Conditions

Zuzana Konopkova, Gerd Steinle-Neumann, and Ronald Redmer

Bad Honnef, Germany, October 20-23, 2020

We would like to draw your attention to the WE-Heraeus-Seminar on Matter under Extreme Conditions that we are organizing October 20-23, 2020 in the Physikzentrum in Bad Honnef, Germany. The seminar will cover a wide range of topics from the structure and dynamics of exoplanets to experimental and computational work on planetary materials, with an interesting list of invited speakers that should make the various topics accessible also to non-experts and foster cross-disciplinary discussions.
Despite the difficulties of organizing such a meeting in times of the SARS-CoV-2 pandemic, the WE-Heraeus Foundation and we came up with a hybrid meeting form that promises to make seminar participation a valuable experience. Some of the speakers and participants will be on-site in Bad Honnef, from where the sessions will be moderated, while others will participate remotely. All speakers will be available for the discussions that go along with each of the topical sessions.
On-site participation will be supported by the WE-Heraeus Foundation by providing free accommodation and meals; participants will cover their own travel expenses. Participation requires a poster presentation and therefore the submission of an abstract. For both on-site and online participation, please fill out the application form (see link below) by August 30.
We hope to see some of you in Bad Honnef and many of you online. Zuzana Konopkova, Gerd Steinle-Neumann and Ronald Redmer.

Download/Website: `https://www.we-heraeus-stiftung.de/veranstaltungen/seminare/2020/matter-unde`

Contact: `g.steinle-neumann@uni-bayreuth.de`

PLATO ESP 2020 – Planetary Interiors and System Architectures

Sz. Csizmadia
DLR (German Aerospace Center), Rutherfordstrasse 2, Berlin, Germany

Online Workshop, 30 Nov - 3 Dec, 2020

We invite you to attend the PLATO Extra-Solar Planets 2020 (ESP2020) workshop, to be held virtually between 30th November - 3rd December 2020. (The original place was Berlin, Germany, but due to the known pandemic situation we decided that the workshop will be virtual this year.) This is the third such workshop. The first one was held in Marseille, France (2018) and the second one was in Warwick, UK (2019).
The topic of the workshop this year is ”Planetary interiors and system architectures”. The aims of the workshop are to discuss how PLATO may help to understand planetary interiors and give new and more precise constraints on them, and to identify which open issues of planetary system architecture could be solved by PLATO's future measurements. We will also discuss what was learned from earlier (CoRoT, Kepler/K2, TESS, and ground-based measurements) related to system architectures and how the observations are confronted by theory.
More information about PLATO ESP2019 can be found at https://platoesp.org/, including a link to the registration and abstract submission form. The closing date for registration is Wednesday, 30th of September 2020 at 23:59pm UTC+2.
We look forward to seeing you at the workshop. If you have any questions, please contact the LOC at psmoffice@warwick.ac.uk.

Download/Website: `https://platoesp.org/`

Contact: `szilard.csizmadia@dlr.de`

Exoplanet Demographics I Conference

J. Christiansen
NASA Exoplanet Science Institute, California Institute of Technology, Pasadena, CA, USA

Pasadena, CA, November 9-12, 2020

The first Exoplanet Demographics conference, hosted by the NASA Exoplanet Science Institute, will be held November 9-12, 2020. This will be a fully virtual meeting and there is no registration free. The abstract deadline has passed for the meeting however registration is still open. The full agenda will be published before the end of August.

This conference will bring together community members working both theoretically and observationally on understanding exoplanet demographics focusing on the following themes.

- What are the current limitations on our ability to discern the true underlying planet population from the observed distribution?
- What can the size and/or mass distribution of exoplanets teach us about the dominant planet formation, migration, and evolution pathways?
- What properties of stars affect the types of planets that form, and how can we use the properties of stars to study planet formation?
- What can we learn from planetary systems or disks around stellar remnants and substellar objects?
- How will upcoming missions advance our understanding of exoplanet demographics?

Download/Website: `http://nexsci.caltech.edu/workshop/2020`

Contact: `exodem@ipac.caltech.edu`

4 Exoplanet Archive Updates

July 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, August 18, 2020

Note: All new planetary data can be viewed in the Confirmed Planets (`http://bit.ly/2MqFnub`), Composite Planet Data (`http://bit.ly/2l84Qw9`), and Extended Planet Data (`http://bit.ly/2NLy1Ci`) tables. Data can also be found in the Microlensing Data Table (`http://bit.ly/2JQr180`) or Direct Imaging Table (`http://bit.ly/3ayD185`).

Also, the new alpha release of the Planetary Systems table allows you to browse ALL the planet and host star solutions (`http://bit.ly/2Pt0tM1`), and clicking on a planet name in the table takes you to the planet's redesigned System Overview page.

July 23, 2020

Among the 14 new planets added this week is TYC 8998-760-1 c (`https://bit.ly/31KdAgH`), which is the second exoplanet found by direct imaging in a system that has a star similar to our own Sun. Read the discovery paper (`https://bit.ly/31KCzAL`) and the NASA Discovery Alert (`https://go.nasa.gov/2XScmPA`).

The other 13 new planets—11 of which are NASA TESS discoveries—are HD 95338 b, BD-11 4672 c, HIP 67522 b, HD 191939 b, c, & d, TOI-700 b, c, & d, TOI-1899 b, HIP 65 A b, TOI-157 b, and TOI-169 b. These discoveries bring our total exoplanet count to **4,197**.

We've also added new parameter sets for HD 106906 b and bet Pic b in the Direct Imaging Table.

July 9, 2020

We've added 12 new planets, including two super-Earths discovered around GJ 887, and TOI-849 b, a gas giant missing its atmosphere, which allowed researchers to observe its solid core. The nine other planets are: GJ 338 B b, Kepler-160 d, WASP-148 b & c, TOI-1728 b, NGTS-11 b, OGLE-2017-BLG-0406L b, Wendelstein-1 b, and Wendelstein-2 b. In addition, PDS 70 b & c have new planet parameter sets.

The following planets have additional parameter sets in the Direct Imaging Table: HIP 78530 b, HD 95086 b, and HR 8799 b, c, d, & e.

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

Contact: `mharbut@caltech.edu`

5 Observing proposal call

2021A NASA Keck Call for General Observing Proposals

Dr. Dawn M. Gelino, NASA Exoplanet Science Institute

Proposals Due: September 17, 2020 at 4 pm PDT,

The NASA Exoplanet Science Institute is soliciting proposals to use NASA's portion of time on the Keck Telescopes for the 2021A observing semester (February 1 - July 31, 2021). All proposals are due by **September 17, 2020 at 4 pm PDT**.

The opportunity to propose as a Principal Investigator for NASA time on the Keck Telescopes is open to all U.S.-based astronomers (a U.S.-based astronomer has their principal affiliation at a U.S. institution). *Investigators from institutions outside of the U.S. may participate as Co-Investigators on proposals for NASA Keck time*.

NASA intends the use of the Keck telescopes to be highly strategic in support of on-going space missions and/or high priority, long-term science goals. Proposals are sought in the following discipline areas: (1) investigations in support of EXOPLANET EXPLORATION science goals and missions; (2) investigations of our own SOLAR SYSTEM; (3) investigations in support of COSMIC ORIGINS science goals and missions; and (4) investigations in support of PHYSICS OF THE COSMOS science goals and missions. Direct mission support proposals in any of these scientific areas are also encouraged. Please read the Call for Proposals for complete information and application guidelines.

Key Dates:

- September 3: deadline to request General Mission Support letter from NASA HQ
- September 17: all proposals and supporting letters due to NExScI

Download/Website: `http://nexsci.caltech.edu/missions/KeckSolicitation/index.shtml`

Contact: `KeckCFP@ipac.caltech.edu`

6 Job announcements

Postdoctoral position on Extreme Precision Radial Velocity

Prof. François Bouchy
[1] Observatoire de Genève, Université de Genève, 51 Ch. des Maillettes, 1290 Sauverny, Switzerland

Department of Astronomy - Geneva University, 1 Dec 2020

Applications are invited for a postdoctoral position within the Geneva exoplanet team to work on optimisation of radial velocity extraction in the context of the BLUVES project. The goal of BLUVES is to develop a reliable laser frequency comb for blue part of visible high-precision spectrographs. The goal is to explore and compare all the different approaches of optimal spectroscopic extraction, wavelength solution and radial velocity measurement. Several challenges exist to extract and to measure Doppler signal at the level of only few cm/s. Several pipelines were already developed at the Geneva Observatory for CORALIE, SOPHIE, HARPS, HARPS-N, ESPRESSO, and more recently NIRPS spectrographs. The goal will be to go a step further in the data reduction software in order to integrate all the state-of-the-art recent developments, to prepare all the recipes to ingest and reduce laser frequency comb spectra, and to investigate all the sources of errors which may introduce radial velocity changes at the level of 10 cm/s. The postdoc will have access to all the data obtained with these above-mentioned spectrographs in order to re-reduce some observations with different approaches. The postdoc will also be in charge to define, to prepare and to conduct the astronomical tests of a new generation laser frequency comb that will be performed on ESPRESSO@VLT and to set up all the analysis tools needed to reduced data and to interpret them.

The successful candidate will have ample opportunity to collaborate within the Swiss research network for planetary sciences PlanetS (http://nccr-planets.ch/) which presents a vibrant research environment with a wide range of activities including theory, numerical simulations, observations and instrumental developments related to exoplanets. The exoplanet team at the University of Geneva (https://www.unige.ch/sciences/astro/exoplanets/en/) is renown for its strong involvement in planet detection, the determination of the planet physical properties, the characterisation of planetary atmospheres, and the development of an associated world-class instrumentation.

Applicants are expected to have completed a PhD in Astronomy or Astrophysics or expect to complete it by the start of the position. Applicants are also expected to have experience in observation, data reduction and analysis, especially related to high-precision radial velocity. The duration of the appointment is for four years. This position is funded by the Swiss National Science Foundation with a gross salary around 80,000 CHF a year. The position is available immediately and to be started at latest on 1 December 2020. Interested candidates should contact Prof. François Bouchy at the University of Geneva. Applications should be sent via email to francois.bouchy@unige.ch and contain (in a singe pdf file) 1) curriculum vitae, 2) list of publications, 3) a short research statement describing past achievements and future projects (max. 2 pages) and arrange for two letters of recommendation to be sent before 31 August 2020.

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

Contact: `francois.bouchy@unige.ch`

51 Pegasi b Fellowship

51 Pegasi b Fellowship: Application Guidelines

PROGRAM OVERVIEW

The 51 Pegasi b Fellowship Program sponsored by the Heising-Simons Foundation provides an opportunity for promising recent doctoral scientists to conduct novel theoretical, experimental, or observational research in **planetary astronomy.** The fellowship program supports postdoctoral fellows to advance our fundamental understanding of planet formation and evolution, solar system science, planetary atmospheres, protoplanetary disks, exoplanet science, or other closely related topics. The fellowship program recognizes early-career investigators of significant potential and provides them with the opportunity to conduct independent research at a selected host institution.

The Program also sponsors an annual summit for the 51 Pegasi b Fellows and their mentors to increase and facilitate the exchange of information and ideas in the field of planetary astronomy through the networking of students, postdoctoral researchers, young faculty members, and established researchers.

The Foundation anticipates awarding six to eight fellowships this year. The Heising-Simons Foundation is committed to diversity, equity, and inclusion within its community. Thus, we particularly welcome applications from individuals who belong to groups that have been historically underrepresented in planetary sciences and astronomy such as women, persons with disabilities, racial and ethnic minorities, gender and sexual minorities, and others who may contribute to diversification of the field.

Awarded postdoctoral fellows are expected to carry out a strong, coherent research program. Each recipient will receive a three-year grant of up to $375,000 to cover salary, benefits, highly-flexible discretionary spending (e.g., travel, child care, personal computers, etc.), and indirect costs.

51 Pegasi b Fellowship research must be pursued at one of the 14 following host institutions:

- California Institute of Technology
- Cornell University
- Harvard University / Harvard-Smithsonian
- Massachusetts Institute of Technology
- Pennsylvania State University
- Princeton University
- University of Arizona
- University of California, Berkeley
- University of California, Los Angeles
- University of California, Santa Cruz
- University of Chicago
- University of Michigan
- University of Texas, Austin
- Yale University

APPLICANT ELIGIBILITY CRITERIA

- Applicants can come from any academic institution or research lab, both nationally and internationally.
- Applicants are not required to have US citizenship; however, all visa and work permit paperwork is the responsibility of the fellow and host institution.
- Applicants must have received a doctoral degree in astronomy, physics, earth and planetary sciences, chemistry, mathematics, engineering, or a related discipline. Doctoral degrees must be awarded after **August 31, 2011** and before **August 31, 2021**.

APPLY HERE:

http://www.51pegasib.org

7 As seen on astro-ph

The following list contains the entries relating to exoplanets that we spotted on astro-ph during July 2020.

July 2020

astro-ph/2007.00105: **The Venus Life Equation** by *Noam R. Izenberg et al.*
astro-ph/2007.00109: **JWST Transit Spectra II: Constraining Aerosol Species, Particle-size Distributions, Temperature, and Metallicity for Cloudy Exoplanets** by *Brianna Lacy, Adam Burrows*
astro-ph/2007.00573: **Correcting for chromatic stellar activity effects in transits with multiband photometric monitoring: Application to WASP-52** by *A.Rosich et al.*
astro-ph/2007.00610: **Compositional layering in Io driven by magmatic segregation and volcanism** by *Dan C. Spencer et al.*
astro-ph/2007.00678: **The K2 TESS Synergy I: Updated Ephemerides and Parameters for K2-114, K2-167, K2-237, K2-261** by *Mma Ikwut-Ukwa et al.*
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