ExoPlanet News
An Electronic Newsletter

No. 121, 15. July 2019

Editors: S. P. Quanz,Y. Alibert, A. Leleu, C. Mordasini
NCCR PlanetS, Gesellschaftsstrasse 6, CH-3012 Bern, Switzerland

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

Contents

1 Editorial

Welcome to edition 121 of the ExoPlanet News!

A big "Thank You" to all of you who sent input for this edition of the newsletter! Please keep sending contributions in the form of accepted papers covering all fields related to (exo)planet research, conference or workshop announcements, job ads or any other information relevant to the wider exoplanet community. The current Latex template for submitting contributions of any kind, as well as all previous editions of ExoPlanet News, can be found at http://nccr-planets.ch/exoplanetnews/.

The next issue will appear 19 August 2019.

Thanks for all your support and best regards from Switzerland

Yann Alibert
Sascha P. Quanz
Adrien Leleu
Christoph Mordasini

2 Abstracts of refereed papers

The CARMENES search for exoplanets around M dwarfs. Two temperate Earth-mass planet candidates around Teegarden's Star

M. Zechmeister[1], S. Dreizler[1], I. Ribas[2,3], A. Reiners[1], J. A. Caballero[4], et al.

[1] Institut für Astrophysik, Georg-August-Universität, Friedrich-Hund-Platz 1, 37077 Göttingen, Germany
[2] Institut de Ciències de l'Espai (ICE, CSIC), Campus UAB, C/Can Magrans s/n, 08193 Bellaterra, Spain
[3] Institut d'Estudis Espacials de Catalunya (IEEC), 08034 Barcelona, Spain
[4] Centro de Astrobiología (CSIC-INTA), ESAC campus, Camino bajo del castillo s/n, 28692 Villanueva de la Cañada, Madrid, Spain

Astronomy & Astrophysics, 2019A&A...627A..49Z

Teegarden's Star is the brightest and one of the nearest ultra-cool dwarfs in the solar neighbourhood. For its late spectral type (M7.0 V), the star shows relatively little activity and is a prime target for near-infrared radial velocity surveys such as CARMENES. As part of the CARMENES search for exoplanets around M dwarfs, we obtained more than 200 radial-velocity measurements of Teegarden's Star and analysed them for planetary signals. We find periodic variability in the radial velocities of Teegarden's Star. We also studied photometric measurements to rule out stellar brightness variations mimicking planetary signals. We find evidence for two planet candidates, each with 1.1 $M_\oplus$ minimum mass, orbiting at periods of 4.91 and 11.4 d, respectively. No evidence for planetary transits could be found in archival and follow-up photometry. Small photometric variability is suggestive of slow rotation and old age. The two planets are among the lowest-mass planets discovered so far, and they are the first Earth-mass planets around an ultra-cool dwarf for which the masses have been determined using radial velocities.

Download/Website: `https://www.aanda.org/articles/aa/abs/2019/07/aa35460-19/aa35460-19.html`

Download/Website: `http://www.uni-goettingen.de/en/891.html?id=5496`

Contact: `zechmeister@astro.physik.uni-goettingen.de`

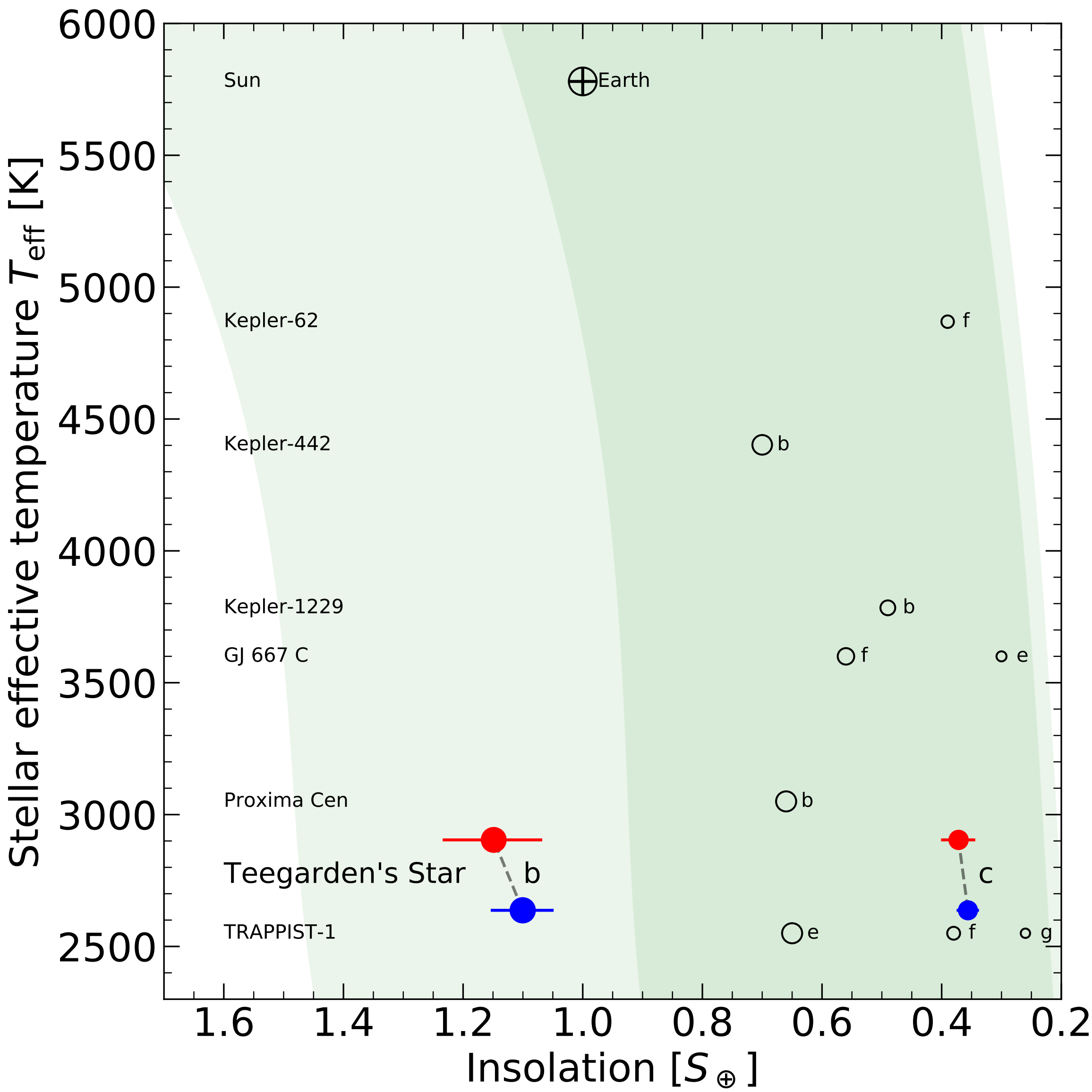

Figure 1: Optimistic (light green) and conservative (dark green) habitable zone. Teegarden's star planets b and c are shown for two stellar parameter sets (red dots: Schweitzer et al. 2019; blue dots: Rojas et al. 2012, Dieterich et al. 2014). For comparison, we plot nine planets from the Habitable Exoplanet Catalog (black circles) and the Earth (black circled plus). Symbol sizes scale with the fourth power of the Earth Similarity Index (ESI) assuming a rocky composition.

CAFE2: an upgrade to the CAFE high-resolution spectrograph. Commissioning results and new public pipeline

J. Lillo-Box[1,2], *J. Aceituno*[3], *S. Pedraz*[3], *G. Bergond*[3], *D. Galadí-Enríquez*[3], *M. Azzaro*[3] *B. Arroyo-Torres*[3], *A. Fernández-Martín*[3], *A. Guijarro*[3], *R. P. Hedrosa*[3], *I. Hermelo*[3], *F. Hoyo*[3], *P. Martín-Fernández*[3]

[1] European Southern Observatory, Alonso de Cordova 3107, Vitacura Casilla 19001, Santiago 19, Chile
[2] Depto. de Astrofísica, Centro de Astrobiología (CSIC-INTA), ESAC campus 28692 Villanueva de la Cañada (Madrid), Spain
[3] Centro Astronómico Hispano Andaluz, Calar Alto, (CSIC-JA), C/Jesús Durbán Remón 2-2, 04004 Almería, Spain

MNRAS, submitted (arXiv:1906.04060)

CAFE is a high-resolution spectrograph with high-precision radial velocity capabilities mounted at the 2.2m telescope of Calar Alto Observatory. It suffered from strong degradation after 4 years of operations and it has now been upgraded. The upgrades of the instrument (now named $CAFE_2$) aimed at improving the throughput and stability thanks to the inclusion of a new grating, an active temperature control in the isolated coude room, and a new scrambling system. In this paper, we present the results of the new commissioning of the instrument and a new pipeline (CAFExtractor) that provides the user with fully reduced data including radial velocity measurements of FGK dwarf stars. The commissioning results show a clear improvement in the instrument performance. The room temperature is now stabilized down to 5 mK during one night and below 50 mK over two months. $CAFE_2$ now provides 3 m/s precision on the reference ThAr frames and the on-sky tests provide a radial velocity precision of 8 m/s during one night (for $S/N > 50$). The throughput of the instrument is now back to nominal values with an efficiency of around 15% at 550 nm. The limiting magnitude of the instrument for a 1h exposure and S/N=20 is V=15. With all these properties, CAFE enters into the small family of high-resolution spectrographs at 2-4m telescopes capable of reaching radial velocity precisions below 10 m/s.

Download/Website: `https://arxiv.org/abs/1906.04060`

Contact: `jlillo@cab.inta-csic.es`

Survivability of radio-loud planetary cores orbiting white dwarfs

Dimitri Veras[1,2]

Alexander Wolszczan[3,4]

[1] Centre for Exoplanets and Habitability, University of Warwick, Coventry, CV4 7AL, UK
[2] Department of Physics, University of Warwick, Coventry, CV4 7AL, UK
[3] Center for Exoplanets and Habitable Worlds, Pennsylvania State University, 525 Davey Laboratory, University Park, PA, 16802, USA
[4] Department of Astronomy and Astrophysics, Pennsylvania State University, 525 Davey Laboratory, University Park, PA, 16802, USA

MNRAS, In Press, arXiv:1906.08273

The discovery of the intact metallic planetary core fragment orbiting the white dwarf SDSS J1228+1040 within one Solar radius highlights the possibility of detecting larger, unfragmented conducting cores around magnetic white dwarfs through radio emission. Previous models of this decades-old idea focussed on determining survivability of the cores based on their inward Lorentz drift towards the star. However, gravitational tides may represent an equal or dominant force. Here, we couple both effects by assuming a Maxwell rheological model and performing simulations over the entire range of observable white dwarf magnetic field strengths ($10^3 - 10^9$ G) and their potential atmospheric electrical conductivities ($10^{-1} - 10^4$ S/m) in order to more accurately constrain survivability lifetimes. This force coupling allows us to better pinpoint the physical and orbital parameters which allow planetary cores to survive for over a Gyr, maximizing the possibility that they can be detected. The most robust survivors showcase high dynamic viscosities ($\gtrsim 10^{24}$ Pa·s) and orbit within kG-level magnetic fields.

Download/Website: `https://arxiv.org/abs/1906.08273`

Contact: `d.veras@warwick.ac.uk`

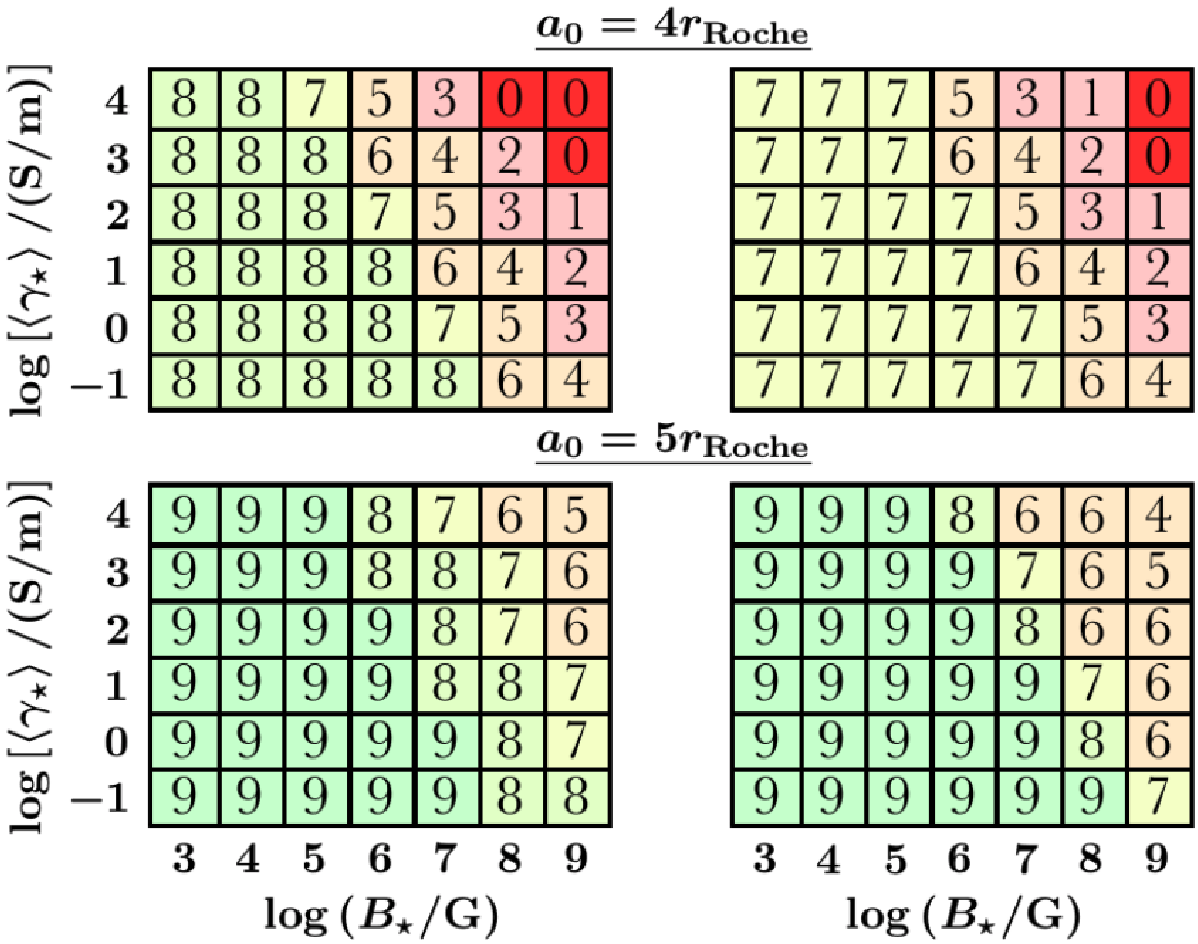

Figure 2: Survival times $t_{\rm surv}$ of planetary cores orbiting white dwarfs as a function of magnetic field strength (x-axis) and electrical conductivity (y-axis). A "0" indicates $t_{\rm surv} < 10$ yr, a "9" indicates $t_{\rm surv} > 10^9$ yr, and an intermediate value $0 < C < 9$ indicates $10^C \le t_{\rm surv} < 10^{C+1}$ yr.

Planet formation and stability in polar circumbinary discs

N. Cuello[1,2], *C. A. Giuppone*[3]

[1] Instituto de Astrofísica, Pontificia Universidad Católica de Chile, Santiago, Chile
[2] Núcleo Milenio de Formación Planetaria (NPF), Chile
[3] Universidad Nacional de Córdoba, Observatorio Astronómico - IATE, Laprida 854, X5000BGR Córdoba, Argentina

Astronomy & Astrophysics, in press (arXiv:1906.10579)

Dynamical studies suggest that most circumbinary discs (CBDs) should be coplanar (i.e. the rotation vectors of the binary and the disc should be aligned). However, some theoretical works show that under certain conditions a CBD can become polar, which means that its rotation vector is orthogonal with respect to the binary orbital plane. Interestingly, very recent observations show that polar CBDs exist in nature (e.g. HD 98800).

We test the predictions of CBD alignment around eccentric binaries based on linear theory. In particular, we compare prograde and retrograde CBD configurations. Then, assuming planets form in these systems, we thoroughly characterise the orbital behaviour and stability of misaligned (P-type) particles. This is done for massless and massive particles.

The evolution of the CBD alignment for various configurations was modelled through three-dimensional hydrodynamical simulations. For the orbital characterisation and the analysis stability, we relied on long-term N-body integrations and structure and chaos indicators, such as Δe and MEGNO.

We confirm previous analytical predictions on CBD alignment, but find an unexpected symmetry breaking between prograde and retrograde configurations. More specifically, we observe polar alignment for a retrograde misaligned CBD that was expected to become coplanar with respect to the binary disc plane. Therefore, the likelihood of becoming polar for a highly misaligned CBD is higher than previously thought. Regarding the stability of circumbinary P-type planets (also know as Tatooines), polar orbits are stable over a wide range of binary parameters. In particular, for binary eccentricities below 0.4 the orbits are stable for any value of the binary mass ratio. In the absence of gas, planets with masses below $10^{-5}\,M_\odot$ have negligible effects on the binary orbit. Finally, we suggest that mildly eccentric equal-mass binaries should be searched for polar Tatooines.

Download/Website: `https://arxiv.org/pdf/1906.10579.pdf`

Contact: `ncuello@astro.puc.cl`

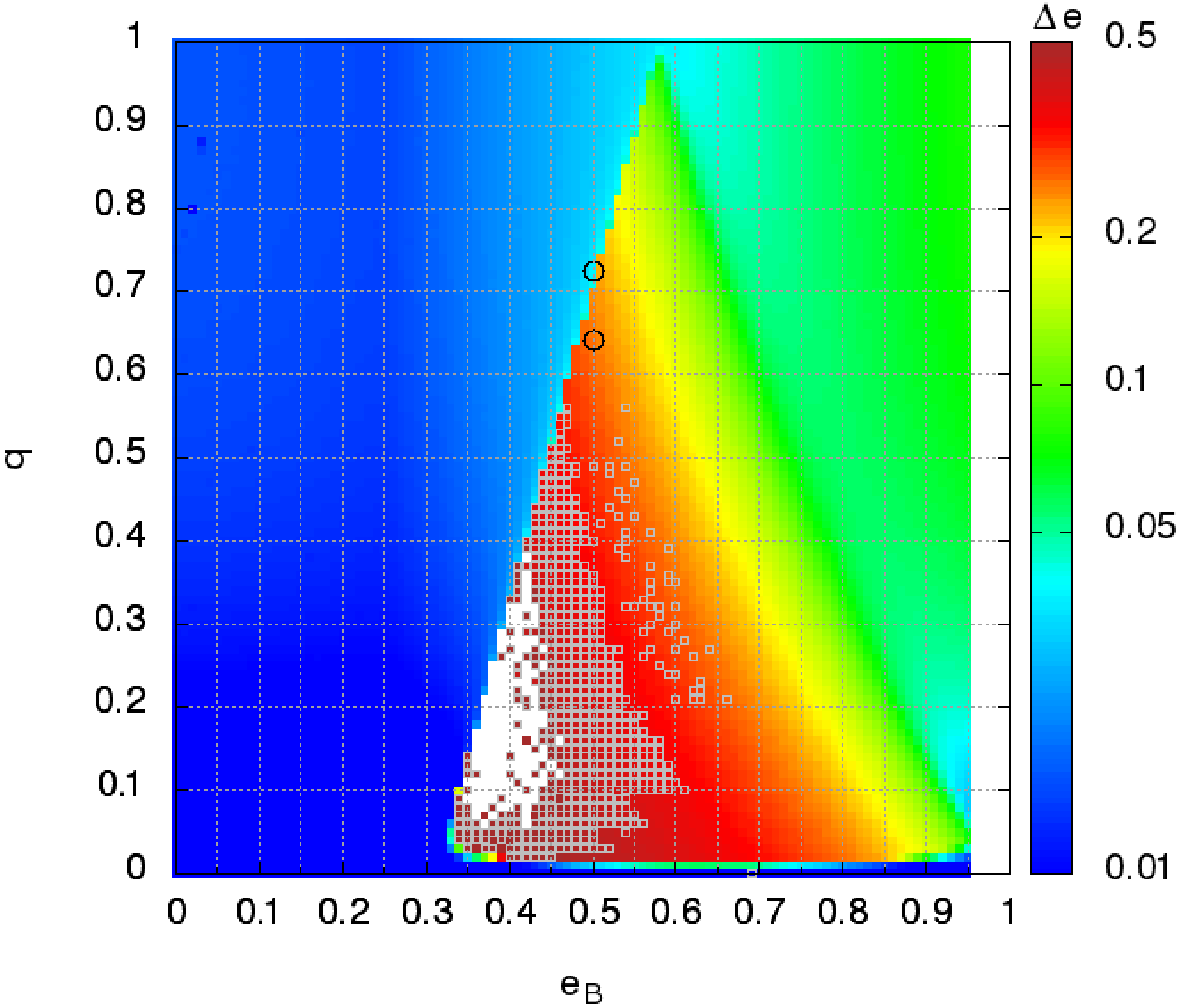

Figure 3: Dynamical map for polar orbits for massless planets with initial $a = 4.5\, a_{Binary}$ in the (e_{Binary}, M_2/M_1) plane (being M_2 and M_1, the masses of the binaries). The colour scale corresponds to Δe. The orbits identified with white dots are unstable. Chaotic orbits identified with the *MEGNO* indicator are identified with grey squares. Polar particles are not stable for M_2/M_1 $sim 0.2$ and $e_{Binary} \sim 0.4$.

Pairwise Tidal Equilibrium States and the Architecture of Extrasolar Planetary Systems

F. C. Adams[1,2]

[1] Physics Department, University of Michigan, Ann Arbor, MI 48109, USA
[2] Astronomy Department, University of Michigan, Ann Arbor, MI 48109, USA

Monthly Notices of the Royal Astronomical Society, in press (arXiv:1907.00915)

Current observations indicate that the planet formation process often produces multiple planet systems with nearly circular orbits, regular spacing, a narrow range of inclination angles, and similar planetary masses of order $m_{\rm p} \sim 10 M_\oplus$. Motivated by the observational sample, this paper determines the tidal equilibrium states for this class of extrasolar planetary systems. We start by considering two planet systems with fixed orbital spacing and variable mass ratios. The basic conjecture explored in this paper is that the planet formation process will act to distribute planetary masses in order to achieve a minimum energy state. The resulting minimum energy configuration — subject to the constraint of constant angular momentum — corresponds to circular orbits confined to a plane, with nearly equal planetary masses (as observed). We then generalize the treatment to include multiple planet systems, where each adjacent pair of planets attains its (local) tidal equilibrium state. The properties of observed planetary systems are close to those expected from this pairwise equilibrium configuration. In contrast, observed systems do not reside in a global minimum energy state. Both the equilibrium states of this paper and observed multi-planet systems, with planets of nearly equal mass on regularly spaced orbits, have an effective surface density of the form $\sigma \propto r^{-2}$, much steeper than most disk models.

Download/Website: `https://arxiv.org/abs/1907.00915`

Contact: `fca@umich.edu`

Search for gas from the disintegrating rocky exoplanet K2-22b

A. R. Ridden-Harper[1,2]*, I. A. G. Snellen*[1]*, C. U. Keller*[1]*, P. Mollière*[1]

[1] Leiden Observatory, Leiden University, Niels Bohrweg 2, 2333 CA Leiden, The Netherlands
[2] Department of Astronomy and Carl Sagan Institute, Cornell University, Ithaca, NY 14853, USA

Astronomy & Astrophysics, in press (arXiv:1906.08795)

Context. The red dwarf star K2-22 is transited every 9.14 hours by an object which is best explained by being a disintegrating rocky exoplanet featuring a variable comet-like dust tail. While the dust is thought to dominate the transit light curve, gas is also expected to be present, either from being directly evaporated off the planet or by being produced by the sublimation of dust particles in the tail.
Aims. Both ionized calcium and sodium have large cross-sections, and although present at low abundance, exhibit the strongest atomic absorption features in comets. We therefore also identify these species as the most promising tracers of circumplanetary gas in evaporating rocky exoplanets and search for them in the tail of K2-22 b to constrain the gas-loss and sublimation processes in this enigmatic object.
Methods. We observed four transits of K2-22 b with X-shooter on the Very Large Telescope operated by ESO to obtain time series of intermediate-resolution (R $\sim$ 11400) spectra. Our analysis focussed on the two sodium D lines (588.995 nm and 589.592 nm) and the Ca^+ triplet (849.802 nm, 854.209 nm, and 866.214 nm). The stellar calcium and sodium absorption was removed using the out-of-transit spectra. We searched for planet-related absorption in the velocity rest frame of the planet, which changes from approximately -66 to $+66$ km s^{-1} during the transit.
Results. Since K2-22 b exhibits highly variable transit depths, we analysed the individual nights and their average. By injecting signals we reached 5σ upper limits on the individual nights that range from 11% - 13% and 1.7% - 2.0% for the sodium and ionized calcium absorption of the tail, respectively. Night 1 was contaminated by its companion star so we considered weighted averages with and without Night 1 and quote conservative 5σ limits without Night 1 of 9% and 1.4%, respectively. Assuming their mass fractions to be similar to those in the Earth's crust, these limits

correspond to scenarios in which 0.04% and 35% of the transiting dust is sublimated and observed as absorbing gas. However, this assumes the gas to be co-moving with the planet. We show that for the high irradiation environment of K2-22 b, sodium and ionized calcium could be quickly accelerated to 100s of km s^{-1} owing to radiation pressure and entrainment by the stellar wind, making these species much more difficult to detect. No evidence for such possibly broad and blue-shifted signals are seen in our data.
Conclusions. Future observations aimed at observing circumplanetary gas should take into account the possible broad and blue-shifted velocity field of atomic and ionized species.

Download/Website: `https://arxiv.org/abs/1906.08795`

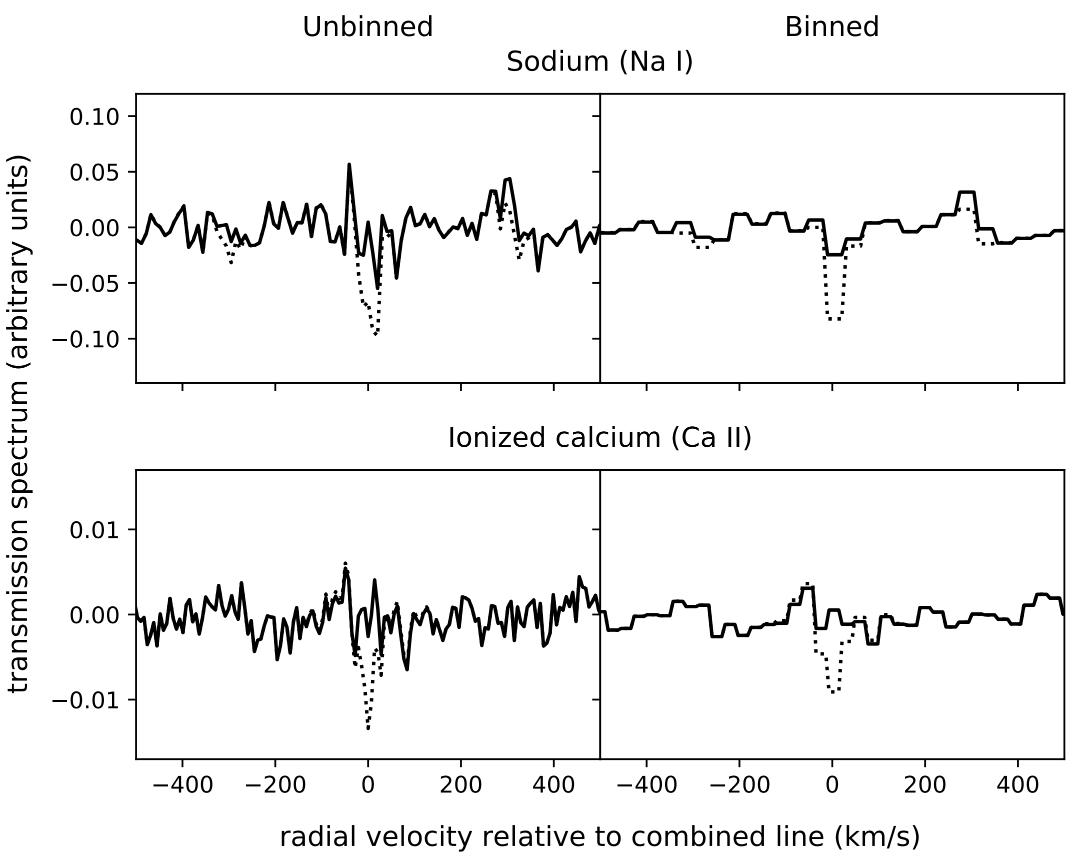

Figure 4: Average planet transmission spectrum (excluding Night 1) of the combined sodium D lines (top) and the ionized calcium near infrared triplet (bottom). The solid and dashed lines indicate the unchanged data, and data with injected signals at 5σ, respectively. The injected signals have strengths relative to the stellar spectrum of 9% and 1.4% for sodium and ionized calcium, respectively. The left and right panels show the unbinned and binned (at 0.8Å or 40 km s^{-1}) data, respectively.

Hot exozodiacal dust: an exocometary origin?

É. Sezestre[1], *J.-C. Augereau*[1], *P. Thébault*[2]
[1] Univ. Grenoble Alpes, CNRS, IPAG, 38000 Grenoble, France
[2] LESIA, Observatoire de Paris, CNRS, Université Paris Diderot, Université Pierre et Marie Curie, 5 place Jules Janssen, 92190 Meudon, France

Astronomy and Astrophysics, published (2019A&A...626A...2S)

Near- and mid-infrared interferometric observations have revealed populations of hot and warm dust grains populating the inner regions of extrasolar planetary systems. These are known as exozodiacal dust clouds, or exozodis, reflecting the similarity with the solar system's zodiacal cloud. Radiative transfer models have constrained the dust to be dominated by tiny submicron-sized, carbon-rich grains that are accumulated very close to the sublimation radius. The origin of this dust is an unsolved issue. We explore two exozodiacal dust production mechanisms, first re-investigating the Poynting-Robertson drag pile-up scenario, and then elaborating on the less explored but promising exocometary dust delivery scenario. We developed a new, versatile numerical model that calculates the dust dynamics, with non-orbit-averaged equations for the grains close to the star. The model includes dust sublimation and incorporates a radiative transfer code for direct comparison to the observations. We consider in this study four stellar types, three dust compositions, and we assume a parent belt at 50 au. In the case of the Poynting-Robertson drag pile-up scenario, we find that it is impossible to produce long-lived submicron-sized grains close to the star. The inward drifting grains fill in the region between the parent belt and the sublimation distance, producing an unrealistically strong mid-infrared excess compared to the near-infrared excess. The dust pile-up at the sublimation radius is by far insufficient to boost the near-IR flux of the exozodi to the point where it dominates over the mid-infrared excess. In the case of the exocometary dust delivery scenario, we find that a narrow ring can form close to the sublimation zone, populated with large grains from several tens to several hundreds of micrometers in radius. Although not perfect, this scenario provides a better match to the observations, especially if the grains are carbon-rich. We also find that the number of active exocomets required to sustain the observed dust level is reasonable. We conclude that the hot exozodiacal dust detected by near-infrared interferometry is unlikely to result from inward grain migration by Poynting-Robertson drag from a distant parent belt, but could instead have an exocometary origin.

Download/Website: `https://ui.adsabs.harvard.edu/abs/2019A%26A...626A...2S/abstract`

Contact: `elie.sezestre@univ-grenoble-alpes.fr`

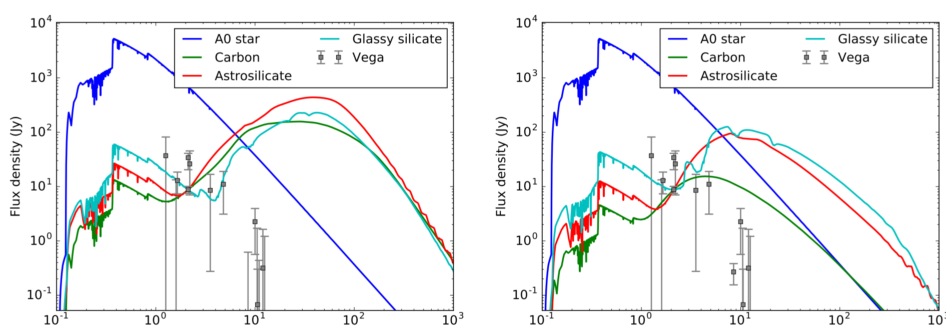

Figure 5: SED in the PR-drag scenario (left) and cometary scenario (right). Three grain compositions are used, all normalised to the detected excess at 2μm. Data points for Vega are from Absil et al. (2006). Although not perfect, the cometary scenario tends to decrease the contribution of grains at 10μm.

Combining high contrast imaging and radial velocities to constrain the planetary architecture of nearby stars

A. Boehle[1], *S. P. Quanz*[1], *C. Lovis*[2], *D. Ségransan*[2], *S. Udry*[2], *D. Apai*[3]

[1] Institute for Particle Physics and Astrophysics, ETH Zurich, 8093 Zurich, Switzerland
[2] Observatoire Astronomique de l'Université de Genève, 51 Ch. des Maillettes, 1290 Versoix, Switzerland
[3] Department of Astronomy/Steward Observatory, U. of Arizona, 933 N Cherry Avenue, Tucson, AZ 85721, USA

A&A, in press (http://arxiv.org/abs/1907.04334)

Nearby stars are prime targets for exoplanet searches and characterization using a variety of detection techniques. Combining constraints from the complementary detection methods of high contrast imaging (HCI) and radial velocity (RV) can further constrain the planetary architectures of these systems because these methods place limits at different regions of the companion mass and semi-major axis parameter space. We aim to constrain the planetary architectures from the combination of HCI and RV data for 6 nearby stars within 6 pc: τ Ceti, Kapteyn's star, AX Mic, 40 Eri, HD 36395, and HD 42581. We compiled the sample from stars with available archival VLT/NACO HCI data at L′ band (3.8 μm). The NACO data were fully reanalyzed using the state-of-the-art direct imaging pipeline PynPoint and combined with RV data from HARPS, Keck/HIRES, and CORALIE. A Monte Carlo approach was used to assess the completeness in the companion mass/semi-major axis parameter space from the combination of the HCI and RV data sets. We find that the HCI data add significant information to the RV constraints, increasing the completeness for certain companions masses/semi-major axes by up to 68 – 99% for 4 of the 6 stars in our sample, and by up to 1 – 13% for the remaining stars. The improvements are strongest for intermediate semi-major axes (15 – 40 AU), corresponding to the semi-major axes of the ice giants in our own solar system. The HCI mass limits reach 5 - 20 M_{Jup} in the background-limited regime, depending on the age of the star. Through the combination of HCI and RV data, we find that stringent constraints can be placed on the possible substellar companions in these systems. Applying these methods systematically to nearby stars will quantify our current knowledge of the planet population in the solar neighborhood and inform future observations.

Download/Website: `http://arxiv.org/abs/1907.04334`

Contact: `anna.boehle@phys.ethz.ch`

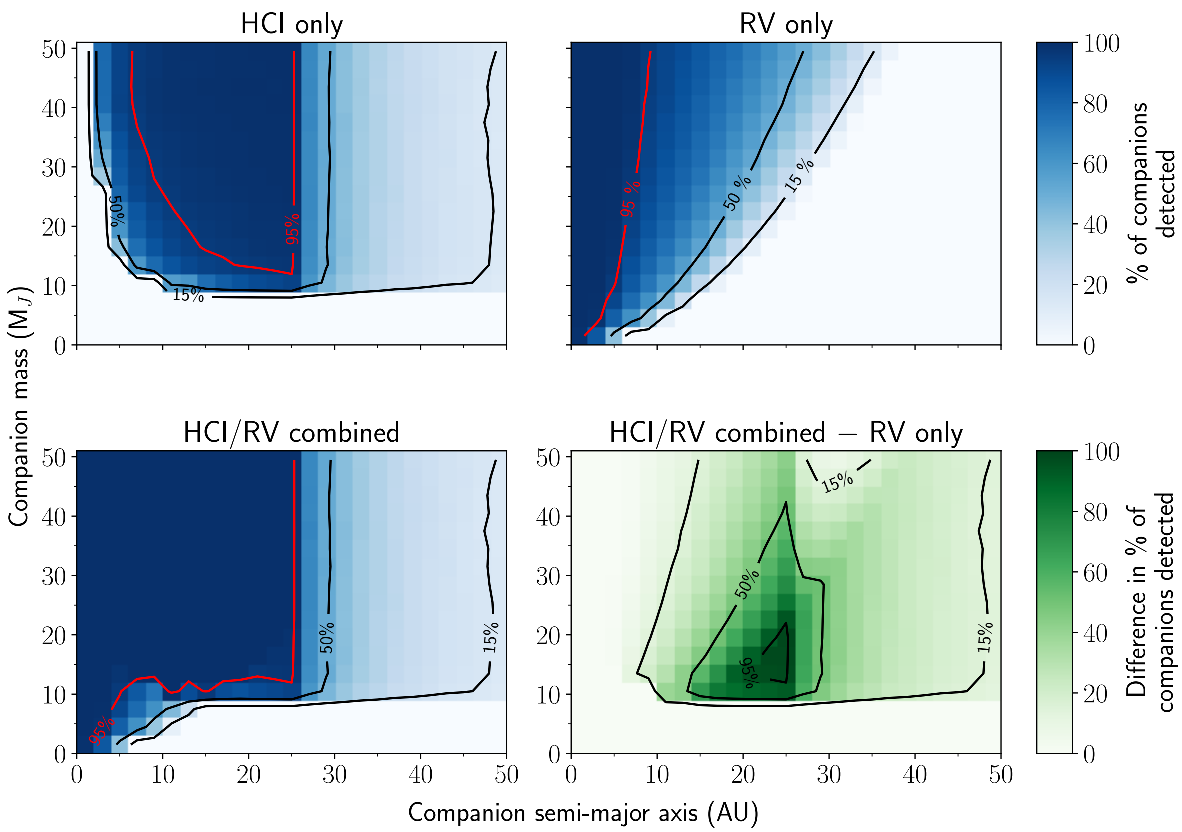

Figure 6: Constraints on substellar companion mass and semi-major axis for the nearby star AX Mic (M1V star at 3.97 pc). The percentage of companions that can be detected by high contrast imaging (HCI) alone for the nominal stellar age of 4.8 Gyr is plotted in the upper left panel, the percentage of companions that can be detected by radial velocity (RV) alone is plotted in the upper right panel, the combined HCI/RV constraints in the lower left panel, and the difference between the HCI/RV combined and the RV only constraints in the lower right panel. For this star, HCI adds significant information (up to 99% more detectable companions), concentrated at companion masses of 8 – 14 $M_{\rm Jup}$ and semi-major axes of 15 – 25 AU. The detectable companions also increase by up to 65% at semi-major axes larger than the field of view of the VLT/NACO HCI data (¿6.5 arcsec or 26 AU).

Blue, white, and red ocean planets - Simulations of orbital variations in flux and polarization colors

V.J.H. Trees, D.M. Stam

Faculty of Aerospace Engineering, Delft University of Technology, Kluyverweg 1, 2629 HS Delft, The Netherlands

Astronomy & Astrophysics, published (2019AA...626A.129T/arXiv:1904.08922)

Context. An exoplanet's habitability will depend strongly on the presence of liquid water. Flux and/or polarization measurements of starlight that is reflected by exoplanets could help to identify exo-oceans.
Aims. We investigate which broadband spectral features in flux and polarization phase functions of reflected starlight uniquely identify exo-oceans.
Methods. With an adding-doubling algorithm, we computed total fluxes F and polarized fluxes Q of starlight that is reflected by cloud-free and (partly) cloudy exoplanets, for wavelengths from 350 to 865 nm. The ocean surface has waves composed of Fresnel reflecting wave facets and whitecaps, and scattering within the water body is included.
Results. Total flux F, polarized flux Q, and degree of polarization P of ocean planets change color from blue, through white, to red at phase angles α ranging from $\sim 134°$ to $\sim 108°$ for F, and from $\sim 123°$ to $\sim 157°$ for Q, with cloud coverage fraction f_c increasing from 0.0 (cloud-free) to 1.0 (completely cloudy) for F, and to 0.98 for Q. The color change in P only occurs for f_c ranging from 0.03 to 0.98, with the color crossing angle α ranging from $\sim 88°$ to $\sim 161°$. The total flux F of a cloudy, zero surface albedo planet can also change color, and for $f_c = 0.0$, an ocean planet's F will not change color for surface pressures $p_s \gtrapprox 8$ bars. Polarized flux Q of a zero surface albedo planet does not change color for any f_c.
Conclusion. The color change of P of starlight reflected by an exoplanet, from blue, through white, to red with increasing α above 88°, appears to identify a (partly) cloudy exo-ocean. The color change of polarized flux Q with increasing α above 123° appears to uniquely identify an exo-ocean, independent of surface pressure or cloud fraction. At the color changing phase angle, the angular distance between a star and its planet is much larger than at the phase angle where the glint appears in reflected light. The color change in polarization thus offers better prospects for detecting an exo-ocean.

Download/Website: `https://www.aanda.org/articles/aa/abs/2019/06/aa35399-19/aa35399-19.html`

Contact: `d.m.stam@tudelft.nl`

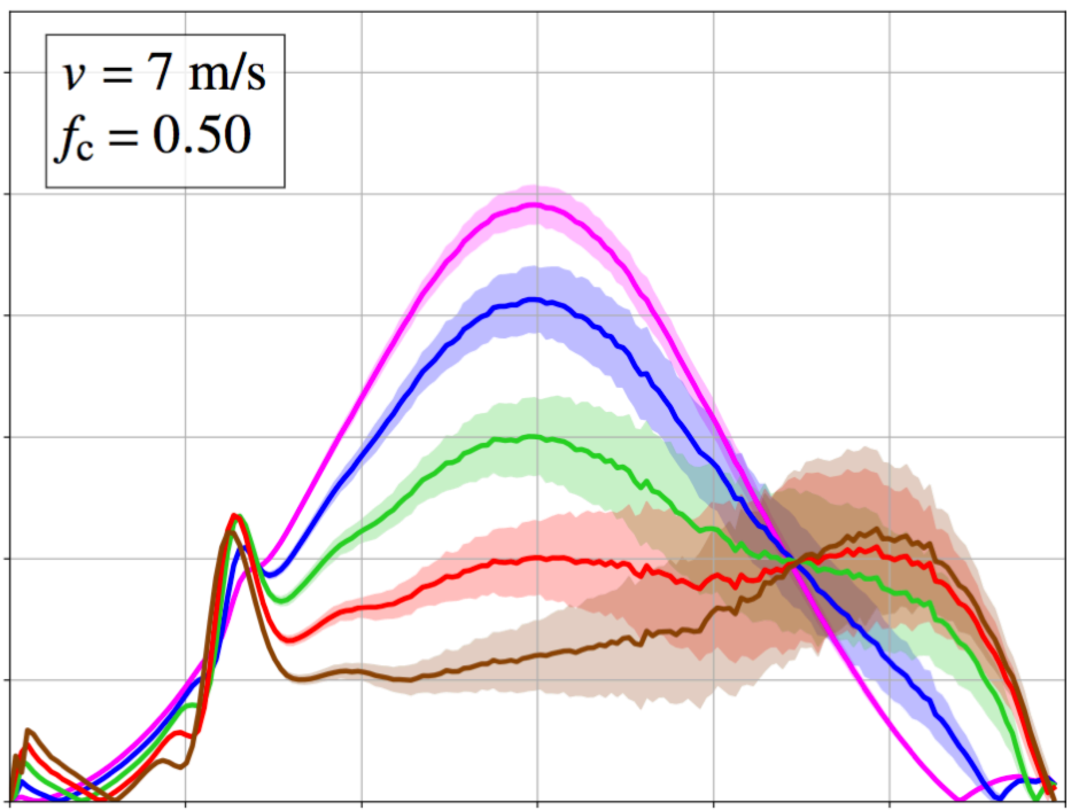

Figure 7: Disk-integrated degree of polarization of ocean planets with patchy clouds for 350 nm (pink), 443 nm (blue), 550 nm (green), 670 nm (red), and 865 nm (brown), for a wind speed of 7 m/s, and a cloud fraction f_c of 0.50.

Emerging trends in metallicity and lithium properties of debris disc stars

C. Chavero,[1]*, R. de la Reza*[2]*, L. Ghezzi*[2,3]*, F. Llorente de Andrés,*[4] *C. B. Pereira*[2]*, C. Giuppone*[5]*, G. Pinzón*[6]

[1] Universidad Nacional de Córdoba, Observatorio Astronómico, Laprida 854, 5000 Córdoba, CONICET, Argentina
[2] Observatório Nacional, Rua General José Cristino, 77, 20921-400, São Cristóvão, Rio de Janeiro, RJ, Brazil
[3] Observatório do Valongo, Universidade Federal do Rio de Janeiro, Ladeira do Pedro Antônio 43, Rio de Janeiro, RJ 20080-090
[4] Ateneo de Almagro (Secc. Ciencia & Tecnología)- 13270 Almagro, Spain
[5] Universidad Nacional de Córdoba, Observatorio Astronómico, IATE, Laprida 854, 5000 Córdoba, Argentina
[6] Universidad Nacional de Colombia, Colombia

Monthly Notices of the Royal Astronomical Society, published (2019MNRAS.487.3162C)

Dwarf stars with debris discs and planets appear to be excellent laboratories to study the core accretion theory of planets formation. These systems are however, insufficiently studied. In this paper we present the main metallicity and lithium abundance properties of these stars together with stars with only debris discs and stars with only planets. Stars without detected planets nor discs are also considered. The analysed sample is formed by main-sequence FGK field single stars. Apart from the basic stellar parameters, we include the use of dusty discs masses. The main results show for the first time that the dust mass of debris disc stars with planets correlate with metallicity. We confirm that these disc dust masses are related to their central stellar masses.

Separately, the masses of stars and those of planets also correlate with metallicity. We conclude that two conditions are necessary to form giant planets: to have a sufficient metallicity and also a sufficient protoplanetary mass of gas and dust. The debris discs masses of stars without giant planets do not correlate with metallicity, because they do not fulfil these two conditions. Concerning lithium, by adopting a stellar model for lithium depletion based on a strong interaction between the star and a protoplanetary disc, we found that in agreement with the model predictions, observations indicate that the main lithium depletion occurs during this initial protoplanetary evolution stage. We show that the ultimately lithium depletion is independent of the presence or absence of planets and appears to be only age dependent.

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

Contact: `exoplanetnews@nccr-planets.ch`

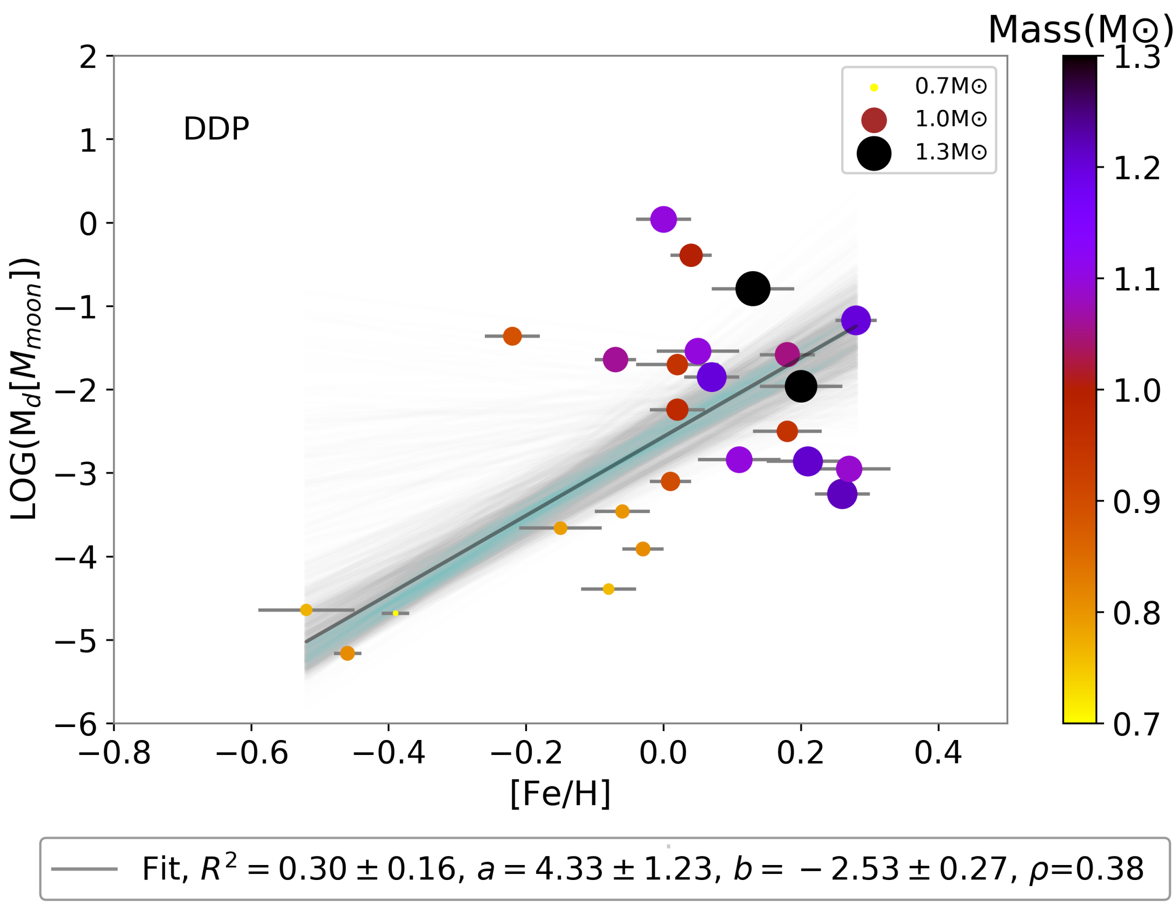

Figure 8: Stellar metallicity as function of the mass of the dusty disc, segregating with stellar mass (for DDP stars. The solid black line shows the lineal regression (y=ax+b), the parameter values are shown in the box below the figure. The shaded area shows the 68% confidence band of the bootstrapping fit (1 σ). Note that the slope attains always positive values (even with 3 σ) and with a good of $R^2 = 0.31$ and $\rho = 0.38$, showing a very good correlation.

3 Jobs and Positions

ESA Research Fellowships in Space Science

ESTEC (Noorwdwijk, NL) or ESAC (Madrid, E) , Fall 2020

The European Space Agency awards several postdoctoral fellowships each year.
The aim of these fellowships is to provide scientists in their early career, holding a PhD or the equivalent degree, with the means of performing research in fields related to the ESA Science Programme.
Areas of research include planetary science, astronomy and astrophysics, solar and solar-terrestrial science, plasma physics and fundamental physics. The fellowships have a duration of two years, with the possible extension to three years, and are tenable at the European Space Research and Technology Centre (ESTEC) in Noordwijk, Netherlands, or at the European Space Astronomy Centre (ESAC) in Villafranca del Castillo, near Madrid, Spain.
Applications are now solicited for fellowships in space science to begin in the fall of 2020. Preference will be given to applications submitted by candidates in an early stage of their career. Candidates not holding a PhD yet are encouraged to apply, but they must provide evidence of receiving their degree before starting the fellowship.
ESA fellows are enrolled in ESA's Social Security Scheme, which covers medical expenses. A monthly deduction covers these short-term and long-term risks.
The deadline for applications is 1 October 2019.
More information on the ESA Research Fellowship programme in Space Science, on the conditions and eligibility, as well as the application form can retrieved from http://cosmos.esa.int/fellowship
Questions on the scientific aspects of the ESA Fellowship in Space Science not answered in the above pages can be sent by e-mail to the fellowship coordinators, Dr. Oliver Jennrich or Dr. Jan-Uwe Ness at the address fellowship@cosmos.esa.int

Download/Website: `http://cosmos.esa.int/fellowship`

Contact: `fellowship@cosmos.esa.int`

4 Conference announcements

50th Saas-Fee Advanced Course: Astronomy in the Era of Big Data

Yann Alibert, Kevin Heng, Danuta Sosnowska, Nathan Hara, Xavier Dumusque, Lucio Mayer

Saas-Fee, Switzerland, March 15 - 20, 2020

The 2020 Saas-Fee Advanced Course of the Swiss Society for Astrophysics and Astronomy (SSAA) will be held from Sunday, 15 March to Friday, 20 March 2020 in Saas-Fee, in the Swiss Alps. This course has taken place annually since 1971 and will be devoted in 2020 to:

Astronomy in the Era of Big Data.

The three lecturers will be:
- Dr. Roberto Trotta (Imperial College London)
- Prof. Suzanne Aigrain (University of Oxford)
- Prof. Marc Huertas-Company (Paris Observatory)

Attendance will be limited by space, so please check out the meeting's webpage and pre-register now. We will alert you when the full registration page is available.

Download/Website: `http://nccr-planets.ch/saasfee2020/`

P028 - Planetary Atmospheres and Evolution, 2019 AGU Fall Meeting

Feng Tian[1]
[1] Macau University of Science and Technology

San Francisco, USA, Dec. 9-13, 2019

Understanding the nature and variability of (exo)planetary atmospheres, the physical mechanisms governing these atmospheres, and their chemical evolution are strong driving forces of planetary science and solar system exploration mission planning. While the long-term evolution of the Earth is constrained by geological studies and isotopic analyses, the evolutionary paths of other planets must be reconstructed from data obtained through astronomical observations and planetary missions. Models of planetary atmospheres use these observations to illuminate governing physical processes operating from the Earth to other planets in our solar system and beyond. The rapidly increasing number of discovered exoplanets provides a new opportunity for interdisciplinary collaborations between heliophysicists, astrophysicists, geoscientists, biochemists, planetary and climate scientists concerning the physical and chemical evolution of (exo)planetary atmospheres and planetary habitability. This session welcomes observational, theoretical, experimental, and field studies relevant to the atmospheres, evolution, and habitability of planets in and outside of our solar system.
Convenors: Feng Tian (Macau University of Science and Technology), Cedric Gillmann (Free University of Belgium) and Vladimir Airapetian (NASA Goddard Space Flight Center/SEEC & American University).

Download/Website: `https://agu.confex.com/agu/fm19/prelim.cgi/Session/79425`

Planet^2/RESCEU Symposium 2019: From Protoplanetary Disks through Planetary System Architecture to Planetary Atmospheres and Habitability

Masahiro Ikoma[1]
[1] The University of Tokyo, Japan

Okinawa, Japan, October 14-18, 2019

The space telescope TESS was launched last year to conduct an extensive survey of exoplanets orbiting nearby bright stars, which will be followed by precise measurements with CHEOPS launched this autumn. Furthermore, spectroscopic observations of those transiting planets will be extensively conducted by scheduled missions such as JWST, ARIEL, and WSO-UV. We are about to enter the age of characterization of exoplanet atmospheres, which is a crucial milestone also in habitable planet science. Also recent solar-system missions have brought much new knowledge of the solar-system planets and small bodies. Against this background, we will hold a symposium that brings together scientists from a broad range of research topics such as planetary atmospheres, habitability, and planet formation and evolution, aiming for the participants to share current understanding regarding such important topics for the extra-solar and solar-system planets. We hope that you will actively join this exciting symposium and look forward very much to seeing you in Okinawa.

Sessions include

- Exoplanet atmospheres
- Solar system planet atmospheres
- Climate and habitability
- Evolution of planetary atmosphere and interior
- Protoplanetary disks
- Volatile delivery
- Planetary system formation and evolution
- Future Prospects

Deadlines

- Abstract submission: 31st July
- Registration with visa application: 31st July
- Registration without visa application: 30th September

Download/Website: `http://www.resceu.s.u-tokyo.ac.jp/symposium/resceu_sympo2019/`

Contact: `resceu_sympo2019@resceu.s.u-tokyo.ac.jp`

ESP2019: Single, Shallow, and Strange Transits

D. L. Pollacco, J. Cabrera, Sz. Csizmadia, M. Deleuil, I. Pagano, G. Piotto, H. Rauer, N. Santos

University of Warwick, UK, 2nd - 4th September 2019

The PLATO Extra-Solar Planets 2019 (ESP2019) is the second in the series of thematic workshops organised by the PLATO mission's Exoplanet Science team. The topic of this 2019 edition is ”Single, Shallow, and Strange transits”.

The aims of the workshop are to examine what we can learn about the long-period planet population from the detection and modelling of single transits, and to discuss the photometric signatures produced by other objects such as exomoons, exocomets, evaporating / fragmenting planets, or planet accretion. Confirmed speakers include:
- Sz. Csizmadia
- B. Gaensicke
- M. Kenworthy
- H. Osborn
- I. Rebollido
- G. Szabo
- D. Veras

More information about PLATO ESP2019 can be found at the url below including a link to the registration form. Please note that spaces at the workshop are limited in number, though we will be operating a waiting list system.

We hope that you will be able to join us at this exciting workshop. If you have any questions, please contact the LOC at the email address below.

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

Contact: `psmoffice@warwick.ac.uk`

AGU Session ”Extra-Solar Planets: from Numerical Modelling, Observational and Data Science Perspectives”

Session Chairs: L. Noack, D.A. Yuen, D. Breuer, and T. Spohn

San Francisco, 9-13 December 2019

The recent surge in observational data has stimulated intense activities at many fronts of research in extra-solar planets by many communities. There is an obvious need to bridge the gap between modelers in atmosphere and interior dynamics of exoplanets and observations. In addition, a link to the burgeoning field of data science should be established which can provide new techniques of analysis. We hope to attract researchers in these three areas with the intent of spreading the new knowledge, stimulate cross-disciplinary discussion and identify new directions of research. We invite submission of research papers from these areas and we solicit overview talks.

The abstract deadline is Wednesday 31 July 2019.

We hope to see you in San Francisco!

Download/Website: `https://www2.agu.org/en/Fall-Meeting`

Contact: `lena.noack@fu-berlin.de`

Planet formation from dust coagulation to final orbital assembly

Man Hoi Lee[1], *Nader Haghighipour*[2], *Soko Matsumura*[3], *Hilke Schlichting*[4]

[1] University of Hong Kong
[2] Institute for Astronomy, University of Hawaii
[3] University of Dundee
[4] University of California, Los Angeles

Munich Institute for Astro- and Particle Physics (MIAPP), Garching, Germany, June 1-26, 2020

Dear colleagues,

It gives us great pleasure to announce the 2020 Planet Formation program at the Munich Institute for Astro- and Particle Physics (MIAPP) in Garching, Germany. The program will be held on June 1-26, 2020. This four-week program aims to bring together experts with complementary expertise in observation and theory in solar system and extrasolar planetary astronomy to assess the current status of planet formation models, highlight problems in each formation stage, and explore the possibility of developing comprehensive models that can be applied to different planetary systems. Please see the program website for more details:

http://www.munich-iapp.de/planetformation

The structure of the program will be informal. The main goal of the program is to create an environment that will facilitate collaborations and new initiatives. There will be daily gathering for discussing specific topics, new results, and brain storming.

Each attendee will be provided with an office and Internet access. Financial support at the rate of EUR 80 per day will be provided for accommodation and local expenses. Additional financial support for attendees with family and children and for graduate students is available. Details with regard to financial support can be found at

http://www.munich-iapp.de/home/information-for-participants/financial-support/

In order to attend, it is necessary to apply to the program. Please go to the program website (http://www.munich-iapp.de/planetformation), scroll down to the bottom of the page, and click on ”Register here” (that is actually the link to apply for the program). Please note that the *application deadline is September 1, 2019.* Please also note that MIAPP requires attendance for at least two weeks and that the program can accommodate only 45 attendees in each week. So please apply early.

We invite and encourage you to apply. We also request that you kindly pass this information to your colleagues, collaborators, students and postdocs who are involved and/or interested in planet formation.

Looking forward to receiving your applications.

Best regards,
Man Hoi, Nader, Soko, and Hilke

Download/Website: `http://www.munich-iapp.de/planetformation`

5 Exoplanet Archive Updates

June 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, July 15, 2019

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. New microlensing solutions are in the Microlensing Data table (`http://bit.ly/2JQr18O`).

June 27, 2019
This week we have added six new planets: Teegarden's Star b & c, CI Tau b, V1298 Tau b, WASP-87 b, and HD 126525 b. Teegarden's Star is an ultra-cool dwarf star only 12 light years away, and the two newly discovered Earth-mass planets are both potentially habitable.

June 13, 2019
And the winner is: The confirmed planet count increases by 31 this week, bringing the total exoplanet count to **4,003**! That means we have a winner for our **#Exoplanet4K** contest! Congratulations to Twitter follower Spyder Webb (@Spyder_Webb), who won the random drawing. Your full-color print of the 55 Cancri e poster (`https://go.nasa.gov/2TyMeoM`) from the Exoplanet Travel Bureau is on its way!
The archive staff thanks everyone who participated in the contest. We've created a page (`http://bit.ly/2WEu3OW`) to showcase some of the more memorable entries.

New Planets: The new planets this week are: K2-16 d, K2-32 e, K2-50 c, K2-166 c, K2-168 c, EPIC 201238110 b (K2-296 b), EPIC 201497682 b (K2-297 b), EPIC 201841433 b (K2-298 b), EPIC 206024342 b (K2-299 b), EPIC 206032309 b (K2-300 b), EPIC 206042996 b (K2-301 b), EPIC 206215704 b (K2-302 b), EPIC 206317286 b (K2-303 b), EPIC 212297394 b (K2-304 b), EPIC 212424622 b (K2-305 b), EPIC 212499991 b (K2-306 b), EPIC 212587672 b (K2-307 b), K2-282 c, and L 98-59 b, c, & d, HD 180617 b, LSPM J2116+0234 b, KELT 23 A b, TOI 150.01, Kepler-65 e, PDS 70 c, EPIC 246865365 b (K2-308 b), HD 2685 b, GJ 49 b, and NSVS 14256825 b.
Additionally, there are new planet parameter sets for HIP 41378 b, c, d, e, & f, Kepler-25 b, c, & d, Kepler-65 b, c, & d, Kepler-68 b, c, & d, K2-32 b, c, & d, and Gl 686 b.

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

Contact: `mharbut@caltech.edu`

6 As seen on astro-ph

The following list contains all the entries relating to exoplanets that we spotted on astro-ph during June 2019.

June 2019

astro-ph/1906.00075: **Effects of Radiation Pressure on the Evaporative Wind of HD 209458b** by *Alex Debrecht et al.*

astro-ph/1906.00201: **On the enlargement of habitable zones around binary stars in hostile environments** by *Nikolaos Georgakarakos, Siegfried Eggl*

astro-ph/1906.00320: **Dust Condensation in Evolving Discs and the Composition of Meteorites, Planetesimals, and Planets** by *Min Li et al.*

astro-ph/1906.00462: **Two new HATNet hot Jupiters around A stars, and the first glimpse at the occurrence rate of hot Jupiters from TESS** by *G. Zhou et al.*

astro-ph/1906.00669: **Pebble-driven planet formation for TRAPPIST-1 and other compact systems** by *Djoeke Schoonenberg et al.*

astro-ph/1906.00966: **Wotan: Comprehensive time-series de-trending in Python** by *Michael Hippke et al.*

astro-ph/1906.01112: **Typical Climate Perturbations Unlikely to Disrupt Gaia Hypothesis** by *Olivia D. N. Alcabes, Stephanie Olson, Dorian S. Abbot*

astro-ph/1906.01391: **ISPY – NaCo Imaging Survey for Planets around Young stars. Discovery of an M dwarf in the gap between HD 193571 and its debris ring** by *Arianna Musso Barcucci et al.*

astro-ph/1906.01416: **Observability of Forming Planets and their Circumplanetary Disks III. – Polarized Scattered Light** by *J. Szulágyi, A. Garufi*

astro-ph/1906.01486: **Two accreting protoplanets around the young star PDS 70** by *S. Y. Haffert et al.*

astro-ph/1906.01982: **Small Planets in the Galactic Context: Host Star Kinematics, Iron, and α Element Enhancement** by *Dolev Bashi, Shay Zucker*

astro-ph/1906.02058: **Constraining the properties of HD 206893 B. A combination of radial velocity, direct imaging, and astrometry data** by *A. Grandjean et al.*

astro-ph/1906.02197: **Securing the legacy of TESS through the care and maintenance of TESS planet ephemerides** by *Diana Dragomir et al.*

astro-ph/1906.02214: **A Pathfinder for Imaging Extrasolar Earths from the Ground** by *Thayne Currie*

astro-ph/1906.02395: **A Hot Saturn Near (but unassociated with) the Open Cluster NGC 1817** by *Rayna Rampalli et al.*

astro-ph/1906.02663: **Not Gone with the Wind: Planet Occurrence is Independent of Stellar Galactocentric Velocity** by *Moiya McTier, David Kipping*

astro-ph/1906.02697: **Simulated Phase-dependent Spectra of Terrestrial Aquaplanets in M Dwarf Systems** by *E.T. Wolf, R.K. Kopparapu, J. Haqq-Misra*

astro-ph/1906.02787: **The B-Star Exoplanet Abundance Study: a co-moving 16-25 Mjup companion to the young binary system HIP 79098** by *Markus Janson et al.*

astro-ph/1906.02820: **Constraining Exoplanet Metallicities and Aerosols with ARIEL: An Independent Study by the Contribution to ARIEL Spectroscopy of Exoplanets (CASE) Team** by *Robert T. Zellem et al.*

astro-ph/1906.02860: **CO Detected in CI Tau b: Hot Start Implied by Planet Mass and MK** by *Laura Flagg et al.*

astro-ph/1906.03243: **Polarisation and Brightness Temperature Observations of Venus with the GMRT** by *Nithin Mohan et al.*

astro-ph/1906.03266: **Signatures of a planet-planet impacts phase in exoplanetary systems hosting giant planets** by *Renata Frelikh et al.*

astro-ph/1906.03269: **The Degree of Alignment Between Circumbinary Disks and Their Binary Hosts** by *Ian Czekala et al.*

astro-ph/1906.03270: **Probing Extrasolar Planetary Systems with Interstellar Meteors** by *Amir Siraj, Abraham Loeb*

astro-ph/1906.03276: **KELT-24b: A 5MJ Planet on a 5.6 day Well-Aligned Orbit around the Young V=8.3 F-star HD 93148** by *Joseph E. Rodriguez et al.*

astro-ph/1906.03321: **Analysis of putative exoplanetary signatures found in light curves of two sdBV stars observed by Kepler** by *A. Blokesz, J. Krzesinski, L. Kedziora-Chudczer*

astro-ph/1906.03527: **The runaway greenhouse radius inflation effect - An observational diagnostic to probe water on Earth-size planets and test the Habitable Zone concept** by *Martin Turbet et al.*

astro-ph/1906.03575: **A Probabilistic Approach to Kepler Completeness and Reliability for Exoplanet Occurrence Rates** by *Steve Bryson et al.*

astro-ph/1906.03673: **The ssos Pipeline: Identification of Solar System Objects in Astronomical Images** by *Max Mahlke et al.*

astro-ph/1906.03696: **Modeling the light curve of ‘Oumuamua: evidence for torque and disc-like shape** by *Sergey Mashchenko*

astro-ph/1906.03913: **Shock vaporization/devolatilization of evaporitic minerals, halite and gypsum, in an open system investigated by a two-stage light gas gun** by *Kosuke Kurosawa et al.*

astro-ph/1906.04220: **k-Means Aperture Optimization Applied to Kepler K2 Time Series Photometry of Titan** by *Alex H. Parker et al.*

astro-ph/1906.04253: **Growth Model Interpretation of Planet Size Distribution** by *Li Zeng et al.*

astro-ph/1906.04265: **Radiation pressure clear-out of dusty photoevaporating discs** by *James E Owen, Juna A Kollmeier*

astro-ph/1906.04274: **Lyman-alpha in the GJ 1132 System: Stellar Emission and Planetary Atmospheric Evolution** by *William C. Waalkes et al.*

astro-ph/1906.04495: **Normalization of Hamiltonian and Nonlinear Stability of the Triangular Equilibrium Points in Non-resonance Case with Perturbations** by *Ram Kishor, Badam Singh Kushvah*

astro-ph/1906.04644: **Frequency of planets orbiting M dwarfs in the Solar neighbourhood** by *M. Tuomi et al.*

astro-ph/1906.04742: **Mass Loss from the Exoplanet WASP-12b Inferred from Spitzer Phase Curves** by *Taylor J. Bell et al.*

astro-ph/1906.04816: **Disentangling Planets from Photoelectric Instability in Gas-Rich Optically Thin Dusty Disks** by *Areli Castrejon et al.*

astro-ph/1906.05048: **Greening of the Brown Dwarf Desert. EPIC 212036875 b – a 51 MJ object in a 5 day orbit around an F7 V star** by *Carina M. Persson et al.*

astro-ph/1906.05195: **A self-consistent weak friction model for the tidal evolution of circumbinary planets** by *F.A. Zoppetti et al.*

astro-ph/1906.05254: **MASCARA-3b: A hot Jupiter transiting a bright F7 star in an aligned orbit** by *M. Hjorth et al.*

astro-ph/1906.05290: **Long-Lived Eccentricities in Accretion Disks** by *Wing-Kit Lee , Adam M. Dempsey , Yoram Lithwick*

astro-ph/1906.05371: **Streaming instability: saturation in turbulent protoplanetary disks** by *Orkan. M. Umurhan, Paul. R. Estrada, Jeffrey N. Cuzzi*

astro-ph/1906.05520: **The escape of hydrogen-rich atmosphere of exoplanet: Mass loss rates and the absorptions of stellar Lyman** α by *Dongdong Yan, Jianheng Guo*

astro-ph/1906.05525: **The HD 181433 Planetary System: Dynamics and a New Orbital Solution** by *Jonathan Horner et al.*

astro-ph/1906.05530: **Capture of Solids by Growing Proto-gas Giants: Effects of Gap Formation and Supply-limited Growth** by *Sho Shibata, Masahiro Ikoma*

astro-ph/1906.05580: **Local semi-analytic models of magnetic flux transport in protoplanetary discs** by *Philip K. C. Leung, Gordon I. Ogilvie*

astro-ph/1906.05663: **Determining mass limits around HD163296 through SPHERE direct imaging data** by *D. Mesa et al.*

astro-ph/1906.05748: **Atmospheric Dynamics on Terrestrial Planets: The Seasonal Response to changes in Orbital, Rotational and Radiative Timescales** by *Ilai Guendelman, Yohai Kaspi*

astro-ph/1906.05844: **Effects of a Binary Companion Star on Habitability of Tidally Locked Planets around an M-type Host Star** by *Ayaka Okuya, Yuka Fujii, Shigeru Ida*

astro-ph/1906.05869: **The Planetary Accretion Shock. II. Grid of Post-Shock Entropies and Radiative Shock Efficiencies for Non-Equilibrium Radiation Transport** by *Gabriel-Dominique Marleau*

astro-ph/1906.05958: **Complex macroscale structures formed by the shock processing of amino acids and nucleobases – Implications to the Origins of life** by *V S Surendra et al.*

astro-ph/1906.06302: **Kinematic detections of protoplanets: a Doppler-flip in the disk of HD100546** by *Simon Casassus, Sebastian Perez*

astro-ph/1906.06305: **Long baseline observations of HD100546 with ALMA: a possible circumplanetary disk**

detected in dust continuum and gas kinematics by *Sebastián Pérez et al.*
astro-ph/1906.06308: **Submillimeter emission associated with candidate protoplanets** by *Andrea Isella et al.*
astro-ph/1906.06326: **An emission spectrum for WASP-121b measured across the 0.8-1.1 micron wavelength range using the Hubble Space Telescope** by *Thomas Mikal-Evans et al.*
astro-ph/1906.06338: **Termination of an inward migration of a gap-opening planet triggered by dust feedback** by *Kazuhiro D. Kanagawa*
astro-ph/1906.06795: **Empirical Predictions for the Period Distribution of Planets to be Discovered by the Transiting Exoplanet Survey Satellite** by *Jonathan H. Jiang et al.*
astro-ph/1906.06953: **Dust Spreading in Debris Discs: Do Small Grains Cling on to Their Birth Environment?** by *Nicole Pawellek et al.*
astro-ph/1906.07035: **How Much Information Does the Sodium Doublet Encode? Retrieval Analysis of Non-LTE Sodium Lines at Low and High Spectral Resolutions** by *Chloe Fisher, Kevin Heng*
astro-ph/1906.07089: **Can we detect aurora in exoplanets orbiting M dwarfs?** by *A. A. Vidotto, N. Feeney, J. H. Groh*
astro-ph/1906.07193: **Orbital Stability and Precession Effects in the Kepler-89 System** by *Stephen R. Kane*
astro-ph/1906.07196: **The CARMENES search for exoplanets around M dwarfs. Two temperate Earth-mass planet candidates around Teegarden's Star** by *M. Zechmeister et al.*
astro-ph/1906.07561: **Comparative terrestrial atmospheric circulation regimes in simplified global circulation models: I. from cyclostrophic super-rotation to geostrophic turbulence** by *Yixiong Wang et al.*
astro-ph/1906.07595: **Comparative terrestrial atmospheric circulation regimes in simplified global circulation models: II. energy budgets and spectral transfers** by *Peter Read et al.*
astro-ph/1906.07615: **Signatures of Obliquity in Thermal Phase Curves of Hot Jupiters** by *Arthur D. Adams, Sarah Millholland, Gregory P. Laughlin*
astro-ph/1906.07704: **On the Habitability of Teegarden's Star planets** by *Amri Wandel, Lev Tal-Or*
astro-ph/1906.07708: **Gas accretion damped by dust back-reaction at the snowline** by *Matías Gárate et al.*
astro-ph/1906.07750: **The Breakthrough Listen Search for Intelligent Life: Observations of 1327 Nearby Stars over 1.10-3.45 GHz** by *Danny C. Price et al.*
astro-ph/1906.07905: **Effects of albedo and disc on the zero velocity curves and linear stability of equilibrium points in the generalized restricted three body problem** by *Saleem Yousuf, Ram Kishor*
astro-ph/1906.07959: **Vortex instabilities triggered by low-mass planets in pebble-rich, inviscid protoplanetary discs** by *Arnaud Pierens, Min-Kai Lin, Sean Raymond*
astro-ph/1906.08127: **Understanding the atmospheric properties and chemical composition of the ultra-hot Jupiter HAT-P-7b: I. Cloud and chemistry mapping** by *Ch. Helling et al.*
astro-ph/1906.08273: **Survivability of radio-loud planetary cores orbiting white dwarfs** by *Dimitri Veras, Alexander Wolszczan*
astro-ph/1906.08610: **Transit modelling of selected Kepler systems** by *Q. Y. Huang et al.*
astro-ph/1906.08623: **Amino Acid Chiral Selection Via Weak Interactions in Stellar Environments: Implications for the Origin of Life** by *M. A. Famiano et al.*
astro-ph/1906.08783: **The high-energy radiation environment of the habitable-zone super-Earth LHS 1140b** by *R. Spinelli et al.*
astro-ph/1906.08795: **Search for gas from the disintegrating rocky exoplanet K2-22b** by *A. R. Ridden-Harper et al.*
astro-ph/1906.08797: **The REASONS Survey: Resolved Millimeter Observations of a Large Debris Disk Around the Nearby F Star HD 170773** by *Aldo G. Sepulveda et al.*
astro-ph/1906.09261: **Demographics of Planetesimals Formed by the Streaming Instability** by *Rixin Li, Andrew Youdin, Jacob Simon*
astro-ph/1906.09267: **A super-Earth and sub-Neptune transiting the late-type M dwarf LP 791-18** by *Ian J. M. Crossfield et al.*
astro-ph/1906.09481: **Effects of a quadrupolar magnetic term in a Generalized Störmer problem** by *Amina*

Leghmouche, Noureddine Mebarki

astro-ph/1906.09866: **TOI-150b and TOI-163b: two transiting hot Jupiters, one eccentric and one inflated, revealed by TESS near and at the edge of the JWST CVZ** by *Diana Kossakowski et al.*

astro-ph/1906.10147: **Three Red Suns in the Sky: A Transiting, Terrestrial Planet in a Triple M Dwarf System at 6.9 Parsecs** by *Jennifer G. Winters et al.*

astro-ph/1906.10330: **Thermal Tides in Rotating Hot Jupiters** by *Umin Lee, Daiki Murakami*

astro-ph/1906.10561: **Atmospheric Evolution on Low-Gravity Waterworlds** by *Constantin W. Arnscheidt, Robin D. Wordsworth, Feng Ding*

astro-ph/1906.10579: **Planet formation and stability in polar circumbinary discs** by *Nicolás Cuello, Cristian A. Giuppone*

astro-ph/1906.10699: **Intrinsic polarisation of elongated porous dust grains** by *Florian Kirchschlager, Gesa H.-M. Bertrang, Mario Flock*

astro-ph/1906.10703: **TESS Hunt for Young and Maturing Exoplanets (THYME): A planet in the 45 Myr Tucana-Horologium association** by *Elisabeth R. Newton et al.*

astro-ph/1906.11013: **Nearly Polar orbit of the sub-Neptune HD3167 c: Constraints on a multi-planet system dynamical history** by *Shweta Dalal et al.*

astro-ph/1906.11106: **Upper limits on the water vapour content of the β Pictoris debris disk** by *M. Cavallius et al.*

astro-ph/1906.11183: **KMT-2018-BLG-0029Lb: A Very Low Mass-Ratio Spitzer Microlens Planet** by *Andrew Gould*

astro-ph/1906.11218: **A Principal Component Analysis-based method to analyse high-resolution spectroscopic data** by *M. Damiano, G. Micela, G. Tinetti*

astro-ph/1906.11256: **An empirically-derived formula for the shape of planet-induced gaps in protoplanetary disks** by *Paul C. Duffell*

astro-ph/1906.11268: **The Random Transiter – EPIC 249706694/HD 139139** by *S. Rappaport et al.*

astro-ph/1906.11346: **Maximizing LSST Solar System Science: Approaches, Software Tools, and Infrastructure Needs** by *Henry H. Hsieh et al.*

astro-ph/1906.11368: **O(3P)+CO2 scattering cross sections at superthermal collision energies for planetary aeronomy** by *Marko Gacesa, Robert J. Lillis, Kevin J. Zahnle*

astro-ph/1906.11400: **Ploonets: formation, evolution, and detectability of tidally detached exomoons** by *Mario Sucerquia et al.*

astro-ph/1906.11491: **Are the observed gaps in protoplanetary discs caused by growing planets?** by *Nelson Ndugu, Bertram Bitsch, Edward Jurua*

astro-ph/1906.11754: **Overcast on Osiris: 3D radiative-hydrodynamical simulations of a cloudy hot Jupiter using the parameterised, phase-equilibrium cloud formation code EddySed** by *S. Lines et al.*

astro-ph/1906.11774: **Upper limits on protolunar disc masses using ALMA observations of directly-imaged exoplanets** by *Sebastián Pérez et al.*

astro-ph/1906.11865: **A Gap in the Mass Distribution for Warm Neptune and Terrestrial Planets** by *David J. Armstrong et al.*

astro-ph/1906.12153: **Close-in sub-Neptunes reveal the past rotation history of their host stars: atmospheric evolution of planets in the HD3167 and K2-32 planetary systems** by *Daria Kubyshkina et al.*

astro-ph/1906.00892: **In-flight photometry extraction of PLATO targets: Optimal apertures for detecting extrasolar planets** by *V. Marchiori et al.*

astro-ph/1906.01029: **Dealing With δ-Scuti Variables: Transit Light Curve Analysis of Planets Orbiting Rapidly-Rotating, Seismically Active A/F Stars** by *John P. Ahlers, Jason W. Barnes, Samuel A. Myers*

astro-ph/1906.01353: **Multipoint study of successive coronal mass ejections driving moderate disturbances at 1 AU** by *Erika Palmerio et al.*

astro-ph/1906.02129: **Cold Debris Disks as Strategic Targets for the 2020s** by *John Debes et al.*

astro-ph/1906.02743: **The role of atom tunneling in gas-phase reactions in planet-forming disks** by *Jan Meisner* *et al.*

astro-ph/1906.03354: **Stochastic Speckle Discrimination with Time-Tagged Photon Lists: Digging Below the Speckle Noise Floor** by *Alex B. Walter et al.*

astro-ph/1906.04060: **CAFE2: an upgrade to the CAFE high-resolution spectrograph. Commissioning results and new public pipeline** by *J. Lillo-Box et al.*

astro-ph/1906.04878: **The Effect of Binarity on Circumstellar Disk Evolution** by *Scott A. Barenfeld et al.*

astro-ph/1906.05079: **A Thousand Earths: A Very Large Aperture, Ultralight Space Telescope Array for Atmospheric Biosignature Surveys** by *Daniel Apai et al.*

astro-ph/1906.05250: **On The XUV Luminosity Evolution of TRAPPIST-1** by *David P. Fleming et al.*

astro-ph/1906.05535: **HL Tau disk in HCO+ (3-2) and (1-0) with ALMA: gas density, temperature, gap, and one-arm spiral** by *Hsi-Wei Yen et al.*

astro-ph/1906.05563: **Evidence from stellar rotation for early disc dispersal owing to close companions** by *Sergio Messina*

astro-ph/1906.05626: **Evolutionary models for ultracool dwarfs** by *Catarina S. Fernandes et al.*

astro-ph/1906.06797: **Impact of Stellar Superflares on Planetary Habitability** by *Yosuke A. Yamashiki et al.*

astro-ph/1906.06910: **The SPHERE view of the jet and the envelope of RY Tau** by *A. Garufi et al.*

astro-ph/1906.08219: **NGTS-7Ab: An ultra-short period brown dwarf transiting a tidally-locked and active M dwarf** by *James A. G. Jackman et al.*

astro-ph/1906.08264: **Directly testing gravity with Proxima Centauri** by *Indranil Banik, Pavel Kroupa*

astro-ph/1906.08293: **HydroSyMBA: a 1D hydrocode coupled with an N-body symplectic integrator** by *Julien Salmon, Robin M. Canup*

astro-ph/1906.08660: **Focusing of nonlinear eccentric waves in astrophysical discs** by *Elliot M. Lynch, Gordon I. Ogilvie*

astro-ph/1906.08788: **Orphaned Exomoons: Tidal Detachment and Evaporation Following an Exoplanet-Star Collision** by *Miguel Martinez, Nicholas C. Stone, Brian D. Metzger*

astro-ph/1906.10598: **Phase tracking based on GPGPU and applications in Planetary radio Science** by *Nianchuan Jian, Dmitry Mikushin, Jianguo Yan*

astro-ph/1906.10776: **Presolar Silicon Carbide Grains of Types Y and Z: Their Molybdenum Isotopic Compositions and Stellar Origins** by *Nan Liu et al.*

astro-ph/1906.10809: **Compact Disks in a High Resolution ALMA Survey of Dust Structures in the Taurus Molecular Cloud** by *Feng Long et al.*

astro-ph/1906.11386: **Chemistry on Rotating Grain Surface: Ro-Thermal Desorption of Molecules from Ice Mantles** by *Thiem Hoang, Ngo Duy Tung*

astro-ph/1906.11454: **Nobeyama 45-m Mapping Observations toward Orion A. III. Multi-Line Observations toward an Outflow-shocked Region, OMC-2 FIR** by *Fumitaka Nakamura et al.*

astro-ph/1906.11582: **GG Tau A: Dark shadows on the ringworld** by *Robert Brauer et al.*

astro-ph/1906.11780: **Automated Detection of Solar Radio Bursts using a Statistical Method** by *Dayal Singh et al.*

astro-ph/1906.01475: **Introduction of water-vapor broadening coefficients and their temperature dependence exponents into the HITRAN database, Part I: CO2, N2O, CO, CH4, O2, NH3, and H2S** by *Yan Tan et al.*

astro-ph/1906.03341: **Evidence for supercritical behavior of high-pressure liquid hydrogen** by *Bingqing Cheng, Guglielmo Mazzola, Michele Ceriotti*

astro-ph/1906.04482: **Normalization of Hamiltonian and nonlinear stability of triangular equilibrium points in the photogravitational restricted three body problem with P-R drag in non-resonance case** by *Ram Kishor, M. Xavier James Raj, Bhola Ishwar*

astro-ph/1906.05728: **A HERO for general relativity** by *Lorenzo Iorio*

astro-ph/1906.06705: **On the mean anomaly and the mean longitude in tests of post-Newtonian gravity** by *Lorenzo Iorio* astro-ph/1906.07224: **Buoyancy-Driven Entrainment in Dry Thermals** by *Brett McKim, Nadir Jeevanjee, Daniel Lecoanet*

astro-ph/1906.08777: **Exoplanets and University-Industry Collaboration** by *T. Banks, E. Budding*

astro-ph/1906.10041: **Generation of a large-scale vorticity in a fast rotating density stratified turbulence or turbulent convection** by *Igor Rogachevskii, Nathan Kleeorin*

astro-ph/1906.10854: **Unconventional phase III of high-pressure solid hydrogen** by *Sam Azadi, T. D. Kuehne*

astro-ph/1906.11082: **A Rayleigh-Ritz method based approach to computing seismic normal modes in the presence of an essential spectrum** by *Jia Shi et al.*

astro-ph/1906.11474: **Collisional excitation of NH(3Σ-) by Ar: A new ab initio 3D potential energy surface and scattering calculations** by *D. Prudenzano et al.*

astro-ph/1906.11990: **Bond strengthening in dense H2O and implications to planetary composition** by *Zachary M. Grande et al.*