ExoPlanet News
An Electronic Newsletter

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Contents

1 Editorial

Welcome to Edition 125 of the ExoPlanet News!

We are pleased to send you the next ExoPlanet newsletter in 2019 with numerous abstracts of new scientific papers, job ads, conference and book announcements, the monthly updates from the NASA exoplanet archive, and the overview of the new exoplanet-related articles on astro-ph. Thanks a lot to all of you who contributed to this issue of the newsletter!

In Switzerland, we are looking forward to the imminent CHEOPS launch. At the moment, we have a "GO" from all sides for a launch in the middle of December 2019. CHEOPS is a photometric satellite like Kepler and TESS, but unlike these satellites, it will not observe a field, but make dedicated observations of individual stars. Note that 20 % of the observational time is open time. It is made available to the scientific community to conduct observations of their choice in the form of an ESA-run Guest Observers' (GO) programme. The next call for proposals to the GO programme will be issued in summer or autumn 2020. If you want to know more and potentially submit your own proposal, please consult https://www.cosmos.esa.int/web/cheops-guest-observers-programme/ .

Looking ahead to Edition 126, we are again looking forward to your paper abstract, job ad or meeting announcement. Also special announcements of all kinds 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 17 December 2019.

Thanks for all your support and best regards from Switzerland,

Christoph Mordasini
Yann Alibert
Adrien Leleu
Sascha P. Quanz

Univ. of Bern, Univ. of Geneva, ETH Zürich, Univ. of Zürich, EPF Lausanne
The National Centers of Competence in Research (NCCR) are a research instrument of the Swiss National Science Foundation.

2 Abstracts of refereed papers

NGTS-8b and NGTS-9b: two non-inflated hot-Jupiters

J. C. Costes[12], C. A. Watson[12], C. Belardi[5], I. P. Braker[5], M. R. Burleigh[5], S. L. Casewell[5], P. Eigmüller[6], M. N. Günther[3,15,16], J. A. G. Jackman[1,2], L. D. Nielsen[4], M. G. Soto[13], O. Turner[4], D. R. Anderson[1,2], D. Bayliss[1,2], F. Bouchy[4], J. T. Briegal[3], E. M. Bryant[1,2], J. Cabrera[6], A. Chaushev[10], S. Csizmadia[6], A. Erikson[6], S. Gill[1,2], E. Gillen[3], M. R. Goad[5], M. J. Hooton[12], J. S. Jenkins[8,9], J. McCormac[1,2], M. Moyano[14], D. Queloz[3], H. Rauer[6,10,11], L. Raynard[5], A. M. S. Smith[6], A. P. G. Thompson[12], R. H. Tilbrook[5], S. Udry[4], J. I. Vines[8], R. G. West[1,2], P. J. Wheatley[1,2]

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Monthly Notices of the Royal Astronomical Society, in press (arXiv:1911.02814)

We report the discovery, by the Next Generation Transit Survey (NGTS), of two hot-Jupiters NGTS-8b and NGTS-9b. These orbit a V = 13.68 K0V star (Teff = 5241 +/- 50 K) with a period of 2.49970 days, and a V = 12.80 F8V star (Teff = 6330 +/- 130 K) in 4.43527 days, respectively. The transits were independently verified by follow-up photometric observations with the SAAO 1.0-m and Euler telescopes, and we report on the planetary parameters using HARPS, FEROS and CORALIE radial velocities. NGTS-8b has a mass, 0.93 +0.04 -0.03 MJ and a radius, 1.09 +/- 0.03 RJ similar to Jupiter, resulting in a density of 0.89 +0.08 -0.07 g cm-3. This is in contrast to NGTS-9b, which has a mass of 2.90 +/- 0.17 MJ and a radius of 1.07 +/- 0.06 RJ , resulting in a much greater density of 2.93 +0.53 -0.49 g cm-3. Statistically, the planetary parameters put both objects in the regime where they would be expected to exhibit larger than predicted radii. However, we find that their radii are in agreement with predictions by theoretical non-inflated models.

Download/Website: `https://ui.adsabs.harvard.edu/abs/2019arXiv191102814C/abstract`

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Circumbinary exoplanets and brown dwarfs with the Laser Interferometer Space Antenna

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Astronomy & Astrophysics, in press, arXiv:1910.05414

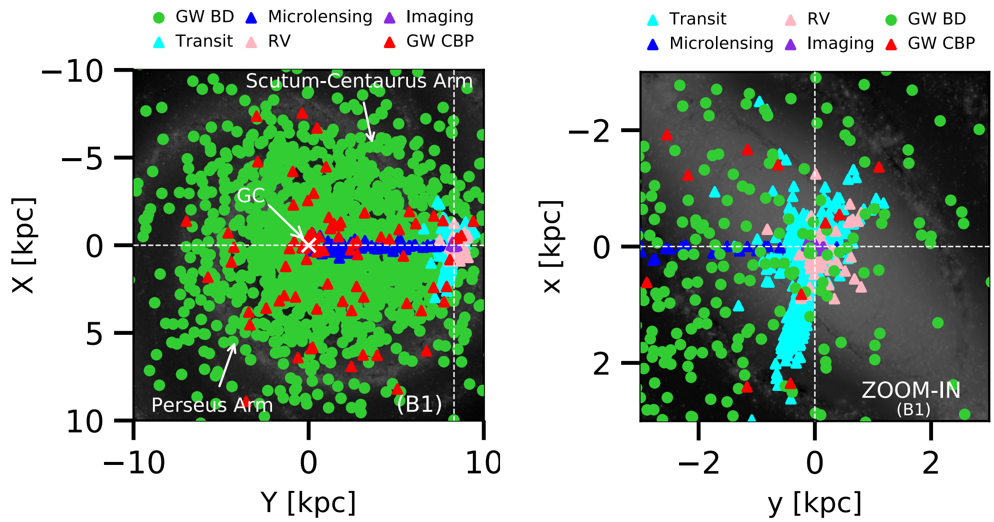

Figure 1: Danielski et al.: Optimistic LISA detection scenario (left, B1) with its zoom-in on the solar region (right, heliocentric coordinates). Each plot shows the location of the binary WD system with a planetary companion (red) and BD (green) detection through GWs. In each panel we also plot the known detected exoplanets' host-stars (see legend for colour scheme). Data overlay a face-on black and white image of the Milky Way for Galactic location reference purposes (credit NASA / JPL-Caltech / R. Hurt, SSC/Caltech).

We explore the prospects for the detection of giant circumbinary exoplanets and brown dwarfs (BDs) orbiting Galactic double white dwarfs binaries (DWDs) with the Laser Interferometer Space Antenna (LISA). By assuming an occurrence rate of 50%, motivated by white dwarf pollution observations, we built a Galactic synthetic population of P-type giant exoplanets and BDs orbiting DWDs. We carried this out by injecting different sub-stellar populations, with various mass and orbital separation characteristics, into the DWD population used in the LISA mission proposal. We then performed a Fisher matrix analysis to measure how many of these three-body systems show a periodic Doppler-shifted gravitational wave perturbation detectable by LISA. We report the number of circumbinary planets (CBPs) and (BDs) that can be detected by LISA for various combinations of mass and semi-major axis distributions. We identify pessimistic and optimistic scenarios corresponding, respectively, to 3 and 83 (14 and 2218) detections of CBPs (BDs), observed during the length of the nominal LISA mission. These detections are distributed all over the Galaxy following the underlying DWD distribution, and they are biased towards DWDs with higher LISA signal-to-noise ratio and shorter orbital period. Finally, we show that if LISA were to be extended for four more years, the number of systems detected will be more than doubled in both the optimistic and pessimistic scenarios. Our results present promising prospects for the detection of post-main sequence exoplanets and BDs, showing that gravitational waves can prove the existence of these populations over the totality of the Milky Way. Detections by LISA will deepen our knowledge on the life of exoplanets subsequent to the most extreme evolution phases of their hosts, clarifying whether new phases of planetary formation take place later in the life of the stars. Such a method is strongly complementary to electromagnetic studies within the solar region and opens a window into the investigation of planets and BDs everywhere in the entire Galaxy, and possibly even in nearby galaxies in the Local Group.

Download/Website: `https://doi.org/10.1051/0004-6361/201936729`

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Planet formation and migration near the silicate sublimation front in protoplanetary disks

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Astronomy & Astrophysics, 2019A&A...630A.147F

The increasing number of newly detected exoplanets at short orbital periods raises questions about their formation and migration histories. Planet formation and migration depend heavily on the structure and dynamics of protoplanetary disks. A particular puzzle that requires explanation arises from one of the key results of the Kepler mission, namely the increase in the planetary occurrence rate with orbital period up to 10 days for F, G, K and M stars. We investigate the conditions for planet formation and migration near the dust sublimation front in protostellar disks around young Sun-like stars. We are especially interested in determining the positions where the drift of pebbles would be stopped, and where the migration of Earth-like planets and super-Earths would be halted. For this analysis we use iterative 2D radiation hydrostatic disk models which include irradiation by the star, and dust sublimation and deposition depending on the local temperature and vapor pressure. Our results show the temperature and density structure of a gas and dust disk around a young Sun-like star. We perform a parameter study by varying the magnetized turbulence onset temperature, the accretion stress, the dust mass fraction, and the mass accretion rate. Our models feature a gas-only inner disk, a silicate sublimation front and dust rim starting at around 0.08 au, an ionization transition zone with a corresponding density jump, and a pressure maximum which acts as a pebble trap at around 0.12 au. Migration torque maps show Earth- and super-Earth-mass planets halt in our model disks at orbital periods ranging from 10 to 22 days. Such periods are in good agreement with both the inferred location of the innermost planets in multiplanetary systems, and the break in planet occurrence rates from the Kepler sample at 10 days. In particular, models with small grains depleted produce a trap located at a 10-day orbital period, while models with a higher abundance of small grains present a trap at around a 17-day orbital period. The snow line lies at 1.6 au, near where the occurrence rate of the giant planets peaks. We conclude that the dust sublimation zone is crucial for forming close-in planets, especially when considering tightly packed super-Earth systems.

Download/Website: `http://www.mpia.de/news/science/2019-07-baby-proof-system?c=2285`

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HARPS-N Solar Telescope Data Release

HARPS-N Science Team

Data release date: 18 July, 2020

The HARPS-N Solar Telescope has been observing the Sun as a distant, point-like star every clear day at 5-minute cadence since 18 July 2015 (Dumusque et al., 2015 ApJL, 814, 2, id. L21; Phillips, Glenday et al., 2016, SPIE, 9912, id. 99126Z). HARPS-N/TNG and the small Solar Telescope deliver long-term stable, precise radial-velocity measurements at the sub-m/s level (Cosentino et al., 2012, 8446, article id. 84461V). This is a unique dataset to examine the physical processes that drive intrinsic stellar radial-velocity variations (Collier Cameron, Mortier et al., 2019, MNRAS, 487, 1082; Milbourne, Haywood et al., 2019, ApJ, 874, 107).

Reaching and surpassing ultra-high precision radial velocities for stars requires open, international, and cross-disciplinary collaboration. Understanding the Sun via high-resolution, stable Sun-as-a-star measurements is a crucial step towards this goal.

In this spirit, we announce the public release of the first 3 years of this dataset on **18 July 2020**, the 5th year anniversary of the HARPS-N Solar Telescope. Subsequent data releases will be made annually. The data will be

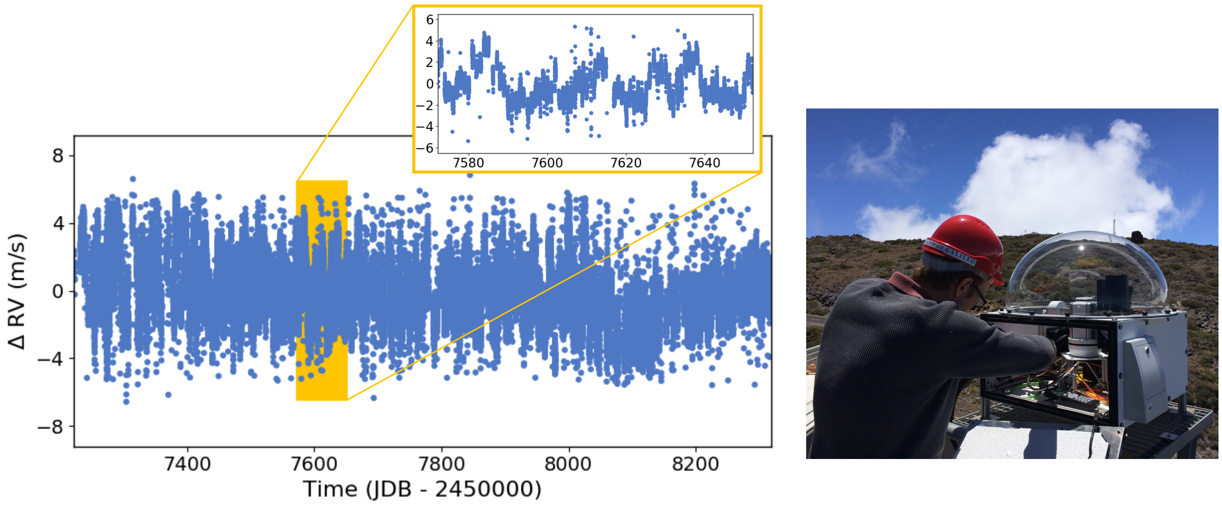

Figure 2: HARPS-N: Left: Radial-velocity variations of the Sun seen as a star (with no planets). Right: Solar Telescope at the TNG (La Palma, Spain). Photo credit: D. Phillips.

accessible via the Data & Analysis Centre for Exoplanets, DACE (`https://dace.unige.ch/`), hosted at the University of Geneva. Data products will include:

(a) The extracted 2d spectra, wavelength-calibrated in the observer's rest frame;

(b) The normalised, merged 1d spectra, rebinned to uniform wavelength increments in the rest frame of the solar-system barycentre;

(c) The cross-correlation functions against a G2 reference template, in the barycentric frame, and the corresponding bisector span, FWHM, and contrast;

(d) Velocities corrected for solar barycentric motion and differential extinction;

(e) Ca II H&K S-indices.

Alongside the data release we will launch a new exoplanet detection challenge based on solar spectra. Details to follow soon!

Download/Website: `https://dace.unige.ch/`

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The polarimetric imaging mode of VLT/SPHERE/IRDIS I: Description, data reduction and observing strategy

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Astronomy & Astrophysics, in press (arXiv:1909.13107)

Context. Polarimetric imaging is one of the most effective techniques for high-contrast imaging and characterization of protoplanetary disks, and has the potential to be instrumental in characterizing exoplanets. VLT/SPHERE contains the InfraRed Dual-band Imager and Spectrograph (IRDIS) with a dual-beam polarimetric imaging (DPI) mode, which offers the capability to obtain linear polarization images at high contrast and resolution. Aims. We aim to provide an overview of IRDIS/DPI and study its optical design to improve observing strategies and data reduction. Methods. For H-band observations of TW Hya, we compare two data reduction methods that correct for instrumental polarization effects in different ways: a minimization of the noise image, and a polarimetric-model-based correction method that we present in Paper II of this study. Results. We use observations of TW Hya to illustrate the data reduction. In the images of the protoplanetary disk around this star we detect variability in the polarized intensity and angle of linear polarization with pointing-dependent instrument configuration. We explain these variations as instrumental polarization effects and correct for these effects using our model-based correction method. Conclusions. IRDIS/DPI has proven to be a very successful and productive high-contrast polarimetric imaging system. However, the instrument performance depends on the specific instrument configuration. We suggest adjustments to future observing strategies to optimize polarimetric efficiency in field tracking mode by avoiding unfavourable derotator angles. We recommend reducing on-sky data with the pipeline called IRDAP that includes the model-based correction method (described in Paper II) to optimally account for the remaining telescope and instrumental polarization effects and to retrieve the true polarization state of the incident light.

Download/Website: `https://ui.adsabs.harvard.edu/abs/2019arXiv190913107D/abstract`

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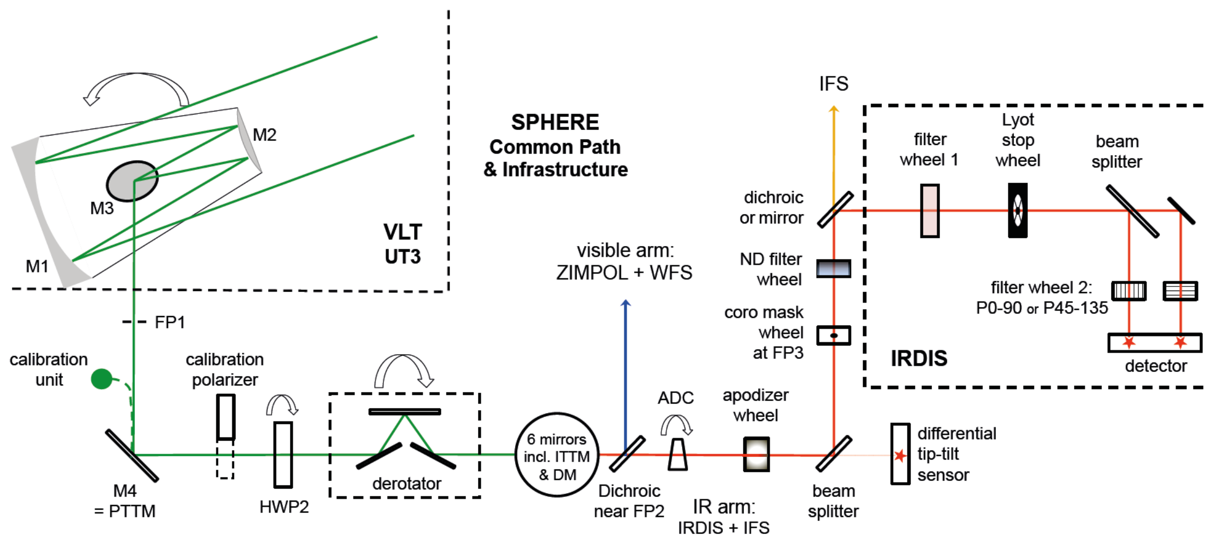

Figure 3: van Holstein et al. (Paper I): Schematic overview of the telescope and SPHERE/IRDIS, showing the optical components that are relevant for the polarimetric imaging mode. The curved arrows indicate components that rotate during an observation block. Reflections at angles of incidence $\geq 45°$ in the instrument are represented with similarly large incidence reflections in the figure. The green beam shows the starlight before color filters are applied, blue represents visible light, red and orange represent NIR light (with the orange beam towards the IFS showing the shorter wavelengths).

The polarimetric imaging mode of VLT/SPHERE/IRDIS II: Characterization and correction of instrumental polarization effects

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Astronomy & Astrophysics, in press (arXiv:1909.13108)

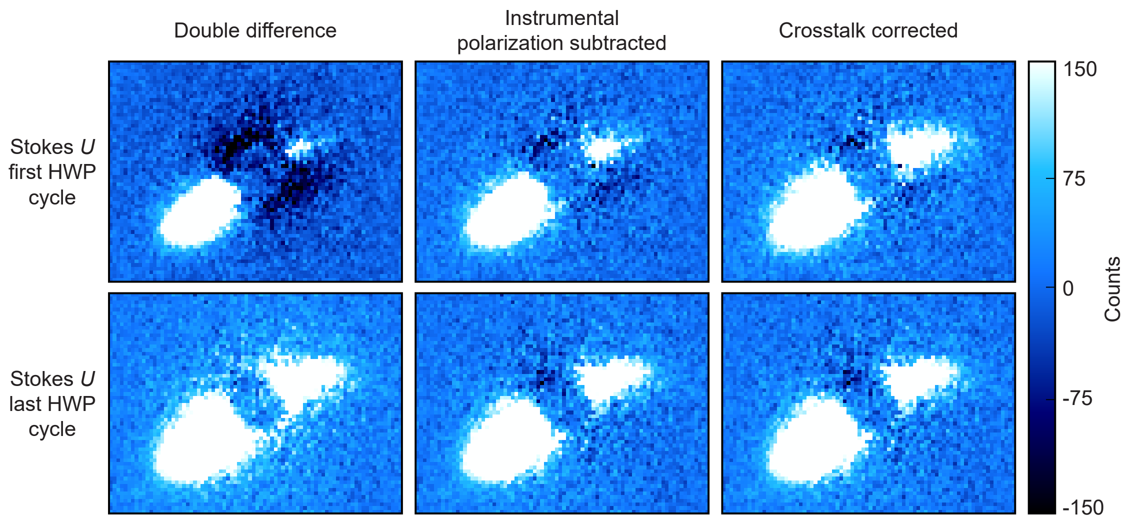

Figure 4: van Holstein et al. (Paper II): Effect of the data-reduction steps of our correction method on the Stokes U-images of the first and last (30th) HWP cycle of the observations of the circumstellar disk of T Cha.

Context. Circumstellar disks and self-luminous giant exoplanets or companion brown dwarfs can be characterized through direct-imaging polarimetry at near-infrared wavelengths. SPHERE/IRDIS at the Very Large Telescope has the capabilities to perform such measurements, but uncalibrated instrumental polarization effects limit the attainable polarimetric accuracy. Aims. We aim to characterize and correct the instrumental polarization effects of the complete optical system, that is, the telescope and SPHERE/IRDIS. Methods. We created a detailed Mueller matrix model in the broadband filters Y-, J-, H-, and K_s and calibrated the model using measurements with SPHERE's internal light source and observations of two unpolarized stars. We developed a data-reduction method that uses the model to correct for the instrumental polarization effects, and applied it to observations of the circumstellar disk of T Cha. Results. The instrumental polarization is almost exclusively produced by the telescope and SPHERE's first mirror and varies with telescope altitude angle. The crosstalk primarily originates from the image derotator (K-mirror). At some orientations, the derotator causes severe loss of signal ($>90\%$ loss in the H- and K_s-band) and strongly offsets the angle of linear polarization. With our correction method we reach, in all filters, a total polarimetric accuracy of $\leq 0.1\%$ in the degree of linear polarization and an accuracy of a few degrees in angle of linear polarization. Conclusions. The correction method enables us to accurately measure the polarized intensity and angle of linear polarization of circumstellar disks, and is a vital tool for detecting spatially unresolved (inner) disks and measuring the polarization of substellar companions. We have incorporated the correction method in a highly-automated end-to-end data-reduction pipeline called IRDAP, which is publicly available at **https://irdap.readthedocs.io**.

Download/Website: `https://ui.adsabs.harvard.edu/abs/2019arXiv190913108V/abstract`

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The Planetary Accretion Shock. II. Grid of Post-Shock Entropies and Radiative Shock Efficiencies for Nonequilibrium Radiation Transport

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The Astrophysical Journal, published (2019ApJ...881..144M)

In the core-accretion formation scenario of gas giants, most of the gas accreting onto a planet is processed through an accretion shock. In this series of papers we study this shock because it is key in setting the structure of the forming planet and thus its post-formation luminosity, with dramatic observational consequences. We perform one-dimensional grey radiation-hydrodynamical simulations with nonequilibrium (two-temperature) radiation transport and up-to-date opacities. We survey the parameter space of accretion rate, planet mass, and planet radius and obtain post-shock temperatures, pressures, and entropies, as well as global radiation efficiencies. We find that usually, the shock temperature T_{shock} is given by the "free-streaming" limit. At low temperatures the dust opacity can make the shock hotter but not significantly so. We corroborate this with an original semi-analytical derivation of T_{shock}. We also estimate the change in luminosity between the shock and the nebula. Neither T_{shock} nor the luminosity profile depend directly on the optical depth between the shock and the nebula. Rather, T_{shock} depends on the immediate pre-shock opacity, and the luminosity change on the equation of state (EOS). We find quite high immediate post-shock entropies ($S \approx$ 13–20 $k_{\mathrm{B}}\,m_{\mathrm{H}}{}^{-1}$), which makes it seem unlikely that the shock can cool the planet. The global radiation efficiencies are high ($\eta^{\mathrm{phys}} \gtrsim 97\,\%$), but the remainder of the total incoming energy, which is brought into the planet, exceeds the internal luminosity of classical cold starts by orders of magnitude. Overall, these findings suggest that warm or hot starts are more plausible.

Download/Website: `http://adsabs.harvard.edu/abs/2019ApJ...881..144M`

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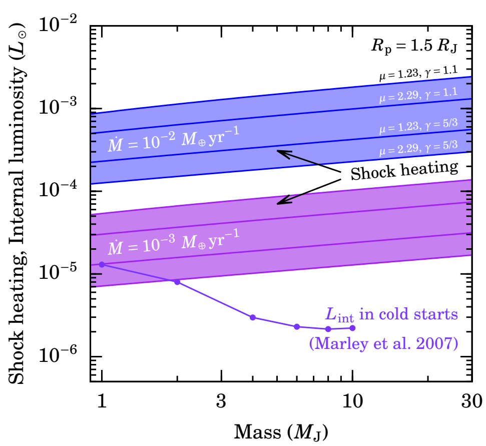

Figure 5: Marleau et al.: Heating of the planet by the shock calculated from our radiation-hydrodynamical simulations (blue and purple bands; two accretion rates) compared to the internal luminosity of planets in the cold starts of Marley et al. (2007). The heating corresponds to the fraction of the total incoming energy (kinetic and thermal) that is going into the planet and not radiated away at the shock. It dominates strongly compared to the internal luminosity, implying that the extreme cold starts of Marley et al. (2007) are not likely. The part radiated away is however still large ($\eta^{\mathrm{phys}} \gtrsim 97\,\%$) and should be observable, as is probably being witnessed for PDS 70b and c.

New constraints on the HR 8799 planetary system from mid-infrared direct imaging

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[3] Universitäts-Sternwarte, Ludwig-Maximilians-Universität München, Scheinerstr 1, D-81679 München, Germany
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MNRAS, published (2019MNRAS.tmp.2709P)

Direct imaging is a tried and tested method of detecting exoplanets in the near infrared, but has so far not been extended to longer wavelengths. New data at mid-IR wavelengths (8-20 m) can provide additional constraints on planetary atmospheric models. We use the VISIR instrument on the VLT to detect or set stringent limits on the 8.7 m flux of the four planets surrounding HR 8799, and to search for additional companions. We use a novel circularised PSF subtraction technique to reduce the stellar signal and obtain instrument limited background levels and obtain optimal flux limits. The BT SETTL isochrones are then used to determine the resulting mass limits. We find flux limits between 0.7 and 3.3 mJy for the J8.9 flux of the different planets at better than 5σ level and derive a new mass limit of $30\,\mathrm{M_{Jup}}$ for any objects beyond 40 AU. While this work has not detected planets in the HR 8799 system at 8.7 m, it has found that an instrument with the sensitivity of VISIR is sufficient to detect at least 4 known hot planets around close stars, including β Pictoris b (1700 K, 19 pc), with more than 5σ certainty in 10 hours of observing time in the mid-IR.

Contact: `petit@eso.org`

Discarding orbital decay in WASP-19b after one decade of transit observations

R. Petrucci[1,2,6], E. Jofré[1,2,6], Y. Gómez Maqueo Chew[1], T. C. Hinse[3], M. Mašek[4], T.-G. Tan[5], M. Gómez[2,6]
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[2] Universidad Nacional de Córdoba, Observatorio Astronómico, Laprida 854, 5000 Córdoba, Argentina
[3] Chungnam National University, Department of Astronomy and Space Science, 34134 Daejeon, Republic of Korea
[4] Institute of Physics Czech Academy of Sciences, Na Slovance 1999/2, CZ-182 21 Praha, Czech Republic
[5] Perth Exoplanet Survey Telescope, 6010 Perth, Australia
[6] Consejo Nacional de Investigaciones Científicas y Técnicas (CONICET), Godoy Cruz 2290, CABA, CPC 1425FQB, Argentina

Monthly Notices of the Royal Astronomical Society, in press(arXiv:1910.11930)

We present a empirical study of orbital decay for the exoplanet WASP-19b, based on mid-time measurements of 74 complete transits (12 newly obtained by our team and 62 from the literature), covering a 10-year baseline. A linear ephemeris best represents the mid-transit times as a function of epoch. Thus, we detect no evidence of the shortening of WASP-19b's orbital period and establish an upper limit of its steady changing rate, $\dot{P} = -2.294$ ms yr^{-1}, and a lower limit for the modified tidal quality factor $Q'_\star = (1.23 \pm 0.231) \times 10^6$. Both are in agreement with previous works. This is the first estimation of $Q'_\star$ directly derived from the mid-times of WASP-19b obtained through homogeneously analyzed transit measurements. Additionally, we do not detect periodic variations in the transit timings within the measured uncertainties in the mid-times of transit. We are therefore able to discard the existence of planetary companions in the system down to a few $M_\oplus$ in the first order mean-motion resonances 1:2 and 2:1 with WASP-19b, in the most conservative case of circular orbits. Finally, we measure the empirical $Q'_\star$ values of 15 exoplanet host stars which suggest that stars with $T_{\rm eff} < 5600$K dissipate tidal energy more efficiently than hotter stars. This tentative trend needs to be confirmed with a larger sample of empirically measured $Q'_\star$.

Download/Website: `https://ui.adsabs.harvard.edu/abs/2019arXiv191011930P/abstract`

Contact: `romina@astro.unam.mx`

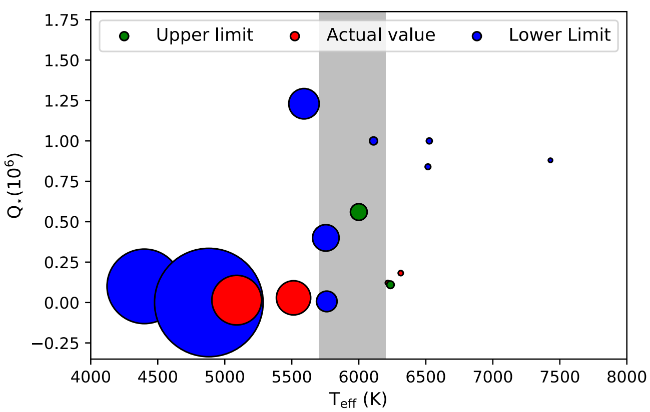

Figure 6: Petrucci et al.: $T_{\rm eff}$ versus $Q'_\star$ for the 15 systems presented in Table 9. Red, blue, and green colors indicate measured actual values, and measured lower and upper limits of $Q'_\star$, respectively. The size of the circles scales with the percentage of the stellar convective zone mass respect to the total mass of the star, where the biggest circle corresponds to K2-39 with $m_{\rm CZ} = 46\%$ and the smallest one to WASP-33 with $m_{\rm CZ} = 0.000004\%$. The gray shaded area marks the range of effective temperatures at which $m_{\rm CZ}$ changes from 2% to 0.035%, according to the models of Baraffe et al. (2015). For a better visualization, error bars in $T_{\rm eff}$ are not shown.)

Remote sensing of exoplanetary atmospheres with ground-based high-resolution near-infrared spectroscopy

D. Shulyak[1], *M. Rengel*[1], *A. Reiners*[2], *U. Seemann*[2], *F. Yan*[2]

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Astronomy & Astrophysics, published (2019A&A...629A.109S/1908.10695)

Thanks to the advances in modern instrumentation we have learned about many exoplanets that span a wide range of masses and composition. Studying their atmospheres provides insight into planetary origin, evolution, dynamics, and habitability. Present and future observing facilities will address these important topics in great detail by using more precise observations, high-resolution spectroscopy, and improved analysis methods. We investigate the feasibility of retrieving the vertical temperature distribution and molecular number densities from expected exoplanet spectra in the near-infrared. We use the test case of the CRIRES+, instrument at the Very Large Telescope which will operate in the near-infrared between 1 μm and 5 μm and resolving powers of R=100 000 and R=50 000. We also determine the optimal wavelength coverage and observational strategies for increasing accuracy in the retrievals. We used the optimal estimation approach to retrieve the atmospheric parameters from the simulated emission observations of the hot Jupiter HD 189733b. The radiative transfer forward model is calculated using a public version of the $\tau - REx$, software package. Our simulations show that we can retrieve accurate temperature distribution in a very wide range of atmospheric pressures between 1 bar and 10^{-6} bar depending on the chosen spectral region. Retrieving molecular mixing ratios is very challenging, but a simultaneous observations in two separate infrared regions around 1.6 μm and 2.3 μm helps to obtain accurate estimates; the exoplanetary spectra must be of relatively high signal-to-noise ratio S/N>10, while the temperature can already be derived accurately with the lowest value that we considered in this study (S/N=5). The results of our study suggest that high-resolution near-infrared spectroscopy is a powerful tool for studying exoplanet atmospheres because numerous lines of different molecules can be analyzed simultaneously. Instruments similar to CRIRES+, will provide data for detailed retrieval and will provide new important constraints on the atmospheric chemistry and physics.

Download/Website: `https://ui.adsabs.harvard.edu/abs/2019A&A...629A.109S`

Contact: `shulyak@mps.mpg.de`

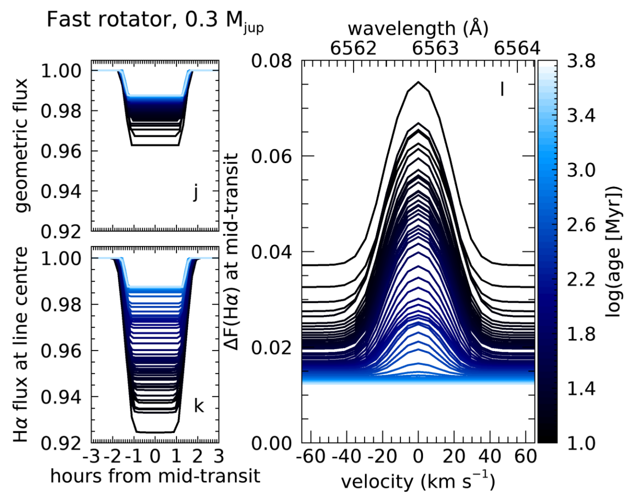

Figure 7: Allan & Vidotto: Hα transit simulations for the 0.3-$M_{\rm jup}$ planet orbiting a fast-rotating star. Panel j shows the lightcurve of the geometric transit. Panel k shows the lightcurves as observed in Hα line centre. Panel l is the mid-transit obscured flux (ΔF_ν) of the Hα line profile, as a function of Doppler velocity and wavelength. Note that ΔF_ν does not reach zero and is offset by a couple % due to the absorption of the opaque disc of the planet. Colour represents age, which are indicated in the colour-bar.

Evolution of atmospheric escape in close-in giant planets and their associated Ly-alpha and H-alpha transit predictions

A. Allan, A. A. Vidotto
Trinity College Dublin, the University of Dublin, College Green, Dublin-2, Ireland

Monthly Notices of the Royal Astronomical Society, in press (arXiv:1908.03510)

Strong atmospheric escape has been detected in several close-in exoplanets. As these planets consist mostly of hydrogen, observations in hydrogen lines, such as Lyα and Hα, are powerful diagnostics of escape. Here, we simulate the evolution of atmospheric escape of close-in giant planets and calculate their associated Lyα and Hα transits. We use a one-dimensional hydrodynamic escape model to compute physical properties of the atmosphere and a ray-tracing technique to simulate spectroscopic transits. We consider giant (0.3 and $1M_{\rm jup}$) planets orbiting a solar-like star at 0.045au, evolving from 10 to 5000 Myr. We find that younger giants show higher rates of escape, owing to a favourable combination of higher irradiation fluxes and weaker gravities. Less massive planets show higher escape rates (10^{10} – 10^{13} g/s) than those more massive (10^9 – 10^{12} g/s) over their evolution. We estimate that the 1-$M_{\rm jup}$ planet would lose at most 1% of its initial mass due to escape, while the 0.3-$M_{\rm jup}$ planet, could lose up to 20%. This supports the idea that the Neptunian desert has been formed due to significant mass loss in low-gravity planets. At younger ages, we find that the mid-transit Lyα line is saturated at line centre, while Hα exhibits transit depths of at most 3 – 4% in excess of their geometric transit. While at older ages, Lyα absorption is still significant (and possibly saturated for the lower mass planet), the Hα absorption nearly disappears. This is because the extended atmosphere of neutral hydrogen becomes predominantly in the ground state after ~ 1.2 Gyr.

Download/Website: `https://arxiv.org/abs/1908.03510`

Contact: `Aline.Vidotto@tcd.ie`

Susceptibility of planetary atmospheres to mass loss and growth by planetesimal impacts: the impact shoreline

M. C. Wyatt[1], *Q. Kral*[2], *C. A. Sinclair*[1]

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[2] LESIA, Observatoire de Paris, Université PSL, CNRS, Sorbonne Université, Univ. Paris Diderot, Sorbonne Paris Cité, 5 place Jules Janssen, 92195 Meudon, France

Monthly Notices of the Royal Astronomical Society, in press (2019MNRAS.tmp.2660W)

This paper considers how planetesimal impacts affect planetary atmospheres. Atmosphere evolution depends on the ratio of gain from volatiles to loss from atmosphere stripping $f_{\rm v}$; for constant bombardment, atmospheres with $f_{\rm v} < 1$ are destroyed in finite time, but 'grow linearly with time for $f_{\rm v} > 1$. An impact outcome prescription is used to characterise how $f_{\rm v}$ depends on planetesimal impact velocities, size distribution and composition. Planets that are low mass and/or close to the star have atmospheres that deplete in impacts, while high mass and/or distant planets grow secondary atmospheres. Dividing these outcomes is an $f_{\rm v} = 1$ impact shoreline analogous to Zahnle & Catling's cosmic shoreline. The impact shoreline's location depends on assumed impacting planetesimal properties, so conclusions for the atmospheric evolution of a planet like Earth with $f_{\rm v} \approx 1$ are only as strong as those assumptions. Application to the exoplanet population shows the gap in the planet radius distribution at $\sim 1.5 R_\oplus$ is coincident with the impact shoreline, which has a similar dependence on orbital period and stellar mass to the observed gap. Given sufficient bombardment, planets below the gap would be expected to lose their atmospheres, while those above could have atmospheres enhanced in volatiles. The level of atmosphere alteration depends on the total bombardment a planet experiences, and so on the system's (usually unknown) other planets and planetesimals, though massive distant planets would have low accretion efficiency. Habitable zone planets around lower luminosity stars are more susceptible to atmosphere stripping, disfavouring M stars as hosts of life-bearing planets if Earth-like bombardment is conducive to the development of life.

Download/Website: `https://arxiv.org/abs/1910.10731`

Contact: `wyatt@ast.cam.ac.uk`

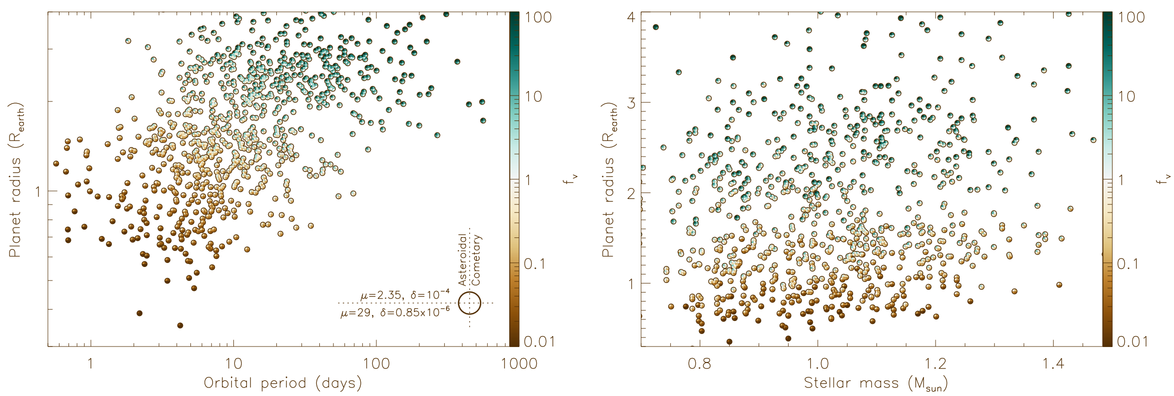

Figure 8: Wyatt, Kral & Sinclair: Model predictions for the population of 907 exoplanets from table 4 of Fulton & Petigura (2018). The plots show planet radius versus either orbital period (left) or stellar mass (top right), and so are respectively equivalent to figs 4 and 8 of Fulton & Petigura (2018). For each planet the colour shows the model prediction for $f_{\rm v}$ as indicated in the colour bar on the right (i.e., blue is $f_{\rm v} > 1$ meaning the atmosphere grows in impacts, brown is $f_{\rm v} < 1$ meaning the atmosphere depletes in impacts). The planets are assumed to have a density $5.5\,{\rm g\,cm^{-3}}$, and the predictions are shown for four different further assumptions about the impactors or atmosphere, by dividing each planet's circle into four quadrants corresponding to the assumptions summarised in the bottom right of the left plot; i.e., impactors are assumed to be asteroidal ($2.8\,{\rm g\,cm^{-3}}$, 2% volatile fraction) for the left quadrants and cometary ($0.9\,{\rm g\,cm^{-3}}$, 20% volatile fraction) for the right quadrants, the atmosphere is assumed to be Earth-like ($\delta = M_{\rm atm}/M_{\rm pl} = 0.85 \times 10^{-6}$, $\mu = 29$) for the bottom quadrants and primordial ($\delta = 10^{-4}$, $\mu = 2.35$) for the top quadrants.

3 Jobs and Positions

Postdoctoral position in the ESCHER (ExtraterreStrial prebiotic CHEmistRy) interdisciplinary research project

Prof. Leen Decin, Prof. Jeremy Harvey, Prof. Christine Kirschhock
[1] Institute of Astronomy, KU Leuven, Belgium
[2] Quantum Chemistry and Physical Chemistry division, KU Leuven, Belgium
[3] Center for Surface Chemistry and Catalysis, KU Leuven, Belgium

Leuven, Belgium, September 2020

The ESCHER project
The question of the origin of life is more than ever under the spotlight now that new telescopes allow scientists to detect biosignatures on exoplanets. However, the analysis and interpretation of these detections in terms of chemical and biological evolution heavily depends on our ability to understand how simple molecular units build larger macromolecular units and get (self-)organised under extraterrestrial circumstances. Mineral surfaces are thought to play a crucial factor, not only as catalysts for gas-phase reactions, but also as templates imprinting their structure onto available building units. The goal of this interdisciplinary ESCHER project is to address the role and impact of solid-state surfaces on (extra)terrestrial prebiotic chemistry.

Within the ESCHER project we are offering a postdoctoral position on ”Rocky exoplanets as chemical reactors”. A more detailed description of the project can be found on:
`https://fys.kuleuven.be/ster/vacancies/vacancies`

The positions
The postdoc candidate will be employed at the Institute of Astronomy. The initial contract runs over 2 years (with the possibility for prolongation). The salary will be commensurate to the standard scale for postdoctoral researchers at KU Leuven. The preferred starting date is September 2020, but will be adapted to the selected candidate’s availability. Candidates are thus requested to indicate their preferred starting date in the application. The postdoc will be encouraged to take up training in science and people management, science communication and grant application writing, with the aim to develop a personal independent career track.

Instructions to apply
The application package should be sent as **one single PDF** containing

- (i) a curriculum vitae with publication list;
- (ii) a statement of interest (max. 3 pages, including a brief description of research interests, relevant experience and future plans);
- (iii) copies of university grades, certificates and/or diplomas;
- (iv) names and contact details of 2 experts who are prepared to send confidential recommendation letters should they be requested to do so;

The application material should be sent as one PDF by e-mail to Clio.Gielen@kuleuven.be with subject ”PD-ESCHER-applicantname” by December 15th 2019. Applications that do not strictly follow these guidelines will not be considered.

Download/Website: `https://fys.kuleuven.be/ster/vacancies/vacancies`

Contact: `clio.gielen@kuleuven.be`

Multiple PhD positions in the ESCHER (ExtraterreStrial prebiotic CHEmistRy) interdisciplinary research project

Prof. Leen Decin, Prof. Jeremy Harvey, Prof. Christine Kirschhock
[1] Institute of Astronomy, KU Leuven, Belgium
[2] Quantum Chemistry and Physical Chemistry division, KU Leuven, Belgium
[3] Center for Surface Chemistry and Catalysis, KU Leuven, Belgium

Leuven, Belgium, TBD 2020

The ESCHER project
The question of the origin of life is more than ever under the spotlight now that new telescopes allow scientists to detect biosignatures on exoplanets. However, the analysis and interpretation of these detections in terms of chemical and biological evolution heavily depends on our ability to understand how simple molecular units build larger macromolecular units and get (self-)organised under extraterrestrial circumstances. Mineral surfaces are thought to play a crucial factor, not only as catalysts for gas-phase reactions, but also as templates imprinting their structure onto available building units. The goal of this interdisciplinary ESCHER project is to address the role and impact of solid-state surfaces on (extra)terrestrial prebiotic chemistry.

Within the ESCHER project we are offering 3 PhD positions:

- PhD 1: Rocky exoplanets as chemical reactors
- PhD 2: Characterisation of supramolecular assemblies of nucleobases and solid surfaces as organising mechanism
- PhD 3: Prebiotic chemical discovery through quantum chemistry

A more detailed description of the offered PhD projects can be found on: `https://fys.kuleuven.be/ster/vacancies/vacancies`

The positions
The selected PhD students will be offered a 2+2-year contract. The salary will be commensurate to the standard scale for PhD students in Belgium; it includes social and medical insurance as well as pension rights. The successful applicants will have to register at, and comply with, the regulations of the Arenberg Doctoral School of the KU Leuven. The successful PhD applicants will follow a doctoral programme including personal training in management, science communication, and teaching. We seek excellent students with a strong background in chemistry, physical sciences, mathematics and/or astrophysics. A successful candidate must hold a Masters degree or equivalent by the starting date of the position.

Instructions to apply
The application package should be sent as **one single PDF** containing

- (i) a curriculum vitae, with a publication list if relevant;
- (ii) a statement of interest (max. one page, including a brief description of research interests and relevant experience, and the preferred PhD projects);
- (iii) copies of university grades, certificates and/or diplomas;
- (iv) names and contact details of 2 experts who are prepared to send confidential recommendation letters should they be requested to do so;

The application material should be sent as one PDF by e-mail to Clio.Gielen@kuleuven.be with subject ”PhD-ESCHER-applicantname” by December 15th 2019. Applications that do not strictly follow these guidelines will not be considered.

Download/Website: `https://fys.kuleuven.be/ster/vacancies/vacancies`

Contact: `clio.gielen@kuleuven.be`

Two PhD positions at Lund Observatory

Anders Johansen and Jens Hoeijmakers
[1] Lund Observatory, Lund University, Sweden

Lund Observatory, 2020

Lund Observatory announces two PhD positions within astronomy and astrophysics. The PhD students will work within the subjects:

(1) The PhD student will work on the analysis and interpretation of observations of exoplanets using high resolution ground-based spectroscopy. The student will work with data obtained from state-of-the-art spectrographs such as HARPS, ESPRESSO and others, and use models to constrain the physical, chemical and thermal structure characteristics of exoplanet atmospheres. This project will be focussed on short period giant and sub-giant exoplanets, while preparing for observations of smaller rocky planets in the era of the ELT. The PhD supervisor will be Jens Hoeijmakers who will join Lund Observatory as an Assistant Professor in 2020.

(2) The PhD student will work on models of the formation of giant planets. The student will use the code PLANETESYS, developed in the research team of Anders Johansen, to consider the destruction, growth and sedimentation of dust in the gas envelope of a growing protoplanet. The goal of the thesis project is to understand how the evolution of dust affects the opacity and convective dynamics in the gas envelopes of growing planets. The PhD supervisor will be Professor Anders Johansen.

In addition to working on the topics listed above, the students will work within the inspiring environment at Lund Observatory, which currently hosts 45 scientific staff, including postdocs and 15 PhD students.

Deadline for applications: 1 December 2019

Download/Website: `http://www.astro.lu.se/vacancies`

Contact: `anders@astro.lu.se, jens.hoeijmakers@unige.ch`

Ph.D Position in Exoplanet Formation, Evolution, and Structure at the Universities of Bern and Zurich, Switzerland

Christoph Mordasini, Ravit Helled
[1] Physikalisches Institut, Universität Bern, Switzerland
[2] Institute for Computational Science, Universität Zürich, Switzerland

NCCR PlanetS, Switzerland, 2020

We are seeking qualified candidates to fill a 4-year Ph.D position in exoplanet science in the research groups of Christoph Mordasini (University of Bern) and Ravit Helled (University of Zurich). The Ph.D position is mostly funded through the National Center of Competence in Research PlanetS. PlanetS is a large national framework in Switzerland that unifies Swiss efforts in planetary and exoplanetary science across Bern, Geneva, and Zurich. Frequent collaboration is foreseen with several other researchers that are part of PlanetS (groups of Yann Alibert, Klaus Mezger, Willy Benz, Kevin Heng, Christophe Lovis, Sascha Quanz).
The ideal candidate has a bachelor's and master's degree in physics, astrophysics, planetary sciences or equivalent. She/he should be enthusiastic, tenacious, communicative, and willing to integrate into two diverse teams in Bern and Zurich. In particular, we expect the successful candidate to spend half of her/his time at both locations during the four years. The research work consists of a combination of numerical modeling (developing and running computer codes mostly in Fortran) and analytical work. The scientific goal of the Ph.D project is to develop a general framework that couples the formation, long-term interior evolution, and atmosphere of low-mass planets with primordial hydrogen-helium envelopes, also assessing the observational characterisation of such planets.
The formal employment will be for 2 years at the University of Bern, and 2 years at the University of Zurich. There will be a standard first year of probation. The annual salary is set by a predetermined matrix from the Universities. Child allowance and maternity/paternity leave are offered. There are ample funds for travel, publications and computers. The successful candidate will participate in group meetings, journal clubs, research discussions, attend seminars and colloquia, interact with research visitors, travel to conferences, etc., both in Bern and Zurich. The start date is expected to be winter 2019/spring 2020, and is negotiable.
To apply, please send a motivation letter including a personal statement (maximum 1 page), a CV (maximum 2 pages), a list of publications (if applicable), transcripts of your grades of courses obtained during your bachelor's and master's degrees, and a cover letter (1 page). The entire application should be submitted as a single pdf file to Christoph Mordasini (christoph.mordasini@space.unibe.ch) and Ravit Helled (rhelled@physik.uzh.ch). It is the responsibility of the applicant to ensure that furthermore, 2-3 letters of recommendation are sent directly by the letter writers to C. Mordasini and R. Helled, by the **application deadline of 1. December 2019**.

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

Contact: `christoph.mordasini@space.unibe.ch,rhelled@physik.uzh.ch`

JWST Postdoctoral Fellow

Prof. David Lafreniere
Université de Montréal, Montréal, QC, Canada

Montréal, Canada, Starting date: May to September 2020

The Institute for Research on Exoplanets (iREx), affiliated with the Department of Physics at the Université de Montréal, is seeking applications for a postdoctoral position to join the NIRISS instrument team for the James Webb Space Telescope in order to contribute to the analysis and publication of NEAT observations (NIRISS Exploration of the Atmospheric diversity of Transiting exoplanets). NEAT is a large 200-hour JWST GTO program led by the NIRISS team and dedicated to the study of the atmosphere of 14 exoplanets using transit, eclipse and phase spectroscopy. More details on the NEAT program are available here: http://www.stsci.edu/jwst/observing-programs/program-information?id=1201.

Candidates should send a CV, a list of publications and a statement of main achievements and research interests (maximum 3 pages) to **irex@astro.umontreal.ca**. Three letters of recommendation should also be sent to the same address. All documents must be sent by **December 15, 2019** for full consideration to be given to the application. However, the position will remain open until a candidate is selected.

A PhD in physics, astronomy or related discipline is required. Preference will be given to candidates who have completed their PhD within the last 3 years. The position has an expected start date in the fall of 2020. The position is for a two-year term, renewable for a third year depending on performance and availability of funds.

The iREx consists of a growing team of over 45 people (professors, postdocs, research assistants and students) mostly from UdeM and McGill University all working on various research programs focused on the study of exoplanets and related fields of stellar astrophysics. Members of iREx are actively involved in large international projects related to the detection and characterisation of exoplanets, notably the future James Webb Space Telescope (JWST), SPIRou, NIRPS and high-dispersion spectroscopy for 8-10m and giant telescopes. In addition, iREx researchers will have access to guaranteed observing time with JWST, SPIRou and NIRPS. More information on iREx research programs can be found here: http://www.exoplanetes.umontreal.ca/research/?lang=en.

Social Benefits:
Postdoctoral researchers at iREx at UdeM enjoy a comprehensive benefits package, see: https://esp.umontreal.ca/fileadmin/esp/documents/PDF/GuideStagiairePostoctoral_Eng.pdf

For more information, see:
http://www.exoplanetes.umontreal.ca/2020-jwst-postdoctoral-fellowship/?lang=en

Contact: `nathalie@astro.umontreal.ca`

Call for application for 15 Marie Sklodowska-Curie PhDs to study Exoplanets and Planet Forming Disks

Dr Ludmila Carone, Max Planck Institute for Astronomy, Heidelberg, Germany

Professor Leen Decin, University of Leuven, Belgium

Dr Christiane Helling (Network lead) and Dr Peter Woitke, University of St Andrews, UK

Professor Uffe Jørgensen and Professor Anja Andersen, University of Copenhagen, Denmark

Professor Inga Kamp, University of Groningen, The Netherlands

Professor Katrien Kolenberg, University of Antwerp, Belgium

Professor Paul Palmer, University of Edinburgh, UK

Dr Michiel Min, SRON, The Netherlands

'CHAMELEON – Virtual Laboratories for Planets and Planet-forming Disks' is an exciting new Marie Sklodowska-Curie Innovative Training Network (ITN): https://chameleon.wp.st-andrews.ac.uk/.

The overarching goal of CHAMELEON is to train a network of PhD researchers to retrieve and predict the chemical composition of planet-forming disks and exoplanet atmospheres using such Virtual Laboratories in conjunction with existing and upcoming data such as the VLT, ALMA, JWST, and ARIEL.

We are looking for 15 outstanding Early Stage Researchers (ESRs) to join the CHAMELEON ITN to study for their PhD. We offer a range of data-driven and computational modelling projects that build Virtual Laboratories by using advanced numerical and statistical methods from astrophysics, computational chemistry, laboratory and theoretical physics, geosciences, mathematics, and computer sciences.

You can apply for up to three out of the 15 positions available: https://chameleon.wp.st-andrews.ac.uk/recruitment. A common set of application materials must be submitted to the host institutes, following instructions that are described in individual adverts.

Each ESR will be appointed on a full-time, fixed-term contract for a period of three years under the ITN at a primary host institute. During their period of study, each ESR will spend a pre-defined period of time at another CHAMELEON institute (detailed in individual project adverts), which enables them to meet the eligibility requirements for dual/joint degrees. Additional time may be added to individual contracts as part of these dual/joint degrees.

Recruitment Requirements

Marie Curie eligibility rules require that ESRs have no more than four years' research experience, counting from the date at which they have been awarded a degree that allows them to embark on a PhD.

To satisfy Marie Curie mobility criteria, ESRs will not have resided or carried out their main activity (work, studies, etc.) in the country of the primary host institute for more than 12 months in the 3 years immediately prior to the start date. Short stays such as holidays and/or compulsory national service are not taken into account.

Application deadlines vary with host institution and vary between December 2019 to February 2020. See project website for further details.

Download/Website: `http://chameleon.wp.st-andrews.ac.uk/recruitment/`

4 Conferences

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)

Registration is now open. Attendance is limited by space and will be granted on a first-come-first-served basis.

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


Saas-Fee Course 2020
Astronomy in the Era of Big Data
15 - 20 March 2020
Lecturers :
- Prof. Suzanne Aigrain, University of Oxford
- Dr. Roberto Trotta, Imperial College London
- Prof. Marc Huertas-Company, Paris Observatory
Location :
Hotel Allalin
Saas-Fee, Switzerland
SOC/LOC :
- Yann Alibert
- Kevin Heng
- Danuta Sosnowska
- Nathan Hara
- Xavier Dumusque
- Lucio Mayer
SSAAG
PlanetS
UNIVERSITÄT BERN
CSH
CENTER FOR SPACE AND HABITABILITY

COSPAR2020-B0.1: Unifying planetary system formation out of elementary building blocks: from dust, gas and ice to our Solar System and exoplanets

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[1] CSH; Switzerland
[2] INAF-IAPS; Italy

Sydney, Australia, 15-22 August, 2020

Dear Colleagues,
we wish to invite you to attend the event B0.1:
"Unifying planetary system formation out of elementary building blocks: from dust, gas and ice to our Solar System and exoplanets".
at the 43rd COSPAR Scientific Assembly that will be held in Sydney, Australia, 15-22 August, 2020. https://www.cospar2020.org/ https://www.cospar-assembly.org/
*********************IMPORTANT DATE************************
ABSTRACT SUBMISSION DEADLINE is 14 FEBRUARY 2020
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Scientific Rationale:
The assembly of planetary systems can no longer be considered a process exclusive to mature circumstellar (i.e., protoplanetary) disks, as strings of evidence are pushing its onset to the earliest phases of star formation. These findings require previously separate communities to come together and to exchange expertise. This event offers the venue for such exchange in the form of a unique interdisciplinary platform for discussing the full evolutionary sequence of our Solar System and of exoplanetary systems that may be analogous and different from our own. The event is open to experts on the Solar System, its small and large bodies; exoplanets; protoplanetary disks, embedded and prestellar phases of star formation. It will cover studies of gas, ice, dust and larger bodies from theoretical, observational and experimental perspectives. This science is stimulated by the increasing amount of in-situ measurements from past missions such as Cassini and Rosetta, present missions like New Horizons, and upcoming missions such as JUICE and Europa Clipper. Simultaneously, the field is being revolutionized with interferometric observations from powerful facilities such as ALMA, exoplanet demographics from transits and radial velocities (e.g., TESS, ESPRESSO) and with experimental studies in state-of-the-art laboratories simulating the various space environments. This event is sponsored by and coordinated with Commissions B1, E4 and F3.
Main Scientific Organizers:
Maria Drozdovskaya (CSH; Switzerland) & Diego Turrini (INAF-IAPS; Italy)
Scientific Organizing Committee:
Michael Ireland, ANU, Australia; Stavro Ivanovski, INAF-OATS, Italy; Niels Ligterink, CSH, Switzerland; Gianfranco Vidali, Syracuse, U.S.A.; Eric Herbst, UVA, U.S.A.; Martin Rubin, UniBe, Switzerland; Trevor Ireland, ANU, Australia; Raphael Marschall, SwRi, U.S.A.; Sho Sasaki, Osaka, Japan; Sean Andrews, CfA, U.S.A.
Confirmed Invited Speakers:
Fred Ciesla (University of Chicago, U.S.A.) Joanna Drażkowska (University Observatory of the Ludwig Maximilian University of Munich, Germany) Davide Fedele (INAF/Osservatorio Astrofisico di Arcetri, Italy) Mark Krumholz (ANU, Australia) Jeong-Eun Lee (Kyung Hee University, South Korea) Yamila Miguel (Leiden University, The Netherlands) Paola Pinilla (Max Planck Institute for Astronomy in Heidelberg, Germany) Alessandro Sozzetti (INAF/Osservatorio Astronomico di Torino, Italy) Frances Westall (CNRS in Orléans, France) Makoto Yoshikawa (JAXA, Japan)

2020 Sagan Summer Workshop: Finding and Characterizing Exoplanets with Extreme Precision Radial Velocities

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

Pasadena, CA, July 20-24, 2020

Join us in 2020 for the 20th Sagan Summer Workshop! This year's topic is extreme precision radial velocity for finding and characterizing exoplanets. Attendees will participate in hands-on group projects and will have the opportunity to present their own work through short presentations (research POPs) and posters. More details will be posted on the workshop website in early 2020.

The Sagan Summer Workshops are free to attend and are aimed at graduate and post doctoral level students, however anyone who is interested in learning more about the field is welcome to attend. Videos of presentations from past summer workshops are available on the Sagan Exoplanet Summer Workshop YouTube channel.

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

2nd announcement: TOEIII - From Solar System to Exoplanets (Douro Valley, Portugal) - registration are now open!

O. Demangeon, S. Sousa, G. Gilli, N. Santos
Instituto de Astrofísica e Ciências do Espaço (IA), Portugal

Lamego, Douro Valley, Portugal, 1-5 June 2020

Atmosphere, Interior, formation and evolution of planets and planetary systems. The Solar System Planets and Exoplanets communities aim at answering similar questions, but seldom interact due to the different datasets they have access to. Our goal is to discuss how the detailed and in situ datasets from Solar System planets can inform the often under constrained exoplanetary models. We will try to understand how the diversity and large sample offered by exoplanets can put in context and inform our understanding of Solar System planets, focusing on each of these categories:

1. Super-Earths, Mercury, Venus, Mars and Earth
2. Ice giants, Uranus and Neptune
3. Gas giants, Jupiter and Saturn
4. Planetary System architecture

Scientific Organization Commitee: David Ehrenreich, Jonathan Fortney, Victoria Meadows, Antonio Garcia Munoz, Caroline Dorn, Tristan Guillot. Heike Rauer, Li Zeng, Christoph Mordasini, Alessandro Morbidelli, Rebecca Dawson, Gabriella Gilli, Sergio Sousa, Nuno Santos, Olivier Demangeon.

Key dates:
26 Jun. 2019: 1st announcement
15 Nov. 2019: 2nd announcement
29 Feb. 2020: Early registration deadline
30 Apr. 2020: Late registration deadline
1-5 June 2020: Conference week

Download/Website: `http://www.iastro.pt/toe3/`
Contact: `toe3@iastro.pt`

COSPAR 2020 Scientific Assembly exoplanet event B6.1/E4.1: Exoplanet detection and characterisation: current research, future opportunities and the search for life outside the solar system"

(Main Scientific Organizers: Rens Waters (SRON, The Netherlands), Francesca Altieri (INAF-IAPS, Italy), Michael Ireland (Australian National Observatory, Australia) ; SOC: Kim Bott (University of Washington, U.S.A.), Jean-Michel Desert (University of Amsterdam, the Netherlands), Maria Drozdovskaya (CSH Bern, Switzerland), Teruyuki Hirano (Tokyo Institute of Technology School of Science, Japan), Pierre-Olivier Lagage (CEA Saclay, France), Sacha Quanz (ETH Zurich, Switzerland), Mark Swain (JPL, U.S.A.), Giovanna Tinetti (UCL, U.K.)

Sydney, Australia, August 15-23, 2020

Exoplanet searches using ground- and space-based facilities have revealed a remarkable variety in observed properties of exoplanets and the planetary systems they are part of. It is clear by now that planetary systems are commonly found in low- and intermediate mass stars. In order to understand the observed diversity in planetary systems we begin to link their architecture to the properties of planet forming disks around young stars, and to trace the present-day properties of exoplanets (mass, radius, chemical composition, atmosphere) to their formation history and evolution to mature planetary systems. Such studies are important to understand which planets in which planetary systems have properties that would support the emergence of life as we know it. The CHEOPS, TESS, JWST, ARIEL and PLATO missions, and ground-based facilities such as the 30-m class telescopes and long baseline interferometers, open a new era in the exoplanet studies and will revolutionize our picture of exoplanets, their atmospheres, and their habitability. Accurate mass and radii determinations will constrain the composition and interior structure of rocky exoplanets. Spectra of increasing quality and resolution enable us to investigate exoplanet rotation, atmospheric chemical composition, the presence of clouds and day to night side differences of large samples of exoplanets, and to study important biomarkers. These more detailed observations require more sophisticated modelling efforts, including understanding potential abiotic origins of biomarkers and evolutionary models of processes such as atmospheric escape. In view of the outcomes from the next exoplanet investigations, this COSPAR event aims to put together the broad community interested in the field to review major results, discuss models and present new projects.

Download/Website: `https://www.cospar-assembly.org/`

Contact: `waters@sron.nl`

5 Exoplanet Archive Updates

October Updates at the NASA Exoplanet Archive

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

Pasadena CA USA, November 11, 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/2JQr180`).

October 24, 2019 We've added 11 planets this week, including HD 97048 b, an exoplanet discovered using a different method based on the kinematic interaction between the circumstellar disk and the orbiting planet. The method is described in the planet discovery paper by Pinte et al. (2019). The other new planets are: OGLE-2015-BLG-1649L b, V1298 Tau c, d & e, HU Aqr AB b & c, HW Vir b, 7 CMa c, NY Vir c, and eps Ind A b. There are also new planet parameter sets for 13 planets.

October 10, 2019 We have 16 new planets, including GJ 15 A b, which was refuted and then reinstated based on new published data in Pinamonti et al. The same paper also announced a new planet in the same system, GJ 15 A c. The other new planets this week are: GJ 27.1 b, GJ 160.2 b, GJ 180 b & c, GJ 229 A b, GJ 3512 b, GJ 422 b, GJ 433 c, GJ 682 b & c, WASP-178 b, WASP-184 b, WASP-185 b, and WASP-192 b.

October 8, 2019
Exoplanet Researchers Win a Nobel Prize!
It's been an exciting week for exoplanet research, with two astronomers awarded the Nobel Prize in Physics for their 1995 discovery of 51 Pegasi b, the first planet observed to orbit a Sun-like star. This discovery launched a new field of astronomical exploration that continues to this day. Here are some resources on the exoplanet that started it all:

- Our Confirmed Planet Overview Page contains all of the data we have on 51 Pegasi b, including a link to the discovery paper by Mayor & Queloz (`http://bit.ly/30W1O31`).
- 51 Pegasi b also makes a brief appearance in our movie of animated plots, *Exoplanets: Cumulative Detections by Discovery Year* (`http://bit.ly/2PP9Ean`).
- The Exoplanet Travel Bureau featured 51 Peg b in a poster that you can download and print (`https://go.nasa.gov/2AQggN3`).
- NASA's Office of Exoplanet Exploration put together a high-resolution infographic on 51 Pegasi b (`https://go.nasa.gov/33uCh0F`).

Upcoming Changes for the NASA Exoplanet Archive

The NASA Exoplanet Archive staff have been working on some improvements that we hope will enhance our users' experience by providing more a integrated and streamlined interface. These plans include:

1. **A New Planetary Systems Table.** This new interactive table will display all planet solutions in the archive that are associated with confirmed planetary systems, including parameter values for associated planetary, stellar, and system properties. These values are extracted from the refereed literature, mission deliveries (e.g., Kepler and TESS), and the TESS Input Catalog.

2. **Redesigned Overview Pages.** Rather than having separate overview pages for confirmed planets, planet hosts, and planet candidates, there will be a single, consolidated overview page for each planetary system. The page will contain data as well as links to other archive tools and resources that extend the use of those data.

3. **Table Access Protocol (TAP) Support.** A Table Access Protocol (TAP) API will be connected to the new Planetary Systems Table. TAP, created by the International Virtual Observatory Alliance (IVOA), is the standard protocol for accessing table data in astronomical catalogs and databases, and is used at at many astronomical research institutions and archives.

We plan to roll out these enhancements in mid-December for initial testing, and we encourage our users to try them out and send us your feedback and suggestions. The archive's existing API, overviews, and Confirmed Planets and Extended Planet Data interactive tables will not be affected in the short term. However, they will eventually be replaced by the new and improved services in 2020. More details will be provided in the coming months, so follow the archive on social media or our email list to stay informed. Sign up at: https://exoplanetarchive.ipac.caltech.edu/docs/connect.html

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

Contact: `mharbut@caltech.edu`

6 Announcements

Planet Formation and Panspermia: New Prospects for the Movement of Life through Space

B. Vukotić[1], R. Gordon[2], J. Seckbach[3]

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[2] Gulf Specimen Marine Laboratory & Aquarium, Florida, USA
[3] The Hebrew University of Jerusalem, Israel

A contracted book in Series: Astrobiology Perspectives on Life of the Universe, series editors: Richard Gordon & Joseph Seckbach, Wiley-Scrivener publishing, Beverly, Massachusetts, USA.

The theory of planetary formation relates to stellar formation and giant molecular clouds on one end while the smaller scales deal with the early evolution and dynamics of planetary systems. The panspermia hypothesis can thus be examined against a wide range of phenomena. The investigations of novel strategies for observational and theoretical (including computer simulation) approaches that can further test and scrutinize the panspermia hypothesis are also encouraged. All chapters will be subject to normal peer review. There are no author fees. The book will be distributed through Wiley, a major publisher. If you are interested in contributing a chapter please contact us on one of the emails below.

Download/Website: `https://www.scrivenerpublishing.com/`

Contact: `bvukotic@aob.rs, DickGordonCan@gmail.com`

7 As seen on astro-ph

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

October 2019

astro-ph/1910.00076: **The Precision of Mass Measurements Required for Robust Atmospheric Characterization of Transiting Exoplanets** by *Natasha E. Batalha et al.*

astro-ph/1910.00161: **Signatures of an eccentric disc cavity: Dust and gas in IRS 48** by *Josh Calcino et al.*

astro-ph/1910.00167: **LRP2020: Signposts of planet formation in protoplanetary disks** by *Nienke van der Marel et al.*

astro-ph/1910.00267: **Rapid escape of ultra-hot exoplanet atmospheres driven by Hydrogen Balmer absorption** by *A. García Muñoz, P.C. Schneider*

astro-ph/1910.00269: **Detection of α emission from PZ Tel B using SPHERE/ZIMPOL** by *Arianna Musso Barcucci et al.*

astro-ph/1910.00329: **Toward the Analysis of JWST Exoplanet Spectra: the effective temperature in the context of direct imaging** by *Jean-Loup Baudino et al.*

astro-ph/1910.00347: **A new take on the low-mass brown dwarf companions on wide-orbits in Upper-Scorpius** by *Simon Petrus et al.*

astro-ph/1910.00383: **Multi-season optical modulation phased with the orbit of the super-Earth 55 Cnc e** by *S. Sulis et al.*

astro-ph/1910.00609: **Tracking Dust Grains During Transport and Growth in Protoplanetary Disks** by *William Misener, Sebastiaan Krijt, Fred J. Ciesla*

astro-ph/1910.00688: **The Effects of Telluric Contamination in Iodine Calibrated Precise Radial Velocities** by *Sharon Xuesong Wang et al.*

astro-ph/1910.01070: **Helios-r.2 – A new Bayesian, open-source retrieval model for brown dwarfs and exoplanet atmospheres** by *Daniel Kitzmann et al.*

astro-ph/1910.01167: **Kepler data analysis: non-Gaussian noise and Fourier Gaussian process analysis of star variability** by *Jakob Robnik, Uroš Seljak*

astro-ph/1910.01261: **Positive Ion Chemistry in an N2-CH4 Plasma Discharge: Key Precursors to the Growth of Titan Tholins** by *David Dubois et al.*

astro-ph/1910.01532: **Spiral Structure in the Gas Disk of TW Hya** by *Richard Teague et al.*

astro-ph/1910.01554: **The role of C/O in nitrile astrochemistry in PDRs and planet-forming disks** by *Romane Le Gal et al.*

astro-ph/1910.01567: **Evidence for H2 Dissociation and Recombination Heat Transport in the Atmosphere of KELT-9b** by *Megan Mansfield et al.*

astro-ph/1910.01607: **Exploring the atmospheric dynamics of the extreme ultra-hot Jupiter KELT-9b using TESS photometry** by *Ian Wong et al.*

astro-ph/1910.01622: **The Atmospheric Circulation of Ultra-hot Jupiters** by *Xianyu Tan, Thaddeus D. Komacek*

astro-ph/1910.01750: **PEXO: a global modeling framework for nanosecond timing, microsecond astrometry, and μm/s radial velocities** by *Fabo Feng et al.*

astro-ph/1910.01756: **orbitize!: A Comprehensive Orbit-fitting Software Package for the High-contrast Imaging Community** by *Sarah Blunt et al.*

astro-ph/1910.02070: **Detection of He I 10830 Å absorption during the transit of a warm Neptune around the M-dwarf GJ 3470 with the Habitable-zone Planet Finder** by *Joe P. Ninan et al.*

astro-ph/1910.02355: **Climate Diversity in the Habitable Zone due to Varying pN2 Levels** by *Adiv Paradise et al.*

astro-ph/1910.02504: **Detecting Magnetic Fields in Exoplanets with Spectropolarimetry of the Helium Line at 1083 nm** by *Antonija Oklopčić et al.*

astro-ph/1910.02547: **Initial Characterization of Interstellar Comet 2I/2019 Q4 (Borisov)** by *David Jewitt, Jane Luu*

astro-ph/1910.02638: **Detection of new strongly variable brown dwarfs in the L/T transition** by *Simon C. Eriksson, Markus Janson, Per Calissendorff*

astro-ph/1910.02846: **What is transiting HD 139139 ?** by *Jean Schneider*

astro-ph/1910.02941: **The ablation barrier for the growth of metre-size objects in protoplanetary discs** by *Mor Rozner, Evgeni Grishin, Hagai B. Perets*

astro-ph/1910.02965: **The Possible Astrometric Signature of a Planetary-mass Companion to the Nearby Young Star TW Piscis Austrini (Fomalhaut B): Constraints from Astrometry, Radial Velocities, and Direct Imaging** by *Robert J. De Rosa et al.*

astro-ph/1910.02982: **Physical properties of terrestrial planets and water delivery in the habitable zone using N-body simulations with fragmentation** by *Agustín Dugaro, Gonzalo C. de Elía, Luciano A. Darriba*

astro-ph/1910.03024: **Orbital evolution of eccentric low-mass companions embedded in gaseous disks: testing the local approximation** by *F. J. Sanchez-Salcedo*

astro-ph/1910.03130: **On the Dust Signatures Induced by Eccentric Super-Earths in Protoplanetary Disks** by *Ya-Ping Li et al.*

astro-ph/1910.03479: **Climates of Warm Earth-Like Planets III: Fractional Habitability from a Water Cycle Perspective** by *Anthony D. Del Genio et al.*

astro-ph/1910.03518: **Using HARPS-N to characterise the long-period planets in the PH-2 and Kepler-103 systems** by *Sophie C. Dubber et al.*

astro-ph/1910.03626: **In the Presence of a Wrecking Ball: Orbital Stability in the HR 5183 System** by *Stephen R. Kane, Sarah Blunt*

astro-ph/1910.03711: **Breakthrough Listen Follow-up of the Random Transiter (EPIC 249706694/HD 139139) with the Green Bank Telescope** by *Bryan Brzycki et al.*

astro-ph/1910.03901: **Planet formation and migration near the silicate sublimation front in protoplanetary disks** by *Mario Flock et al.*

astro-ph/1910.04111: **Stability of Nitrogen in Planetary Atmospheres in Contact with Liquid Water** by *Renyu Hu, Hector Delgado Diaz*

astro-ph/1910.04563: **Four newborn planets transiting the young solar analog V1298 Tau** by *Trevor J. David et al.*

astro-ph/1910.04687: **The Shock Physics of Giant Impacts: Key Requirements for the Equations of State** by *Sarah T. Stewart et al.*

astro-ph/1910.04717: **Size and density sorting of dust grains in SPH simulations of protoplanetary disc II: Fragmentation** by *Francesco C. Pignatale et al.*

astro-ph/1910.04747: **An unusually large gaseous transit in a debris disc** by *Daniela P. Iglesias et al.*

astro-ph/1910.05050: **TOI-222: a single-transit TESS candidate revealed to be a 34-day eclipsing binary with CORALIE, EulerCam and NGTS** by *Monika Lendl et al.*

astro-ph/1910.05066: **Spectral properties of the surface reflectance of the northern polar region of Mercury** by *Nguyen Bich Ngoc, Nicolas Bott, Pham Ngoc Diep*

astro-ph/1910.05156: **ROME/REA: A gravitational microlensing search for exo-planets beyond the snow-line on a global network of robotic telescopes** by *Yiannis Tsapras et al.*

astro-ph/1910.05224: **Phosphine as a Biosignature Gas in Exoplanet Atmospheres** by *Clara Sousa-Silva et al.*

astro-ph/1910.05252: **Comet C/2017 S3 (PanSTARRS): Outbursts and Disintegration** by *M.R. Combi et al.*

astro-ph/1910.05350: **The Endgame of Gas Giant Formation: Accretion Luminosity and Contraction Post-Runaway** by *Sivan Ginzburg, Eugene Chiang*

astro-ph/1910.05400: **The infrared line-emitting regions of T Tauri protoplanetary disks** by *A. J. Greenwood et al.*

astro-ph/1910.05414: **Circumbinary exoplanets and brown dwarfs with LISA** by *Camilla Danielski et al.*

astro-ph/1910.05439: **The Effect of Land Fraction and Host Star Spectral Energy Distribution on the Plane-**

tary Albedo of Terrestrial Worlds by *Andrew J. Rushby, Aomawa L. Shields, Manoj Joshi*

astro-ph/1910.05853: **Precise radial velocities of giant stars XIII. A second Jupiter orbiting in 4:3 resonance in the 7 CMa system** by *R. Luque et al.*

astro-ph/1910.06053: **Adapting a solid accretion scenario for migrating planets in FARGO3D** by *L A DePaula, T A Michtchenko, P A Sousa-Silva*

astro-ph/1910.06285: **No Snowball on Habitable Tidally Locked Planets with a Dynamic Ocean** by *Jade H. Checlair et al.*

astro-ph/1910.06383: **A TESS Search for Distant Solar System Planets: A Feasibility Study** by *Matthew J. Holman, Matthew J. Payne, András Pál*

astro-ph/1910.06414: **Exporting Terrestrial Life Out of the Solar System with Gravitational Slingshots of Earthgrazing Bodies** by *Amir Siraj, Abraham Loeb*

astro-ph/1910.06479: **How do Planetary Radius and Gravity Influence the Surface Climate of Earth-like Planets?** by *Huanzhou Yang, Jun Yang*

astro-ph/1910.06794: **Tidally-Induced Radius Inflation of Sub-Neptunes** by *Sarah Millholland*

astro-ph/1910.06804: **Detection of the nearest Jupiter analog in radial velocity and astrometry data** by *Fabo Feng et al.*

astro-ph/1910.06822: **Flybys in protoplanetary discs: II. Observational signatures** by *Nicolás Cuello et al.*

astro-ph/1910.06882: **Detection of ionized calcium in the atmosphere of the ultra-hot Jupiter KELT-9b** by *Jake D. Turner et al.*

astro-ph/1910.06980: **Meridional flows in the disk around a young star** by *Richard Teague, Jaehan Bae, Edwin Bergin*

astro-ph/1910.07135: **The interstellar object 'Oumuamua as a fractal dust aggregate** by *Eirik G. Flekkøy, Jane X. Luu, Renaud Toussaint*

astro-ph/1910.07137: **A Flexible Bayesian Framework for Assessing Habitability with Joint Observational and Model Constraints** by *Amanda R. Truitt et al.*

astro-ph/1910.07276: **WASP-South detection of HD219666b transits provides an accurate ephemeris** by *C. Hellier et al.*

astro-ph/1910.07345: **Measuring the atomic composition of planetary building blocks** by *M. K. McClure, C. Dominik*

astro-ph/1910.07523: **A Hubble PanCET Study of HAT-P-11b: A Cloudy Neptune with a Low Atmospheric Metallicity** by *Yayaati Chachan et al.*

astro-ph/1910.07527: **Transit Signatures of Inhomogeneous Clouds on Hot Jupiters: Insights From Microphysical Cloud Modeling** by *Diana Powell et al.*

astro-ph/1910.07573: **Resilient habitability of nearby exoplanet systems** by *Giorgi Kokaia, Melvyn B. Davies, Alexander J. Mustill*

astro-ph/1910.07605: **Near-Infrared Imaging of a Spiral in the CQ Tau Disk** by *Taichi Uyama et al.*

astro-ph/1910.07760: **What would happen if we were about 1 pc away from a supermassive black hole?** by *Lorenzo Iorio*

astro-ph/1910.07835: **Determining the mass of the planetary candidate HD 114762 b using Gaia** by *Flavien Kiefer*

astro-ph/1910.08522: **A super-Earth and a mini-Neptune around Kepler-59** by *X. Saad-Olivera et al.*

astro-ph/1910.08560: **The impact of planet wakes on the location and shape of the water iceline in a protoplanetary disk** by *Alexandros Ziampras et al.*

astro-ph/1910.08565: **Radiation-Hydrodynamical Models of X-ray Photoevaporation in Carbon Depleted Circumstellar Discs** by *Lisa Wölfer et al.*

astro-ph/1910.08667: **Are long-term N-body simulations reliable?** by *David M. Hernandez et al.*

astro-ph/1910.09042: **Periodic orbits of the retrograde coorbital problem** by *M H M Morais, F Namouni*

astro-ph/1910.09299: **Fingerprints of the protosolar cloud collapse in the Solar System II: Nucleosynthetic anomalies in meteorites** by *Emmanuel Jacquet et al.*

astro-ph/1910.09377: **Direct Imaging of Irregular Satellite Disks in Scattered Light** by *Loic Nassif-Lachapelle, Daniel Tamayo*

astro-ph/1910.09523: **Temporal Variability in Hot Jupiter Atmospheres** by *Thaddeus D. Komacek, Adam P. Showman*

astro-ph/1910.09871: **Stellar Proton Event-induced surface radiation dose as a constraint on the habitability of terrestrial exoplanets** by *Dimitra Atri*

astro-ph/1910.09877: **The Kepler-11 system: evolution of the stellar high-energy emission and initial planetary atmospheric mass fractions** by *D. Kubyshkina et al.*

astro-ph/1910.09988: **New constraint on the atmosphere of (50000) Quaoar from a stellar occultation** by *Ko Arimatsu et al.*

astro-ph/1910.10169: **An updated visual orbit of the directly-imaged exoplanet 51 Eridani b and prospects for a dynamical mass measurement with Gaia** by *Robert J. De Rosa et al.*

astro-ph/1910.10250: **Regime transition between eddy-driven and moist-driven circulation on High Obliquity Planets** by *Wanying Kang*

astro-ph/1910.10303: **New Insights into Interstellar Object 1I/2017 U1 ('Oumuamua) from SOHO/STEREO Nondetections** by *Man-To Hui, Matthew M. Knight*

astro-ph/1910.10389: **Radial-velocity jitter of stars as a function of observational timescale and stellar age** by *Stefan S. Brems et al.*

astro-ph/1910.10403: **Global 3D hydrodynamic modeling of in-transit Lyα absorption of GJ436b** by *M. L. Khodachenko et al.*

astro-ph/1910.10731: **Susceptibility of planetary atmospheres to mass loss and growth by planetesimal impacts: the impact shoreline** by *M. C. Wyatt, Q. Kral, C. A. Sinclair*

astro-ph/1910.10760: **Angular Momentum and Heat Transport on Tidally Locked Hot Jupiter Planets** by *João M. Mendonça*

astro-ph/1910.11167: **The osteology of spiral structure generated by major planets in proto-planetary disks** by *R.H. Sanders*

astro-ph/1910.11169: **VLT/SPHERE exploration of the young multiplanetary system PDS70** by *D. Mesa et al.*

astro-ph/1910.11344: **JexoSim: A time domain simulator of exoplanet transit spectroscopy with JWST** by *Subhajit Sarkar, Nikku Madhusudhan, Andreas Papageorgiou*

astro-ph/1910.11438: **Light Curve Analysis of Ground-Based Data from Exoplanets Transit Database** by *F. Davoudi et al.*

astro-ph/1910.11448: **Bayesian Approach for Determining Microlens System Properties with High-Angular-Resolution Follow-up Imaging** by *Naoki Koshimoto, David P. Bennett, Daisuke Suzuki*

astro-ph/1910.11627: **Interpreting High-Resolution Spectroscopy of Exoplanets Using Cross-Correlations and Supervised Machine Learning** by *Chloe Fisher et al.*

astro-ph/1910.11885: **Breaking the centrifugal barrier to giant planet contraction by magnetic disc braking** by *Sivan Ginzburg, Eugene Chiang*

astro-ph/1910.11930: **Discarding orbital decay in WASP-19b after one decade of transit observations** by *R. Petrucci et al.*

astro-ph/1910.12054: **Exomoons in the habitable zones of M dwarfs** by *Héctor Martínez-Rodríguez et al.*

astro-ph/1910.12099: **Fast and Precise Light Curve Model for Transiting Exoplanets with Rings** by *Edan Rein, Aviv Ofir*

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