EP 15: Exoplaneten und Astrobiologie

Zeit: Freitag 11:00–12:15 Raum: GW2 B2880

Hauptvortrag EP 15.1 Fr 11:00 GW2 B2880

The PLATO Mission — •Heike Rauer — Institut fuer Planetenforschung, DLR, Berlin, Germany — Zentrum fuer Astronomie und Astrophysik, TU Berlin, Berlin, Germany

PLATO (PLAnetary Transits and Oscillations of stars) has been selected as ESA M3 mission with launch opportunity end 2025. PLATO will carry out high-precision, long-term photometric and asteroseismic monitoring of a large number of stars. It will provide a large sample of small planets around bright stars, including terrestrial planets in the habitable zone of solar-like stars. PLATO will characterize planets for their radius, mass, and age with high accuracy. The mission will provide the first large-scale catalogue of well-characterized small planets at intermediate orbital periods, which will be an important constraint to planet formation theories and will provide targets for future atmosphere spectroscopy follow-up observations. This data base of bulk characterized small planets will form a solid basis to put the Solar System into a wider context and allow for comparative exo-planetology.

In addition, the precise stellar parameters obtained by asteroseismic studies will open new doors to better understand stellar interiors and allow us to constrain poorly-understood physical processes, like convection, improve our understanding of stellar evolution, and determine precise ages of stars and planetary systems.

EP 15.2 Fr 11:30 GW2 B2880

Modeling the Cosmic Ray Induced Ionization in the Atmosphere of Earth and Earth-Like Planets Around M-Dwarfs — •Konstantin Herbst[1], Bernd Heber[1], Sasa Banjac[1], and Andreas Kopp[2] — [1]Christian-Albrechts-Universität zu Kiel, Institut fü Experimentelle und Angewandte Physik, Germany — [2]Universite Libre de Bruxelles, Service de Physique Statistique et des Plasmas, Belgium

The terrestrial electric field is known to be induced by cosmic rays (CRs) entering the Earth's atmosphere. While in the upper atmosphere CRs mainly lose their energy due to ionization of the ambient matter, with decreasing altitude the probability of an interaction with the surrounding atmospheric gasses drastically increases. Thereby, CRs are able to initiate secondary particle cascades consisting of, e.g., an electromagnetic component, which instantaneously leads to a further ionization of the middle as well as lower atmosphere. Using PLANETOCOSMICS, a GEANT4- based Monte-Carlo simulation code, we study the altitude-dependent (terrestrial) cosmic ray induced ionization (CRII). By now also eight Earth-like exoplanets orbiting around M-dwarfs (such as e.g., Proxima Centauri, our next stellar neighbor) have been found, we also compute the CRII of an Earth-like exoplanet. Because M-starts most likely have a much stronger stellar activity the computations may strongly differ from what we expect from Earth.

EP 15.3 Fr 11:45 GW2 B2880

The Influence of Stellar Variability on the Atmospheres of Exoplanets Orbiting K- and M-Stars — •Vanessa Schmidt and Miriam Sinnhuber — Institute of Meteorology and Climate Research, Karlsruhe Institute of Technology, Hermann-von-Helmholtz-Platz 1, D-76344 Eggenstein-Leopoldshafen, Germany

With the advent of new ground- and space-based observations, it now becomes increasingly possible to observe features of the atmospheric composition of extrasolar planets. In principle, this allows for the detection of atmospheric signatures indicative of life (biosignatures).

An important factor influencing the occurence of these biosignatures is the variable stellar activity of the host star, which alters the incident cosmic ray and stellar ray flux into the atmosphere. Cosmic and stellar rays ionize the atmosphere, starting a chain of very fast ion-chemistry reactions which can significantly affect the chemical composition of the exoplanets' atmosphere.

We develope and apply a detailed ion chemistry model to investigate the impact of stellar activity on the neutral composition of exoplanets of varying atmospheric composition.

In cooperation with the DLR Adlershof and the University of Kiel, this PhD research is part of a DFG-funded project to model the spectra of exoplanetary atmospheres.

EP 15.4 Fr 12:00 GW2 B2880

Instrumental design of the High Resolution Spectrograph (HIRES) for the E-ELT — •Philipp Huke — Institut für Astrophysik, Georg-August Universität Göttingen

The current instrumentation plan for the E-ELT includes a high resolution spectrograph (HIRES). The science cases for this instrument are: the study of extra-solar planets, their atmospheres, Pop-III stars and fundamental physical constants. The resolving power of the spectrograph should be as high as 200.000, depending on the observation modes and the wavelength. The spectral bandwidth shall range from the blue limit of the telescope up to the K-band. It will be covered by four different spectrographs. In this contribution we will present the preliminary design of the spectrograph, the requirements for the calibration unit and *rst solutions how to achieve 1 mm/s at the calibration unit level.