EP 1: Planets and Small Bodies I

Time: Monday 16:45–18:10 Location: ZHG005

Invited Talk EP 1.1 Mon 16:45 ZHG005

The new planet formation theory — •Joanna Drazkowska — Max Planck Institute for Solar System Research, Göttingen, Germany

The classical theory of planet formation originated when our knowledge about planets was limited to the Solar System alone. The numerous discoveries of exoplanet systems have compelled a revision of this theory, aided by cutting-edge observations of circumstellar disks and precise laboratory studies of Solar System materials. Nonetheless, the formation of planets remains one of the major unsolved problems in modern astrophysics. In this talk, I will outline the emerging paradigm in which centimeter-sized dust aggregates, colloquially known as pebbles, take center stage. Focusing on the early stages of planet formation, we will examine the growth process of tiny dust grains into pebbles, as well as the formation of planetesimals, the first gravitationally-bound building blocks that precede today's asteroids and comets. Finally, I will present the latest results of numerical models revealing a likely scenario of the formation of massive planet chains.

EP 1.2 Mon 17:15 ZHG005

First results of JUICE-SWI from the Lunar Earth Gravity Assist maneuver — •Paul Hartogh, Christopher Jarchow, Ladislav Rezac, and Miriam Rengel — Max-Planck-Institut für Sonnensystemforschung, Göttingen

The Submillimetre Wave Instrument (SWI) is part of JUICE (JUpiter ICy moons Explorer). JUICE is the first Large Class mission (L1) of the ESA's Cosmic Vision programme. SWI will investigate the stratosphere of Jupiter (general circulation, chemistry, isotopic composition) and the atmospheres and surfaces of the Galilean satellites (dynamic and kinetics, molecular and isotopic composition, composition of volcanic and potential cryovolcanic plumes) in the far infrared in two submillimeter wave bands (500 and 250 micrometers). In August 2024 the JUICE spacecraft passed Earth and Moon during the LEGA (Lunar Earth Gravity Assist). During the lunar gravity assist SWI observed the rotational ground states of water vapor (ortho- and para water) in nadir mode. During the Earth flyby, numerous observation modes were executed, observing the Earth atmosphere in nadir and limb modes. Of particular interest are the 250 micrometers results, because the Earth was observed for the first time from space with high resolution techniques in this range of the electromagnetic spectrum. This talk will present the first results of the LEGA data analysis and illustrate the power of submillimeter wave observations in investigating physical processes.

EP 1.3 Mon 17:30 ZHG005

TRIPLE-IceCraft - a Melting Probe for the Exploration of Subglacial Lakes in Antarctica in Preparation for the Icy Moons — •Dirk Heinen[1], Jan Audehm[1], Clemens Espe[2], Mia Giang Do[1], Marco Feldmann[2], Gero Francke[2], Fabian Schöttler[2], Christopher Wiebusch[1], and Simon Zierke[1] — [1]RWTH Aachen University - Physics Institute III B, Aachen, Germany — [2]GSI - Gesellschaft für Systementwicklung und Instrumentierung mbH, Aachen, Germany

The TRIPLE project, initiated by the German Space Agency at DLR, is researching Technologies for Rapid Ice Penetration and subglacial Lake Exploration. TRIPLE aims to explore the subglacial ocean of Jupiter's moon Europa. The mission will be preceded by a technology demonstration in Antarctica. To access the subglacial water reservoir, a drill or melting probe must first penetrate the ice. The TRIPLE-IceCraft melting probe is a modular payload carrier system designed to transport arbitary scientific payloads through the ice. The design is capable of traversing several hundred metres of ice, penetrating into a subglacial ocean or lake, and later returning to the surface. The TRIPLE-IceCraft has been tested in an analogue scenario on the Ekström Ice Shelf in Antarctica in 2023 and 2024. In this talk we present the TRIPLE-IceCraft design and the results of the test campaigns.

EP 1.4 Mon 17:45 ZHG005

A MEMS-based Miniaturized Fabry-Perot Spectrometer for Lunar Exploration — •Matthias Grott[1], Jörg Knollenberg[1], Lynn Miller[1], Christian Althaus[1], Toni Grossmann[2], Julia Wecker[2], Jörg Martin[2], Andreas Ihring[3], Boris Jung[1], and Konstantinos Vasiliou[1] — [1]German Aerospace Center, Institute of Planetary Research, Berlin, Germany — [2]Fraunhofer Institute for Electronic Nano Systems, Chemnitz, Germany — [3]Leibniz Institute of Photonic Technology, Jena, Germany

Rock forming minerals as well as organic compounds show distinct spectral features in the mid and long infrared wavelength range that can be used to characterize materials in-situ. We have developed a spectrometer prototype based on a micro-electromechanical system (MEMS) Fabry-Perot filter using thermopile detectors that covers the 8 to 11 μm wavelength range. The mass of the instrument's sensor head is expected to be less than 100 g and the total electronics mass is estimated to be 100 g without housing, making the instrument suitable for applications on small landed exploration platforms and CubeSats. The instrument design and results from the initial instrument characterization will be presented.

Poster pitch: EP 10.13 (Becker), EP 10.14 (Schmit)