Session 1

SUNRISE III: The Solar Atmosphere in 3D and High Resolution

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The balloon-borne solar observatory SUNRISE III will provide a three-dimensional picture of the physical processes in the solar atmosphere. Its novel instrumentation will deliver the details of the physical processes from the deepest photospheric layers up to chromospheric heights with special emphasis on the coupling between the various height layers. The 1-meter solar telescope will resolve structures down to a size of 70 km and deliver the light to a suite of scientific instruments, simultaneously covering a spectral range between 309 and 900 nm. The conditions in the stratosphere will result in constant-quality, seeing-free observations of spectral lines not easily accessible with ground-based observatories. The pointing stability of the observatory will be in the range of milli-arcseconds, corresponding to only a few kilometers on the solar surface. This stability, achieved by combining the gondola pointing (JHUAPL) with an image stabilization system (KIS) is required for high-precision polarimetric measurements, allowing to obtain the magnetic vector in addition to the temperature and velocity information.

The scientific payload of SUNRISE III consists of three instruments: Two slit-based spectro-polarimeters for the near ultra-violet (SUSI / MPS) and the near-infrared (SCIP / NAOJ, IAA, UV, UPM), and an imaging spectro-polarimeter (TuMag / IAA, INTA, UPM, UV, IAC). SUNRISE III has been extensively tested during during hang tests with Sun pointing at the MPI for Solar System Research (November 2021, Göttingen, Germany), and at Esrange, Sweden, in preparation for the first launch attempt in summer 2022. We present the status of the observatory and the options for a flight in the near future.