

The Submillimeter Wave Instrument on JUICE

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Abstract—The Submillimeter Wave Instrument (SWI) is part of the payload of ESA's L1 mission JUICE (JUperiter ICy moons Explorer). It sounds the middle atmosphere of Jupiter and the exospheres and surfaces of the Galilean satellites with a 290 mm telescope, movable in azimuth and elevation using two heterodyne spectrometers covering the frequency ranges of 530 to 625 GHz and 1080 to 1275 GHz. The heterodyne receivers with tunable solid-state local oscillators and subharmonically pumped mixers are passively cooled. The performance of the receivers has been steadily improved during the last 2-3 years. Presently the receiver temperatures are about 1100 and 2000 K DSB (600 and 1200 GHz respectively). The intermediate frequency output of 3.5 to 8.5 GHz is analyzed by two real-time spectrometer backends consisting of broadband autocorrelators, high resolution multi-channel Chirp Transform Spectrometers and continuum channels. In order to fulfill the very stringent mass limitations of the JUICE payload, the structure of the Telescope and Receiver Unit (TRU) is made of AlBeMet 162. The instrument is now in the phase between PDR and CDR and the design has mostly been completed. This presentation will address the science objectives, the technology challenges and recent break-throughs, the instrument hardware development status and future plans until the launch of the JUICE mission. Finally potential applications of SWI-like instruments for other explorations of the solar system will be addressed.