Submillimetre Wave Instrument for EJSM

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The Submillimetre Wave Instrument (SWI) is part of the model payload on the Jupiter Ganymede Orbiter (JGO). JGO is ESA's contribution to the Europa Jupiter System Mission (EJSM). SWI's primary scientific objectives are to investigate the middle atmosphere of Jupiter and the atmosphere of Ganymede. SWI will contribute to the understanding of the circulation regime in Jupiter's atmosphere as a function of latitude and altitude, how the various atmospheric regions are dynamically coupled, and how the energy originating in Jupiter's interior vertically propagates to the upper layers to be radiated in space. In this sense SWI complements the Juno mission. SWI will investigate water vapour in Ganymede's atmosphere and its supply from sputtering and sublimation processes. Furthermore SWI will be able to locate possible cryovolcanic activity as well as (if existing) boiling water due to thermal flexing and cracks in the surface. Since it is expected that water vapour in Ganymede's atmosphere will exist in collisional, quasi-collisional and collisionless regimes, water excitation models will be constrained.

Secondary objectives of SWI are related to the study of the atmosphere of the other Galilean satellites and of their surfaces. Io's volcanic atmosphere will be studied through lines of SO_2 , SO, NaCl, and perhaps other species. Water vapour will be observed in Europa's atmosphere. Callisto's atmosphere will be investigated. Thermophysical properties of the Galilean satellite surfaces will be measured by radiometric observation of the surface.

In the baseline configuration SWI will operate in two submm wave bands around 600 GHz and 1200 GHz. Both receivers will be tunable within a bandwidth of approximately 20 % around the centre frequency. The antenna has a diameter of 30 cm and will be movable in two dimensions. Two wideband high resolution spectrometers are foreseen. The observations geometry includes limb and nadir sounding. We have proposed to ESA to carry out an assessment study, called "Submillimetre Wave Instrument for EJSM" that will meet the requirements of the instrument proposed in the JGO payload definition document. This study intends to find the optimal concept in terms of functional performance and requirements on JGO spacecraft resources.