

## Monte Carlo Simulation of Europa's Exosphere

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The JUPiter ICy moons Explorer (JUICE) is a planned ESA mission designated to investigate Jupiter and its system in all their inter-relations and complexity (Grasset et al., PSS, 2013). One of the mission's focus lies in the investigation of the Galilean moons Europa, Callisto and Ganymede, with particular emphasis on Ganymede. These investigations include studies of the magnetic fields, the tenuous atmospheres, the topographical, geological and compositional properties of the surface, the physical properties of the icy crusts, the internal mass distributions, the dynamics and the evolution of the interiors as well as the detection of putative subsurface water reservoirs.

Since Europa, Callisto and Ganymede are icy moons, some of the complex chemical inventory is accessible on the surface. The surface material directly feeds into the atmosphere through several release processes (e.g. sublimation, sputtering by photons as well as charged particles, micrometeoroid bombardment, and jets/plumes). Probing of the moons' atmospheres by a spacecraft in orbit or on a flyby trajectory allows thus direct deduction of the surface composition and offers the unique opportunity to measure the spectrum of chemical building blocks of the Jupiter system.

The Particle Environment Package (PEP) suite on board JUICE contains instruments for the comprehensive measurements of electrons, ions and neutrals in the Jupiter system (Barabash et al., 2013). The Neutral and Ion Mass spectrometer (NIM), which is part of the PEP suite, will measure the neutral and ion composition of the exospheres of the icy moons during flybys of Europa, Callisto, and in orbit of Ganymede. We present here a detailed ab initio model of Europa's exosphere including a surface composition model based on planetary formation, and all relevant processes for particle release and their fate in the exosphere. Based on the modelled exosphere we demonstrate NIM's measurement capabilities at various fly-by altitudes.