



Surfaces and exospheres of the icy Galilean moons – an integral approach

André Galli (1), Peter Wurz (1), Audrey Vorburger (1), Marek Tulej (1), Antoine Pommerol (1), Jürgen Scheer (1), Nicolas Thomas (1), Olivier Mousis (2), Stas Barabash (3), Martin Wieser (3), and Helmut Lammer (4)

(1) Physics Institute, University of Bern, Bern, Switzerland (andre.galli@space.unibe.ch), (2) Observatoire des Sciences de l'Univers THETA de Franche-Comté, Besançon, France, (3) Swedish Institute of Space Physics, Kiruna, Sweden, (4) Austrian Academy of Sciences, Graz, Austria

The JUPiter ICy moons Explorer (JUICE) will investigate Jupiter and its system with particular emphasis on Ganymede as a planetary body and potential habitat. Europa and Callisto flybys will allow for a comparative picture of the icy Galilean moons. As part of the scientific preparation work for JUICE, we examine the requirements and expected science results related to the Neutral gas and Ion Mass spectrometer (NIM), which belongs to the Particle Environment Package on board JUICE.

Models of the exosphere profiles at Europa, Ganymede, and Callisto allow us to optimize the design of NIM, but the reliability of the models is limited because the properties of icy surfaces, in particular sputtering and sublimation parameters for icy regolith mixed with carbonates or salts, are not well known.

We therefore have started a series of lab experiments with icy regolith subjected to ion and UV irradiation in a cold vacuum. Currently, we perform irradiation experiments of pure water ice with H^+ and O^+ ions. In the coming years, we will expand the experiments to more complex cases (including UV-radiation, temperature cycles and chemical impurities such as O_2 , C, S, CO_2 , SO_2 , and Na) relevant for Galilean moons. The results will constrain exosphere models and will enable the scientific community to better link exosphere measurements with processes in the ice and observed surface features.