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Imaging of Ganymede through Energetic Neutral Atoms sputtered/backscattered from the surface

Angèle Pontoni¹, Manabu Shimoyama¹, Shahab Fatemi¹, Andrew Poppe², Yoshifumi Futaana¹, and Stas Barabash¹

¹Swedish Institute of Space Physics, Kiruna, Sweden (angele@irf.se)

²Space Sciences Laboratory, University of California, Berkeley

Brightness asymmetries on the surface of Ganymede are thought to be caused by ion impact from Jovian co-rotating plasma. The Jovian Neutrals Analyzer instrument onboard the JUICE spacecraft will help investigate this theory by yielding a map of ion precipitation at the surface of Ganymede through the observation of low-energy Energetic Neutral Atoms (ENAs) (10 eV to 3300 eV) sputtered or backscattered by the Jovian plasma.

In order to optimize JNA operations planning at Ganymede, we estimate the expected energy distribution of ENAs caused by the impacting Jovian plasma. As an input, we use results from a three dimensional hybrid plasma simulation, which gives us the energy distribution of precipitating H⁺, O⁺⁺ and S⁺⁺⁺ at the surface of Ganymede. We then calculate the ENA yield using respectively Famà's model (Famà, 2008) for the sputtering yield of water ice and Thompson-Sigmund's model (Sigmund, 1969) for electronic sputtering to get the energy distribution of the ENAs.