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The Jovian Neutral Atoms Analyzer onboard JUICE/PEP – Calibration measurements and ENA expectations in Ganymede orbit -

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The Jovian Neutral Atoms Analyser (JNA) is one of the sensors of the Particle Environment Package (PEP) onboard the JUICE spacecraft. JUICE will be launched 2022 and will reach the Jovian system 8 years later. Towards the end of the mission, the JUICE spacecraft will orbit Ganymede for about one year [O. Grasset et al., PSS 78, 2013]. The interaction of the Jovian plasma ions with the icy surface of Ganymede results via different processes in energetic neutral atoms (ENAs). JNA will provide the scientific data to quantify ENA fluxes from Ganymede to create ENA maps of the surface of the moon. Thus, ENA measurements will help to understand the complex interactions of the Jovian plasma environment with the icy surface of the moon [M. Wieser et al., Icarus 269, 2016].
The JNA instrument is built at IRF Kiruna with heritage from the CENA (Sub-keV Atom Reflecting Analyser, Chandrayaan-1) and the ENA sensor (Mercury Plasma Particle Environment, BepiColombo). In comparison to the instruments mentioned above, the JNA instrument is designed for being operated in the harsh radiation environment of Jupiter.
We will show the results from laboratory testing of the JNA prototype with particular focus on the angular resolution, the mass resolution and the detection efficiency.

Additionally, it is considered to apply a diamond coating to the surface, which triggers the start of the TOF measurement. Synthetic diamond has yielded promising results regarding its ionisation efficiency and angular scattering properties [Neuland et al., Appl. Surf. Sci. 313, 2014]. In addition, the chemical inertness of diamond would be advantageous regarding radiation hardness.
We carried out numerous test measurements with different particle species, different energies and different angles of incidence to analyse the detection efficiency, to proof the required mass and energy resolution as well as the angular resolution.
Furthermore, we tested the instrument with the start surface being coated with synthetic diamond. We will report on the results of the test measurements and show the JNA performance meeting all mission requirements.

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