An Energetic Particle Monitor for Ice Giant Atmospheric Probes

André Nicolas*[1], Pierre Devoto[1], Quentin Nenon[1], and Lea Griton[1]

[1]IRAP – Institut de Recherche en Astrophysique et Planétologie – France

Abstract

The Voyager 2 flybys of Uranus and Neptune provided limited measurements of energetic particles in the magnetospheres of the planets. The energetic particle instrument onboard the spacecraft detected significant fluxes of energetic electrons and protons in the regions of their magnetosphere where these particles could be stably trapped. We will review these observations and discuss the need for a more detailed modeling of the energetic particle environment of these two planets in the context of their future exploration.
An Ice Giant Atmospheric Probe will provide a unique platform in order to measure energetic particles in the innermost regions of the magnetospheres of Uranus and Neptune – within a few radii of the cloud tops – and into the upper atmosphere, as was done with the Galileo Probe EPI instrument at Jupiter.
We will propose an instrument onboard an Ice Giant Atmospheric Probe in order to provide omnidirectional as well as sectored measurements of electrons (30 keV – 1 MeV) and ions (30 keV – 6 MeV) in the magnetospheres of Uranus and Neptune. The foreseen instrument will operate during the pre-entry phase of the Ice Giant Atmospheric Probe and provide unique measurements in order to understand the innermost magnetospheric structure, dynamics, and electrodynamical coupling with the atmosphere of Uranus and Neptune that can not be achieved with an orbiter.

Keywords: magnetospheres, energetic particle, radiation belts

*Speaker