# The atmospheric structure of the Ice Giant planets from in situ measurements

Francesca Ferri*[1], Alessio Aboudan[1], Giacomo Colombatti[1], Carlo Bettanini[2], and Stefano Debei[1,2]

[1]Università degli Studi di Padova - CISAS – Italy
[2]Università degli Studi di Padova - DII – Italy

**Abstract**

Atmospheric entry probes offer a unique opportunity for sounding atmospheric regions not reachable from remote sensing observations. *In situ* measurements during the entry and descent allow for investigating the atmospheric composition, structure and dynamics down deep into the atmosphere.
The atmospheric profile along the probe trajectory is retrieved by the measurements of the deceleration of the probe and by direct measurements of the pressure and temperature during the descent under parachute. The resulting atmospheric thermal structure constrains the atmospheric stability, dynamics and its effect on the atmospheric chemistry.

The variations in the density, pressure and temperature profiles provide information on the atmospheric stability and stratification, on the presence of wind, thermal tides, waves and turbulence in the atmosphere. The estimation of the temperature lapse rate can be used to identify the presence of the condensation and cloud layers, to distinguish between saturated and unsaturated, stable and conditionally stable regions. Measurements of the atmospheric electrical properties along the descent could contribute to the study of the moist convective processes, clouds formation and characterization, and allow for detection of possible electrical discharges, i.e. lightnings.
The scientific objectives, the measurements and the expected results of the Atmospheric Structure Instrument (ASI) for an entry probe at the Ice Giant planets will be presented and discussed also in comparison with previous atmospheric entry missions (e.g. Galileo probe at Jupiter and Huygens at Titan).

**Keywords:** atmospheric entry & descent, in situ measurements, atmospheric structure, atmospheric dynamics

*Speaker