



Dust measurements with EJSM

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The Galileo measurements revealed a large dust rich environment which interacts with jovians magnetosphere. Sources are volcanoes of the moon Io and the moons embedded in the Gossamer ring. Especially, all Galilean satellites are enshrouded in clouds of dust particles that have been lifted by meteoroid impacts from the moon's surfaces. The particles move on ballistic trajectories, most of which re-collide with the satellite. In situ mass spectroscopic analysis of these particles provides spatially resolved mapping of the surface composition of Europa and Ganymede.

In the absence of a lander for in situ analysis, compositional analysis of a satellite's surface can be carried out by analyzing the ejected dust particles in the vicinity of the satellite and its exosphere. Collecting and analyzing dust particles from low altitude orbit establishes a direct link to the grain's origin at the surface and provides the opportunity to get information on the surface and subsurface composition in the regions where surface material has only recently been exposed. Data obtained by measuring the dust in the vicinity of a satellite can provide key chemical constraints for revealing the satellite's composition, history, and geological evolution. Even trace amounts of endogenic and exogenic minerals (e.g., salts), cyanogen-, sulfur-, and organic compounds which are embedded in ejected ice grains can be quantified with high accuracy. The achieved knowledge about surface-interior exchange processes could provide information about the internal composition of the satellites. Of peculiar interest are particles produced by cryo-volcanic phenomena. Mass spectra of particles emitted by such an activity carry unaltered signatures of the subsurface, probably oceanic, composition of the satellite.

This paper summarizes the scientific objectives and provides an instrument overview about the Dust Spectrometer.