



Laboratoire LEPRINCE-RINGUET  
Ecole polytechnique IN2P3/CNRS

# Séminaire

## The enigmatic case of Enceladus

Soon after its insertion around Saturn, the Cassini-Huygens spacecraft revealed that, despite its modest size (about 250 km in radius), the icy moon Enceladus emits into space a large-scale plume of gas and icy particles from parallel fractures located in the south polar terrain. With Jupiter's Io and the Earth, Enceladus thus belongs to the short list of planetary objects whose ongoing "volcanic" activity has been detected from space. Gravity, topography and rotation data for Enceladus provide clues on its internal structure: in the last years of the Cassini mission, a view emerged where a global ocean is present underneath a relatively thin ice crust. Furthermore, analysis of the plume's composition has revealed that the ocean is salty and that hydrothermal activity occurs at present, deep in the moon's interior that probably involves water-rock interaction at warm temperature (about 100°C). This last evidence positions Enceladus at a primary rank in another very short (albeit very arguable) list: that of planetary bodies in the Solar System possibly harboring extant life.

This spectacular endogenic activity is puzzling as usual heat sources (radiogenic decay in rocks, tidal heating in the ice) fall short of the estimated heat budget in the south polar region. In this presentation, in order to reconcile all these observations, I will present a framework where a water-filled porous rock core plays a central role.

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Salle conférence  
du LLR

**Lundi 26 Mars**  
**14h00**

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Responsables séminaires

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