

## Saturn Dust

### Dust Model for the Saturnian System

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#### In Short

- the project describes the dust environment of planet Saturn (small meteoroids < mm)
- albeit small, such grains can cause fatal damage when hitting a spacecraft
- the research is financed by the European Space Agency (ESA)
- will serve to assess risk of future ESA missions to Saturn
- prime target of such a mission will be Saturn's icy moon Enceladus

The project is funded by the European Space Agency (ESA) to provide a tool to assess the risk that small particles pose to spacecraft operating in the system of the giant planet Saturn. A prime target for scientific exploration in the Saturn system is the small (500 km diameter) ice moon Enceladus. In the past, the NASA/ESA mission Cassini-Huygens has found a subsurface ocean of liquid water on Enceladus. Material from the ocean is ejected into the Saturn system in form of geysers that emerge from the south pole of the moon (figure 1).

Although most particles that a spacecraft will encounter in the Saturn system are small (often smaller than 1/1000 mm) these can damage the spacecraft because they hit at velocities as high as 10 km/s. This may, among other possible damages of hardware on the spacecraft, lead to a degradation of

solar panels. In particular during traversals of the region around Enceladus a spacecraft may encounter a huge number of particles.

But not only material from Enceladus provides a risk. Dust is also found in other parts of the Saturn system. It can, for instance, derive from the main rings of the planet and from other Saturnian moons (of which more than 60 exist in total).

The project will deliver to ESA a software that allows to predict the number of grains encountered by the spacecraft depending on the precise path taken in the system.

#### WWW

<http://www.zib.de>

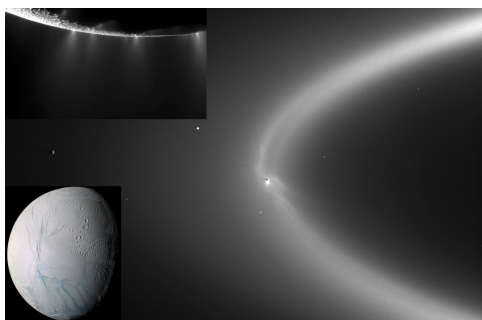
#### More Information

#### Funding

European Space Agency (ESA)

#### DFG Subject Area

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**Figure 1:** Background: Cassini image of the dusty Saturnian E ring with the icy moon Enceladus. Upper panel: Image of the south pole of Enceladus, showing dust emission (water ice grains) from cracks in the ice crust. Lower panel: Close-up view of Enceladus. The active south polar terrain corresponds to the four quasi-parallel, blue stripes near the bottom of the image.

