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EXPLORATION OF LOW-VELOCITY COLLISIONS IN SATURN'S RINGS (ELVIS) ON REXUS 25/26

Abstract

The scientific objective of our Experiment is to get a better understanding of low-velocity collisions in Saturn's main rings. These rings primarily consist of water ice. The most common particle size ranges from 1 cm up to about 10 m. Previous work has shown that the collision properties of low-temperature water ice are similar to those of silica glass, but at tenfold of the velocity. The goal of this experiment is to clarify the collision outcomes between Saturnian ring particles by observing mutual collisions among cm-sized glass marbles. It is expected that binary collisions under Saturn-ring conditions result in the cohesion among the glass beads when the impact speeds are sufficiently small. However, it is unclear to what sizes agglomerates can grow by successive sticking collisions and what the collision properties of the forming clusters are. Our Experiment will take part in the REXUS/BEXUS programme and fly on REXUS 26. During the microgravity phase we will shake a box with glass marbles to observe the formation and destruction of clusters with multiple cameras. For comparison, numerical simulations are carried out at the Max-Planck-Institute for Dynamics and Self-Organization.