

Strength of cometary particles on the nano- to micrometer scale. Force-curve analysis of MIDAS data

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The MIDAS atomic force microscope on board the Rosetta orbiter studied dust particles which provide an insight into cometary properties and cometary formation in the early Solar System. This presentation will display the first results of a special measurement mode which allowed the strength of the collected dust to be probed at the nano- to micrometer scale.

MIDAS investigated the collected samples by scanning the particles with a sharp tip mounted on a cantilever. Two different operational modes were available, the dynamic mode and the contact mode. In contrast to the usually used dynamic mode, in the contact mode the cantilever is statically lowered towards the target and its physical deflection is measured. As the deflection is proportional to the force the cantilever exerts on the dust, a force-displacement curve can be obtained. Its shape reflects whether the cantilever hit the empty target or a dust particle, and gives an insight of how the interaction between tip and dust proceeded (compaction, breaking, rolling, ...).

We will present the first force-displacement curves ever measured for cometary dust particles and will come up with possible explanations.