

Physical properties of cometary dust particles collected in situ by Rosetta/COSIMA

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More than 35,000 cometary dust particles were collected at low velocity on metallic targets in the inner coma of the comet 67P/Churyumov-Gerasimenko by the COSIMA (Cometary Secondary Ion Mass Analyzer [1]) instrument on-board the Rosetta spacecraft. All the particles have been imaged with a resolution of 14 μm x 14 μm with the internal camera of the instrument, the COSISCOPE [2].

Even at the low velocities of impact, most of the particles were fragmented on the collection targets, revealing their fragile nature [3]. We will show how the impact patterns can be used, by comparison with numerical models, simulations [4] and laboratory experiments [5], to retrieve the physical properties of the particles such as their tensile strength but also their original porosity and internal structure. A second information on the internal structure of the dust particles can be obtained by the way the light is scattered by these particles. The optical properties of the particles were analyzed [6] and we could show that scattering of light occurs inside the particles and not only at their surface for a large number of aggregates, which can be interpreted in terms of porosity.

References: [1] Kissel et al., 2007, Space Science Reviews, 128, 82 [2] Langevin et al., 2016, Icarus, 271, 76 [3] Hornung et al., 2016, P&SS, 133, 63 [4] Maroger et al., 2018, LPI, 2149 [5] Ellerbroek et al., 2017, MNRAS, stx1257 [6] Langevin et al., 2017, MNRAS, 469, S535-S549.