

COSIMA - Dust Particles in the Inner Coma of Comet 67P/Churyumov-Gerasimenko prior to perihelion passage

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Abstract

COSIMA, the COmetary Secondary Ion Mass Analyser, is one of the three scientific in-situ dust instruments onboard the Rosetta spacecraft. Rosetta has been accompanying the comet 67P/Churyumov-Gerasimenko since August 2014 during the journey of the nucleus into the inner solar system. COSIMA has collected several thousands of cometary particles in the inner coma from 10 to hundreds of kilometers off the cometary nucleus. We will discuss the evolution of the inner coma dust particles as observed for the collected, imaged and analyzed cometary particles.

1. The Instrument

The COSIMA instrument is a secondary ion mass spectrometer equipped with a dust collector, an ion gun, and an optical microscope for target

characterization. Dust from the near comet environment are collected on a set of targets. Those can be moved to a microscope imager where the positions of the collected grains can be determined. The cometary grains can then be bombarded with a liquid indium ion gun. The resulting secondary ions are extracted into a time-of-flight mass spectrometer and the secondary mass spectra are recorded for science analysis (Figure 1).

2. Grain collection

As shown in Figure 2, a remarkable number of grains (several thousands) have been collected since the beginning of operations in September 2014.

3. Grain Analysis

The grain chemical composition as inferred from secondary mass spectra will be presented and discussed.

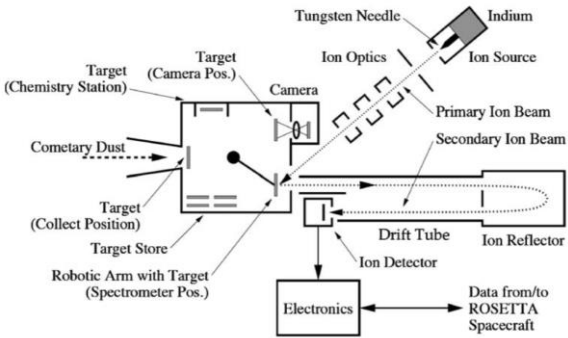


Figure 1: Schematic view of COSIMA from Kissel et al. (2007).

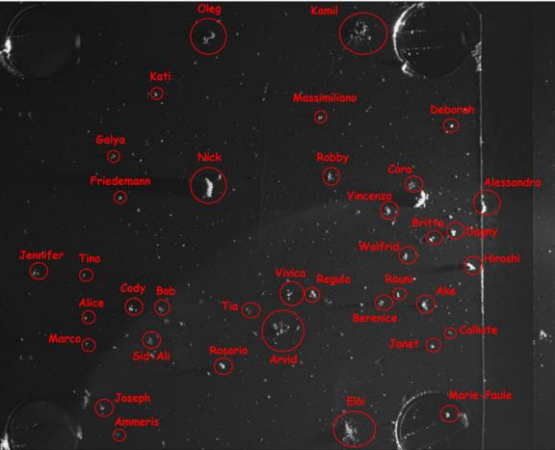


Figure 2: A target plate (1cm across), showing dust grains collected between 11 August and 12 December 2014. Credits: ESA/Rosetta/MPS for COSIMA Team MPS/CSNSM/UNIBW/TUORLA /IWF/IAS/ESA/BUW/MPE/LPC2E/LCM/FMI/UTU/ LISA/UOFC/vH&S.

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