Laboratory Calibration of the Dust Impact Monitor onboard the Rosetta Lander Philae

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Philae is the lander spacecraft on board ESA's Rosetta mission to comet 67P/Churyumov-Gerasimenko which is supposed to land on the comet nucleus in late 2014. The Dust Impact Monitor (DIM) is mounted on one of the corners of Philae's balcony. The DIM sensor consists of three piezoelectric detectors, each one mounted on the outer side of a cube and facing in orthogonal directions (the direction normal to the nucleus surface and two horizontal directions). The total sensor area of all three detectors is approximately 70 cm^2. DIM measures impacts of sub-millimeter and millimeter sized particles. Ice and dust particles emitted from the nucleus couple to the cometary gas flow and are accelerated away from the nucleus surface. Depending on particle size, a fraction of the emitted grains falls back to the surface due to gravity while the rest are ejected into the cometary coma. DIM will be able to detect these backfalling particles (with its sensor facing away from the nucleus surface) as well as grains leaving the nucleus on direct trajectories (with the two sensors facing in horizontal directions). The DIM instrument will measure dust fluxes, impact directions as well as the speed and size of the impacting particles. This is expected to give new insights into the properties of the cometary near-surface material. Here we report on recent results from laboratory calibration experiments performed with flight spare units of the DIM sensor at MPS, Katlenburg-Lindau.

Keywords: dust; interplanetary magnetic field; interstellar dust; dust-plasma interaction.