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Saturn's E ring: in-situ measurements and modelling

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Since July 1st 2004, the Cassini spacecraft has been exploring the Saturnian system, which is distinguished by a pronounced ring system. In particular, Saturn's diffuse E ring is the largest planetary ring of the solar system ranging from $3\mathrm{R_S}$ (Saturn's radius $\mathrm{R_S} = 60\,330$ km) to approximately Titan's orbit. The vertical ring thickness is 8 000 km at Enceladus orbit and 15 000 km at the outer rim of the ring. The ring is not only remarkable for its extend but also for its narrow size distribution. As the particle size distribution is due to grain dynamics, knowledge of the dynamical properties of the ring particles is essential for understanding the ring formation.

The Cosmic Dust Analyser (CDA) on Cassini measures the mass, speed, charge, and elemental composition of individual dust particles hitting the detector. The purpose of the High Rate Detector (HRD) sub-unit is to record the dust flux within the densest regions of the E ring.

Additionally, the dust ring could be observed by remote sensing instruments, either by cameras on board the spacecraft or by earth bound telescopes during a ring plane crossing.

Combination of both methods will leads not only to a fully explanation of the E ring but also to a better understanding of images from dust disk, where in-situ measurements are impossible.

Here, we present basic findings of the CDA in-situ observations supported by model

calculations of the dust dynamics. We show, that there are some mismatches between in-situ and remote sensing observations.