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Stream particles inside Saturn's magnetosphere

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In 2004, the Cosmic Dust Analyser (CDA) onboard the Cassini spacecraft discovered streams of nanometer-sized particles originating from Saturn up to 1 AU (Astronomical Unit $\approx 1.5 \cdot 10^{11}\mathrm{m}$) away from Saturn.

Possible sources of the stream particles are Saturn's icy moons, the outskirts of the A ring, and the diffuse E ring. Inside Saturn's magnetosphere CDA measures predominantly E ring particles. Thus, identifications of stream particles is a challenging task. As an additional hindrance, tiny grains like the stream particles must impact the detector at a high speed in order to exceed the instrument's detection threshold.

However, despite these problems, an indirect determination of the stream particle sources can be done. To achieve this, the dynamical properties of E ring particles and stream particles released from all possible sources need to be studied in detail. Here we present results from numerical simulations useful to discriminate between the various possible sources. We applied our findings to the Cassini measurements to identify periods when stream particle impacts dominate the data.