

EGU21-3198

<https://doi.org/10.5194/egusphere-egu21-3198>

EGU General Assembly 2021

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Nanodust detection with Cassini CDA - Implications for DESTINY+ and Interstellar Probe

Ralf Srama^{1,2}, Jon K. Hillier³, Sean Hsu⁴, Sascha Kempf⁴, Masanori Kobayashi⁵, Harald Krueger⁶, Georg Moragas-Klostermeyer¹, Anna Mocker¹, Jonas Simolka¹, Veerle Sterken⁷, Zoltan Sternovsky⁴, and Heiko Strack¹

¹University of Stuttgart, IRS, -, Stuttgart, Germany (srama@irs.uni-stuttgart.de)

²Baylor University, Waco, TX, USA

³Freie University of Berlin, GER

⁴LASP, University of Colorado, USA

⁵CIT, Tokyo, JPN

⁶MPI Solar System Research, Goettingen, GER

⁷ETH Zurich, Institute for Particle Physics and Astrophysics, CH

The Cosmic Dust Analyzer (CDA) onboard Cassini characterized successfully the dust environment at Saturn from 2004 to 2017. Besides the study of Saturn's E ring and its interaction with the embedded moons, CDA detected nanoparticles in the outer Saturn system moving on unbound orbits and originating primarily from Saturn's E-ring. Although the instrument was built to detect micron and sub-micron sized particles, nano-sized grains were detected during the flyby at early Jupiter and in the outer environment at Saturn. Fast dust particles with sizes below 10 nm were measured by in-situ impact ionization and mass spectra were recorded. What are the limits of in-situ hypervelocity impact detection and what can be expected with current high-resolution mass spectrometers as flown onboard the missions DESTINY+ or EUROPA? Is the sensitivity of Dust Telescopes sufficient to detect nano-diamonds in interstellar space? This presentation summarizes the current experience of in-situ dust detectors and gives a prediction for future missions. In summary, current Dust Telescopes with integrated high-resolution mass spectrometers are more sensitive than the CASSINI Cosmic Dust Analyzer.