

The dust environment of Saturn within Saturn's D ring: CDA results of the Grand Finale of Cassini

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Abstract

The Grand Finale of the Cassini spacecraft with its unique proximal orbits allowed fantastic scientific discoveries between April and September 2017. Cassini crossed the ring plane 22 times at a distance which was so close, that it touched the clouds of Saturn. The Cosmic Dust Analyzer observed unexpected high densities of tiny dust grains. On the other hand, larger grains above one micrometer were found to be highly depleted. The mass distribution of the grains detected peaks well below 70 nm and is cut off by the calibrated mass threshold. The dust density varied along the trajectory with overall consistent results during different ring plane crossings. Significant number of particles were detected above the ring plane, in the ring plane and below the ring plane at latitudes between +/-45 degrees. The measured density profiles are compared with latest models of nanograins ejected by the B and C ring. This paper summarizes the current understanding of this "Ring Rain", starting at Saturn's main ring and ending in Saturn's atmosphere. Density profiles, mass distributions and early compositional variations are reported.

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