

The 2014 and 2016 dust occultations observed by Cassini CDA

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Star occultations are a common tool in astronomy and photons are normally blocked by an object. Here, we do report about the occultation of nanodust particles in the Saturnian system observed by Cassini.

The Cosmic Dust Analyzer (CDA) onboard Cassini characterized successfully the dust environment at Saturn from 2004 to 2017. The instrument measured the primary charge, speed, mass and composition of individual submicron and micron sized dust grains. The detection threshold scaled with speed^{3.5} such that the detection of fast nanograins (~100 km/s) was possible. Saturn's nanodust environment (streams) is studied since many years. However, a special geometric condition of Saturn, Cassini and Titan during the Titan flyby in 2014 (DOY 65) provided a special dust occultation opportunity. Titan and its atmosphere blocked the stream of fast nanoparticles such that CDA registered a clear drop in impact rate around Titan closest approach. An analysis of the data allows to constrain the source region of the nanograins, which is compatible with a source region in the ring plane at distances from Saturn between 4 and 8 Saturn radii. Backward and forward modelling was performed leading to dust grain sizes between 3 and 9 nm and speeds between 80 and 150 km/s. A second dust occultation by Titan was predicted in 2016 (DOY 223). Finally, the measured impact rates by CDA confirmed the occultation model.