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## Mid-latitude ring rain of Saturn - observations and implications

Hsiang-Wen Hsu (1) and James O'Donoghue (2)

(1) LASP, University of Colorado, Boulder, Colorado, USA (sean.hsu@lasp.colorado.edu), (2) Planetary Magnetospheres Laboratory, NASA Goddard Space Flight Center, Greenbelt, Maryland, USA (j.odonoghue@nasa.gov)

Ring rain, the transport of ring material in the form of charged nanograins along the magnetic field lines of Saturn into its atmosphere, is a key ring-planet interaction pathway. It has been proposed based on the Voyager data but only confirmed recently by the in situ measurements carried out during the Cassini Grand Finale mission. Here we present a summary of recent published results from the Cassini Cosmic Dust Analyser (CDA) and the Keck infrared emission observations to illustrate in detail about the ring-planet interactions. The CDA nanograin profile provides a snapshot of the mass infall pattern while the  $H_3^+$  infrared emission profile highlights the effect of ring material deposition in the upper atmosphere. Both results consistently show a prominent north-south asymmetry, expected from the northward offset of Saturn's well-aligned magnetic dipole, and a mass deposition rate of around 400 to 2,000 kg s<sup>-1</sup> over the mid-latitude region. We will also discuss the implications on the mass budget, age, and evolution of Saturn's main rings.