



UV Imaging Spectroscopy of the Saturn System

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Highlights of the UVIS investigation on Cassini include the discovery of a neutral oxygen cloud surrounding Saturn and the determination that Saturn's magnetosphere is dominated by neutrals. Later, UVIS observed and measured the cause of these phenomena: that the icy moon Enceladus is erupting water molecules at about 200kg/sec from fissures in its south polar terrain. These eruptions also carry a fraction of small solid ice grains that are sufficient to produce Saturn's ethereal E ring. The morphology of the jets of vapor in the Enceladus plume imply supersonic flow velocities that loft the grains carried in the jets, consistent with theoretical models. UV occultations and spectroscopy define the constituents of Titan's upper atmosphere and explain its dayside and nightside emissions. UVIS sees Saturn's auroral oval evolve and has detected Enceladus' footprint. Self-Gravity Wakes in Saturn's rings were detected by comparing ring occultations with Voyager results and with multiple Cassini UVIS occultations at a range of viewing aspects. We developed a simple 'granola-bar model' to explain our observations and the azimuthal brightness asymmetry observed from the Earth and previous space missions. UVIS has detected numerous small structures in the rings: kittens, propellers and other embedded objects. Features preferentially form where the rings are stirred by resonances and nearby passing moons. This more active ring system seen by Cassini may explain bright haloes in the rings; how the ring system can recycle ring material so that the rings are much older than inferred from Voyager; and provide implications of how planets may form.