Announcing the Final Examination of Richard Jerousek for the degree of Doctor of Philosophy in Physics

Date: April 3rd, 2018
Time: 1:00 p.m.
Room: FSI (Florida Space Institute) Conference Room (Partnership I, 209)
Dissertation title: Determining the Small-scale Structure and Particle Properties of Saturn's Rings from Stellar and Radio Occultations.

Abstract:

Saturn's rings consist of icy particles of various sizes ranging from millimeters to several meters. Particles may aggregate into ephemeral elongated clumps known as self-gravity wakes in regions where the surface mass density and epicyclic frequency give a Toomre critical wavelength which is much larger than the largest individual particles (Julian and Toomre 1966). Optical depth measurements at different wavelengths can be used to constrain the sizes of individual particles (Zebker et al. 1985, Marouf et al. 1983) while measurements of optical depths spanning many viewing geometries can be used to determine the properties of self-gravity wakes (Colwell et al. 2006, 2007, Hedman et al. 2007, Nicholson and Hedman 2010, and Jerousek et al. 2016). Studies constraining the parameters of the assumed power-law particle size distribution have been attempted (Zebker et al. 1985, Marouf et al. 1983) but have not yet accounted for the presence of self-gravity wakes or the much larger elongated particle aggregates seen in Cassini Imaging Subsystem (ISS) images and commonly referred to as "straw". We use a multitude of Cassini stellar occultations measured by UVIS (Ultraviolet Imaging Spectrograph) and VIMS (Visual and Infrared Mapping Spectrometer) together with Cassini's RSS (Radio Science Sub System) X-band, Ka-band, and S-band radio occultations to better constrain the particle size distribution throughout Saturn's main ring system, including regions where self-gravity wakes have a significant effect on the measured optical depth of the rings.

Outline of Studies:
Major: Physics-Planetary Science Track

Educational Career:
M. S. University of Central Florida, 2008
B. S. University of Central Florida, 2006

Committee in Charge:
Dr. Joshua E. Colwell (Chair)
Dr. Daniel T. Britt
Dr. Yanga R. Fernandez
Dr. Mathew M. Hedman (External Committee Member)

Approved for distribution by Dr. Joshua Colwell, Committee Chair, on March 20, 2018.

The public is welcome to attend.