

Planetary Ring Occultations and the Cassini Spacecraft

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The Cassini spacecraft arrived at Saturn in 2004 and spent 12 years watching the planet go from winter to summer, observing the planet and its moons and rings. No single talk (or conference) can communicate all of the results from the Cassini mission; its reshaping of what we know of the Saturn system cannot be overstated. The Saturnian rings are made of boulders of mostly water-ice, ranging in size from pebbles to house-size blocks, and often forming temporary aggregates under their own self-gravity. The dynamics of the ring are complex, as ring particles regularly but gently collide with one another as they all orbit Saturn, as well as experience gravitational tugs from Saturn's moons 'above' and Saturn's interior 'below.' While much can be learned of the rings from the ultraviolet/visible/infrared light they reflect, and the mid-infrared light they emit, it can be complex to measure the amount of ring material. Occultations — observing the rings blocking a star, letting only some light through — allow such measurements to be made. In this talk, I will explain the science behind taking a simple measurement of the brightness of a star and turning it into information about the rings' properties, such as the particle size-distribution and how this interacts with perturbations from the moons.



Bio: Rebecca Harbison is an Assistant Professor of Practice of Astronomy at the University of Nebraska at Lincoln. She received her bachelor's degree in Physics and Mathematics from the University of Nebraska in 2005, and earned her PhD in Astronomy in 2013 at Cornell University, working on data analysis and modeling from the Cassini mission to Saturn. She then spent two years as a lecturer at California Polytechnic State University in San Luis Obispo, California, developing her passion for teaching undergraduate physics and astronomy, which let her become the UNL Department of Physics and Astronomy's first Professor of Practice, a teaching focused position. Outside of her continuing work on Cassini data and her teaching, she is an avid reader of science fiction and fantasy novels, and fond of several textile arts and crafts.