SATURN'S RINGS IN THERMAL INFRARED

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Much can be learned about Saturn's rings at infrared wavelengths. Ring particle composition and surface/subsurface characteristics are key parameters in determining the scenario of their formation and possible evolution. Ring composition is mainly constrained by observations in the near-infrared (see Poulet et al.) Saturn's ring particles have a peak in thermal emission at 30 microns. The thermal inertia of the surface can be measured while observing temperature variations in the far infrared across the planetary shadow. This constrains the compactness of the surface and provides a possible scenario for their formation by accretion or fragmentation. The structure of particle surfaces also constrains interparticle collisions and ring dynamics. The vertical structure of main rings, the vertical dynamics of particles around the ring plane and their spin rate are preferentially constrained with observations in the infrared domain. Many thermal models have been proposed to reproduce observations of the main rings, including alternative mono- or many-particles-thick layers or vertical heterogeneity, with no definitive answer. Observations of the lit and dark faces of rings over a range of geometries including high and low phase angles, in and out of the shadow and over a variety of emission angles, provide important information on the vertical thermal gradient, and on the temperature contrast between night and day sides of particles. Particle properties can be derived from these constraints. Future missions such as Cassini will provide new information to further constrain ring thermal models.