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Saturn ring temperature roll-off at submillimeter wavelengths from Cassini CIRS observations

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One of the more interesting features of Saturn's main rings has been the steep decrease in brightness temperature with increasing wavelength between 50 and 100 microns, first revealed in earth-based observations [1, 2]. However, because of the limited spatial resolution of these observations, it has been difficult to separate the ring and planet contributions to this effect. The Cassini Composite Infrared Spectrometer (CIRS) resolved the main rings in the far-infrared, measuring the brightness temperature at wavelengths of tens of microns to the submillimeter. CIRS is a Fourier-transform spectrometer that measures radiation in the thermal infrared from 7 microns to 1 millimeter (1400 to 10 cm^{-1}).

The CIRS measurements unambiguously reveal a trend in brightness temperature that is much less steep between 50 and 100 microns than has been reported from earth-based observations. This more gradual trend implies that the main rings are not dominated by particles smaller than $\sim$1 millimeter because larger particles do not show any significant variation in emission over the 50–100 micron wavelength range [2]. This conclusion is consistent with results from particle eclipse cooling [3] and high phase angle Voyager imaging observations [1]. When the filling factor is also included, the temperature roll-offs for the A, B and C rings are similar. The roll-off in tempera-

ture measured by CIRS may be due to particles' surface roughness and/or the varying emissivity of the materials.

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References: [1] J. N. Cuzzi et al. (1984),in *Planetary Rings*, R. Greenberg, A. Brahic. Eds. (Univ. of Arizona Press, Tucson), 72-198. [2] L. W. Esposito et al. (1984),in *Saturn*, T. Gehrels, M.S. Matthews, Eds. (Univ. of Arizona Press, Tucson), 463-545. [3] L. Froidevaux (1981) *Icarus* **46**, 4-17.