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The shadow of Saturn's icy satellites on the E ring

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We analyze shadows that Saturnian satellites cast on the E ring, a faint, broad dust ring composed of icy grains. The brightness contrast of a moon's shadow relative to the surrounding ring allows to infer local properties of the size distribution of ring particles. We derive the shadow contrast from a large number of Cassini images of Enceladus taken in various filters in a range of phase angles 144 to 164 degrees. For Tethys and Dione we identify a clear shadow in images with phase angles larger than 160 degrees. From the data we obtain the number density of E ring grains at the orbits of Tethys and Dione relative to the one near Enceladus. The latter we constrain from the variation of the shadow contrast with color and phase angle. From the Enceladus data we construct the phase curve of the E ring dust between 144 and 164 degrees. We compare to data obtained from Earth-bound observations by de Pater et al 2004. and in situ measurements by the Cosmic Dust Analyzer onboard Cassini.