

IRTF OBSERVATIONS OF SATURN-EARTH RING PLANE CROSSING: FAINT OUTER RING NEAR-IR PROFILES; James Bauer, Jack J. Lissauer and Michal Simon, Astronomy Program, Dept. of Earth and Space Sciences, SUNY at Stony Brook

On May 22nd and August 10th, 1995 (UT), the Earth passed through the plane of Saturn's main rings. In order to study Saturn's ring system and inner moons, we obtained several thousand images at 1.1, 1.7, and 2.2  $\mu\text{m}$  on the nights of May 21st, 22nd, and 25th and August 6th, 7th, and 8th at the NASA IRTF using the NSFCam, a  $256 \times 256$  pixel InSb imaging detector. On all these nights but the 21st, the dark side of the rings was visible. We obtained several deeper exposures of the region beyond the East and West ring ansae of the main rings, and successfully observed Saturn's faint E and G rings.

The plot below is a radial profile of Saturn's E ring synthesized from a series of exposures taken the night of August 8, 1995, just three nights before the Earth crossed through the plane of Saturn's main rings. We took fifty 15 second images of Saturn's East ansa through a filter centered in the 2.2  $\mu\text{m}$  methane absorption band using a scale of 0.31 "/pixel. The radial profile was obtained from these fifty images, shifted and added together into a final image. We determined the flux at equally spaced radial values from about 2.4 to 6.4 Saturn radii ( $R_S$ ) and averaged over a 2 pixel region ( $0.072 R_S$ ), which matches the FWHM resolution of the image. The brightness of the superposed E and G rings at 2.7  $R_S$  is  $42 \pm 8 \mu\text{janskys}$  ( $\mu\text{Jy}$ ) and the E ring peak brightness, at 3.2  $R_S$ , is  $55 \pm 9 \mu\text{Jy}$ . The E ring signal drops off at about 5  $R_S$ . This research was supported by NASA's Planetary Astronomy program through grant NAGW4659.

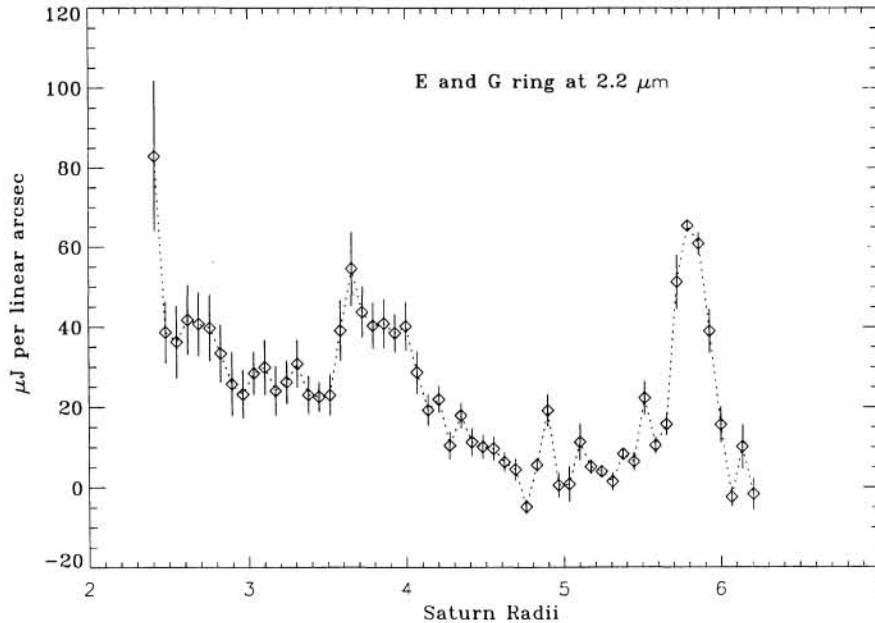


Figure 1: Profile of the integrated brightness of the E and G ring's East ansa at 2.2  $\mu\text{m}$ . The integration is over values of position angle in the sky plane within  $\pm 3^\circ$  of ring plane on August 8, 1995. The 67  $\mu\text{Jy}$  peak at 5.8  $R_S$  is a background star passing through the ring plane.