The Spacelab 2 Infrared Telescope at 2 Microns

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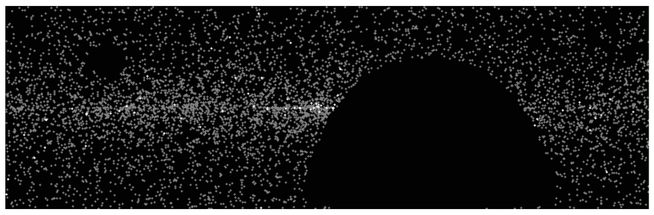
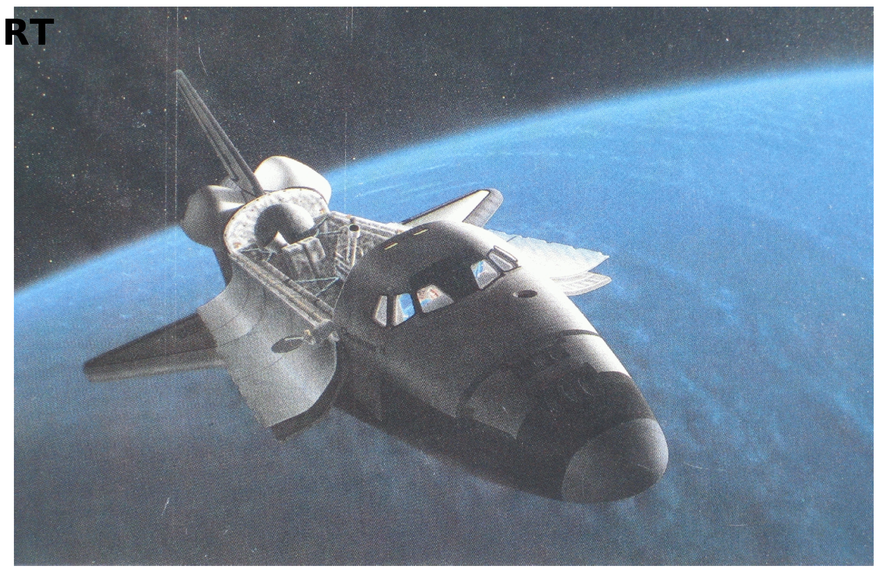
Galactic Plane at 2-Microns before IRT

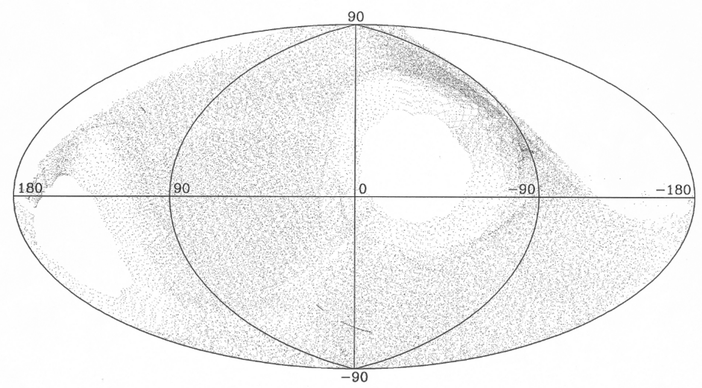


Two Micron Sky Survey (Neugebauer & Leighton, 1969)

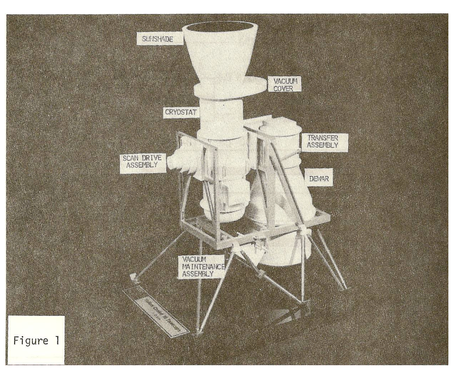


Space shuttle Challenger with Spacelab 2 instruments
(from "Coke Float: Flight of the 'Space Can' aboard Challenger/Spacelab II" by B.E. Johnson)

IRT Sky Coverage at 2 Microns



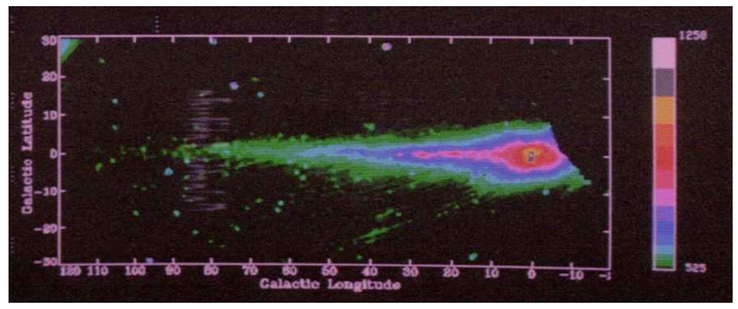
Spacelab 2 IRT



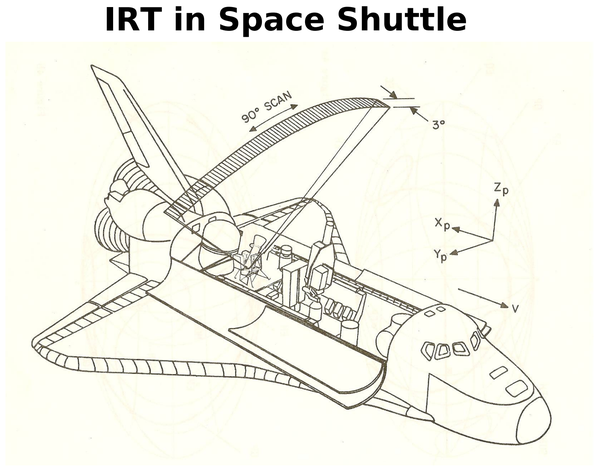
Giovanni Fazio was the Principle Investigator for the Spacelab 2 Infrared Telescope, which flew on the space shuttle Challenger in July 1985. While it had a variety of problems which precluded completing its original mission of mapping the sky in the far infrared, the IRT did map much of the 2 micron sky, and taught several lessons which were useful for the Spitzer Space Telescope. Funding ended before we could calibrate an all-sky 2-micron map.

Abstract from the final project report by Giovanni Fazio:
The Infrared Telescope (IRT) experiment, flown on Spacelab-2, was used to make infrared measurements between 2 and 120 microns. The objectives were multidisciplinary in nature with astrophysical goals of mapping the diffuse cosmic emission and extended infrared sources and technical goals of measuring the induced Shuttle environment, studying properties of superfluid helium in space, and testing various infrared telescope system designs. Astrophysically, new data were obtained on the structure of the Galaxy at near-infrared wavelengths. A summary of the large scale diffuse near-infrared observations of the Galaxy by the IRT is presented, as well as a summary of the preliminary results obtained from this data on the structure of the galactic disk and bulge. The importance of combining CO and near-infrared maps of similar resolution to determine a 3-D model of galactic extinction is demonstrated. The IRT data are used, in conjunction with a proposed galactic model, to make preliminary measurements of the global scale parameters of the Galaxy. During the mission substantial amounts of data were obtained concerning the induced Shuttle environment. An experiment was also performed to measure spacecraft glow in the IR.

IRT View of Galactic Plane at 2 Microns

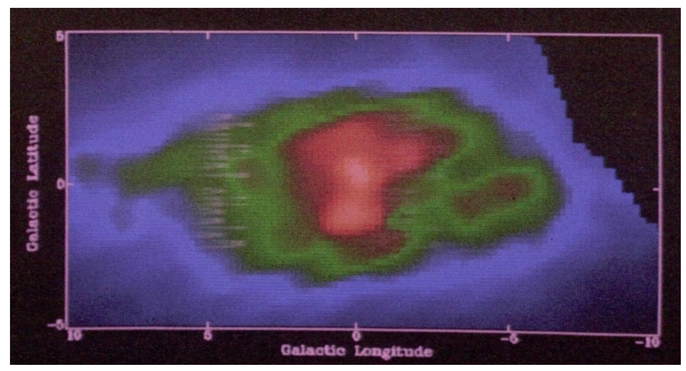


IRT in Space Shuttle

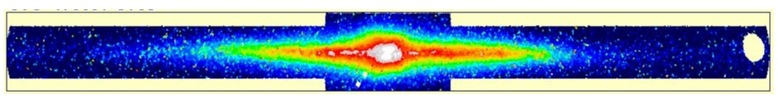


Not such a great environment for an IR Telescope

IRT View of Galactic Center at 2 Microns

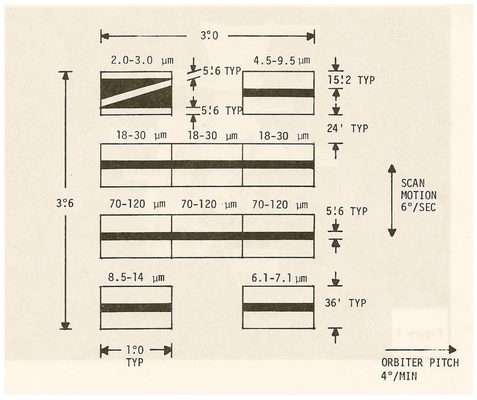


The 2-Micron Sky after 1994 (COBE DIRBE)



"COBE diffuse infrared background experiment observations of Galactic reddening and stellar populations"
Arendt, R. G., Berriman, G. B., Boggess, N., Dwek, E., Hauser, M. G., Kelsall, T., 1994, Astrophysical Journal Letters, 425:L85-L88

IRT Focal Plane
(2 Microns at upper left)



Note 2-micron Z-slit which improves resolution when scanning.

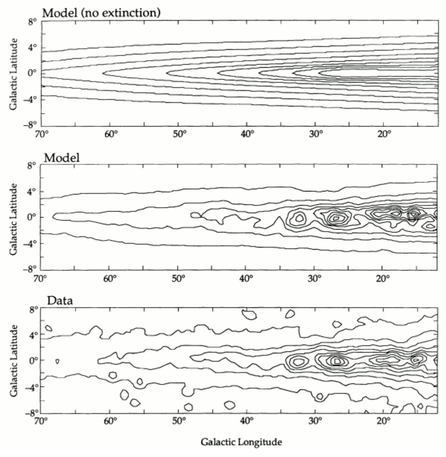
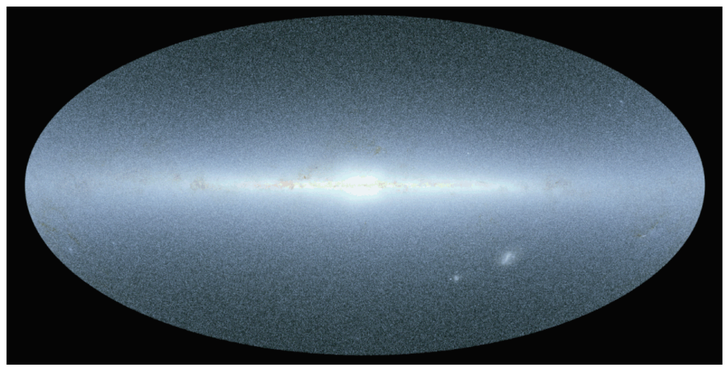


FIG. 5.—*Top*: contour plot of the 2.4 μm emissivity model including a "thin disk" component but *without* dust extinction. *Middle*: same model as in the top panel but with a three-dimensional dust extinction model included. *Bottom*: contour plot of the Galactic 2.4 μm emission as mapped by the IRT experiment. In the bottom two panels, the contours are spaced uniformly by the flux corresponding to a surface brightness of 18.2 mag arcsec^{-2}.

"Galactic structure from the Spacelab infrared telescope.II - Luminosity models of the Milky Way"
Kent, S. M.; Dame, T. M.; Fazio, G., 1991,Astrophysical Journal, 378:131-138

The 2-Micron Sky after 2006 (2MASS)



(Map of the Point Source Catalog integrated flux in 5′ × 5′ bins in a galactic Aitoff projection.)

"The Two Micron All Sky Survey (2MASS)"
M.F. Skrutskie, R.M. Cutri, R. Stiening, M.D. Weinberg, S. Schneider, J.M. Carpenter, C. Beichman, R. Capps, T. Chester, J. Elias, J. Huchra, J. Liebert, C. Lonsdale, D.G. Monet, S. Price, P. Seitzer, T. Jarrett, J.D. Kirkpatrick, J.E. Gizis, E. Howard, T. Evans, J. Fowler, L. Fullmer, R. Hurt, R. Light, E.L. Kopan, K.A. Marsh, H.L. McCallon, R. Tam, S. Van Dyk, and S. Wheelock, 2006, Astronomical Journal, 131:1163-1183