



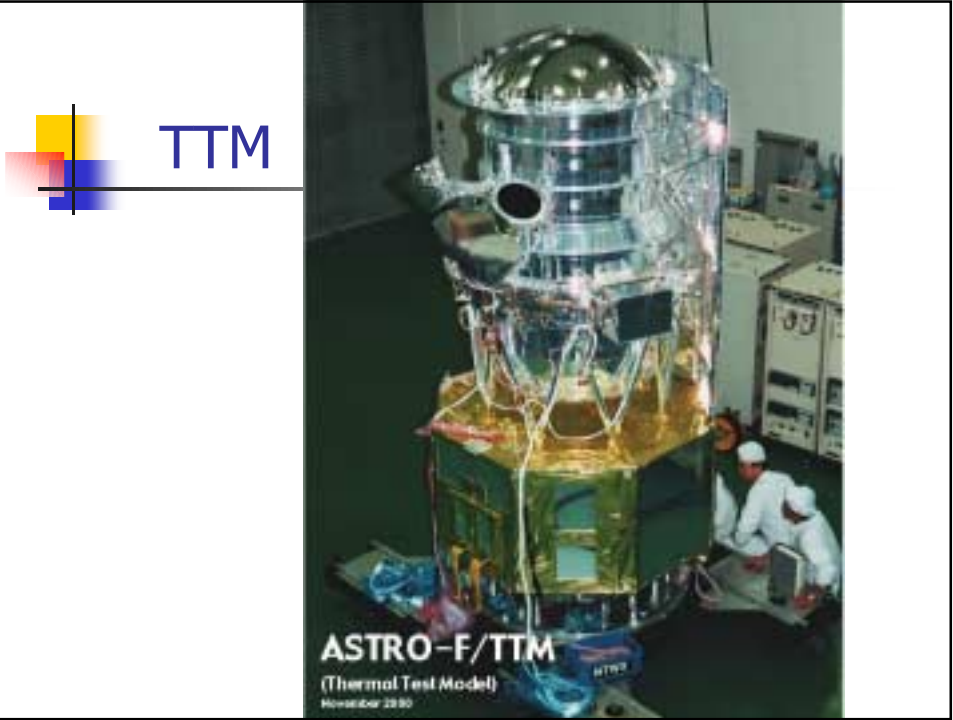
ASTRO-F Survey as an Input Catalogue for FIRST

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ASTRO-F (or IRIS)

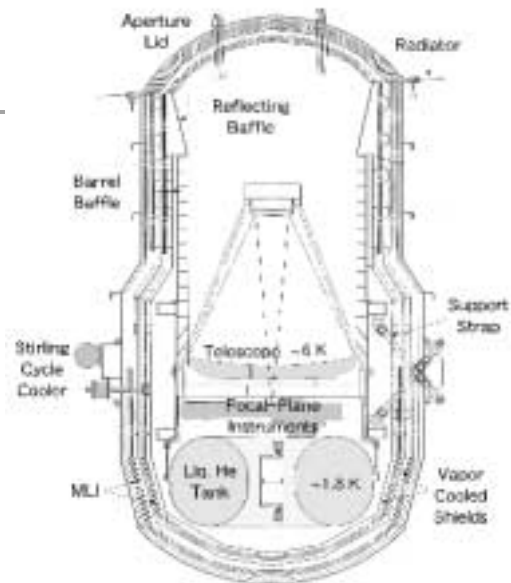
- Second Japanese IR Astronomy Mission
- 70 cm Cooled Telescope
- FIR All Sky Survey
- NIR-FIR Deep Imaging & Spectroscopy
- Solar synchronous orbit
- Launch: by M-V-6 in early 2004
- Results: Excellent Inputs for FIRST





Cryogenics

- Hybrid Type
 - Liq. He
 - Cryocoolers
- Only 170 l. of Liq. He
 - 550 days
 - 960 kg



Mechanical Cryocoolers

- Two-Stage Stirling
 - Two sets
- 200 mW @ 20K
- Merits
 - Mission Life X 2
 - NIR Observation after He run out

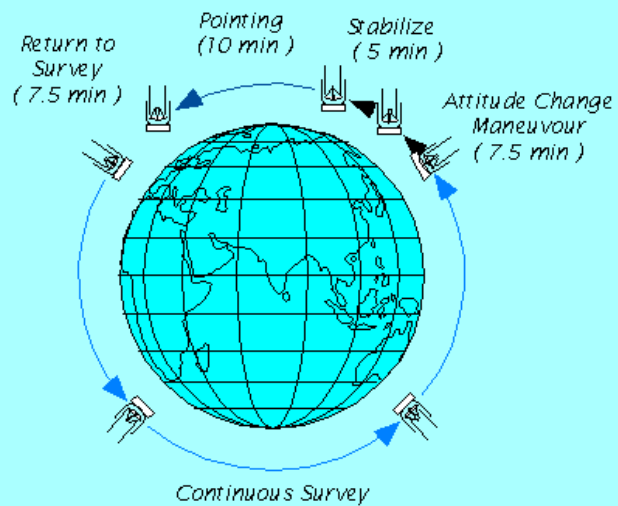


Telescope

- 70cm R.C.
- 5.8 K
- Diff. Limit @5.m
- SiC
 - Porous Core
 - CVD Coat
 - Light (...)



Survey & Pointing Obs.



Focal Plane Instruments

- FIS (Far-Infrared Surveyor)
 - All Sky Survey
 - Deep Imaging and Spectroscopy (pointing)
- IRC (Infrared Camera)
 - Imaging and Spectroscopy (pointing)

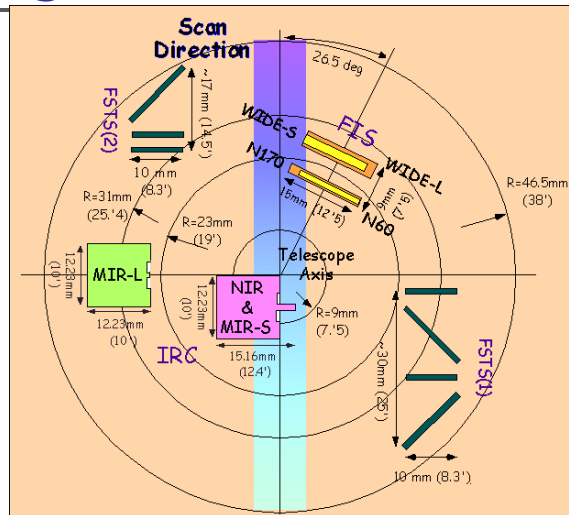
FIS (Far-Infrared Surveyor)



Detector System of FIS

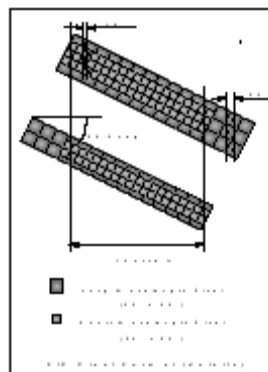
N60	50 - 75 μm	30"	20 x 2
Ge:Ga			
WIDE-S	50 - 110 μm	30"	20 x 3
Ge:Ga			
WIDE-L	110 - 200 μm	50"	15 x 3
stressed			
Ge:Ga			
N170	150 - 200 μm	50"	15 x 2
stressed			
Ge:Ga			

Configuration of Focal Plane



All Sky Survey with FIS

- Pixel Size is not Small
 - Almost Diffraction Pattern Size
 - Poor Sampling
- Tilted Detector Config.
 - Nyquist Sampling even in cross-scan
 - Effective resolution with the pixel size



FIS as a Spectrometer

- Imaging Fourier Transform Spectrometer
 - Polarizing FTS
 - Spectral Range 50-200 μm
 - Detector: Wide-L & Wide-S
- Performance
 - Spectral Resolution 0.2 cm^{-1}
 - Line Detection $2(\text{LW}) - 6(\text{SW}) \times 10^{-17} \text{ W m}^{-2}$

IRC (Infrared Camera)





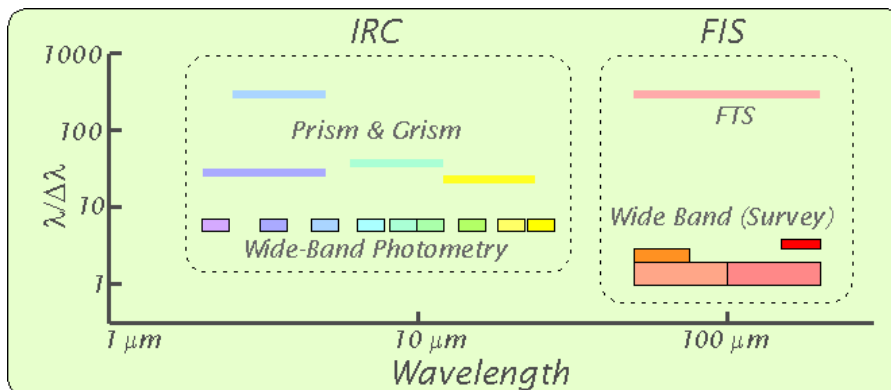
Three Channels of IRC

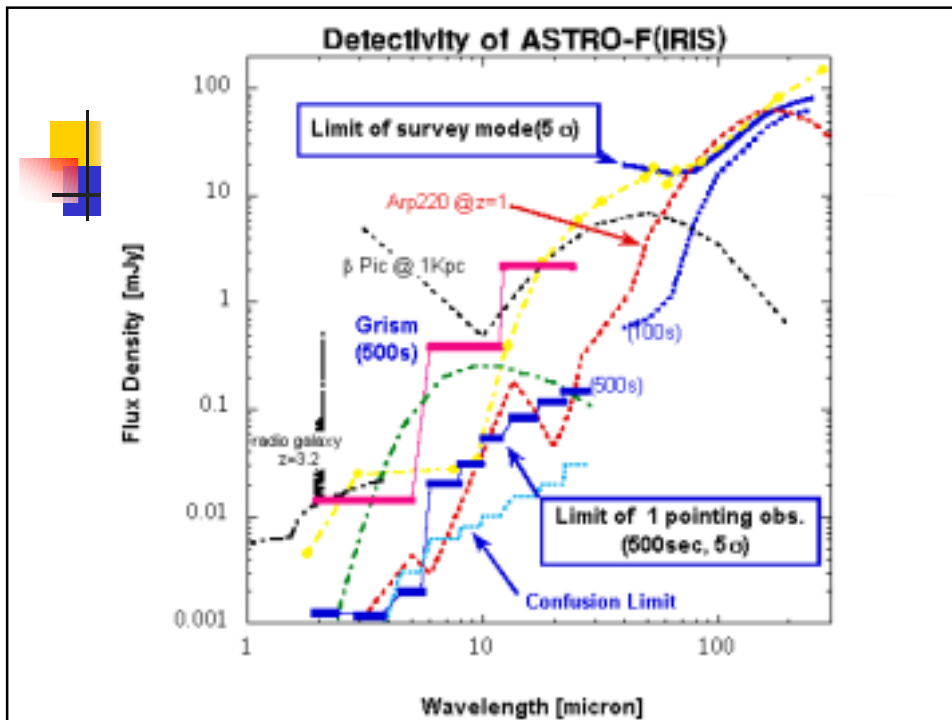
	spectral detector range array	bands	spectros copy	FOV	PFOV
NIR	2 - 5 μm InSb	K, L, M	prism & grism	10'x10'	1.46" 512x412
MIR-S	5 - 12 μm Si:As	7, 9, 11 μm	grisms	10'x10'	2.34" 256x256
MIR-L	12 - 26 μm Si:As	15, 20, 25 μm	grisms	10'x10'	2.34" 256x256

- Wide Field of View (10' X 10')
- Wide Spectral Coverage (2-26 μm)



Photometric & Spectroscopic Capability





FIS: Comparisons with SIRTf

- Advantage of ASTRO-F
 - All Sky Survey with Wide FOV
 - Spectroscopic Imaging Capability
- Advantage of SIRTf
 - Better spatial sampling, higher resolution
 - Deeper Sensitivity



IRC: Comparisons with SIRTf

- Advantage of ASTRO-F
 - Wide FOV (10' vs 5')
 - Wider Spectral Coverage
 - (2-26 μ m vs 3-8 μ m)
 - NIR spectroscopy
- Advantage of SIRTf
 - Better Spatial Resolution
 - Higher Spectroscopic Resolution in MIR



FIS All Sky Survey as an Input Catalogue for FIRST

- Unbiased, All Sky Survey
- Longer Wavelength Coverage
 - 50-200 μ m (c.f. IRAS 12-100 μ m)
- Higher Spatial Resolution
 - 30'' (50-100 μ m) – 50'' (100-200 μ m)
 - C.f. IRAS 2-5 arcmin
- Better Sensitivity
 - 30 – 100 mJy (c.f. IRAS \sim 1Jy)



Common Scientific Interests

- The formation and evolution of galaxies
 - Star-formation history in the universe
 - Wide Area Survey vs Deep Imaging
- Formation of stars in the Galaxy
- Formation of planets in extrasolar systems



Timely Release of Catalogues

- ASTRO-F
 - Launch: Feb 2004
 - Exp. He hold time: until Sep 2005
 - Survey: mostly in the first half-year, and to be supplemented in the following period
- Quick release of results is essential
 - Bright Source Catalogue at high-b in 2006 ?
 - Following Releases of other catalogues



Collaboration with ESA

- Goals
 - Quick release
 - More observations
- ESA Responsibilities
 - Pointing Reconstruction
 - Support of additional ground station(s)
- For European Community
 - Quick Access to the ASTRO-F results
 - Open time (10 %) for Pointing Observations



Summary

- ASTRO-F
 - To be launched in early 2004
 - 70 cm cooled telescope
 - Two focal plane instruments: FIS & IRC
 - Survey type mission
- FIS All Sky Survey
 - Ideal inputs for FIRST
 - Quick release of results is important