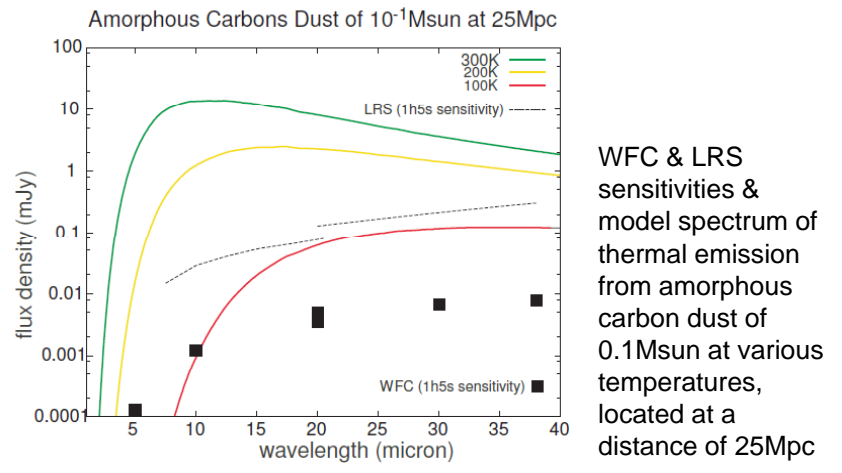
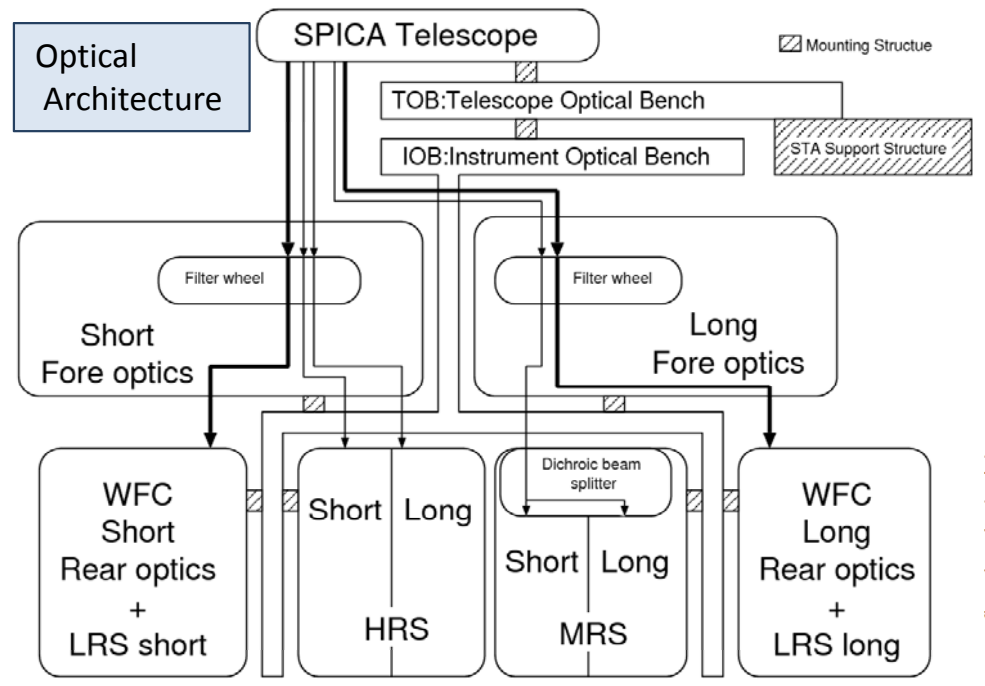
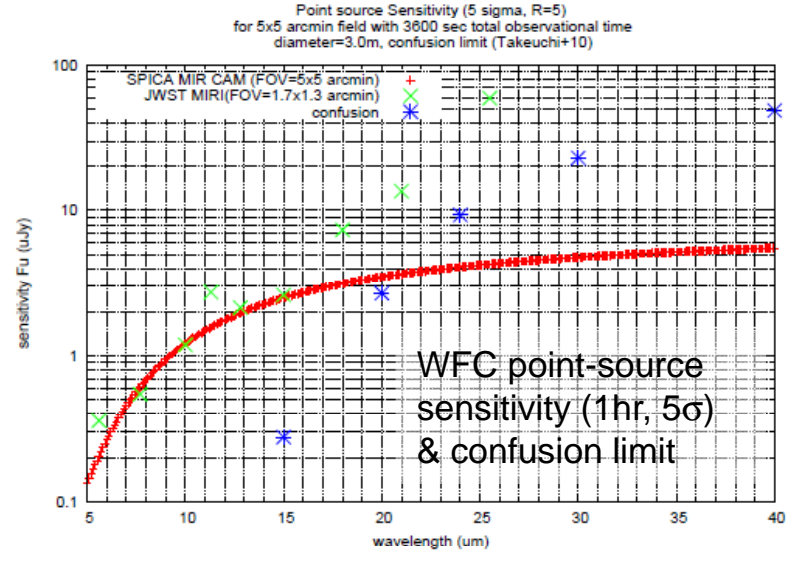
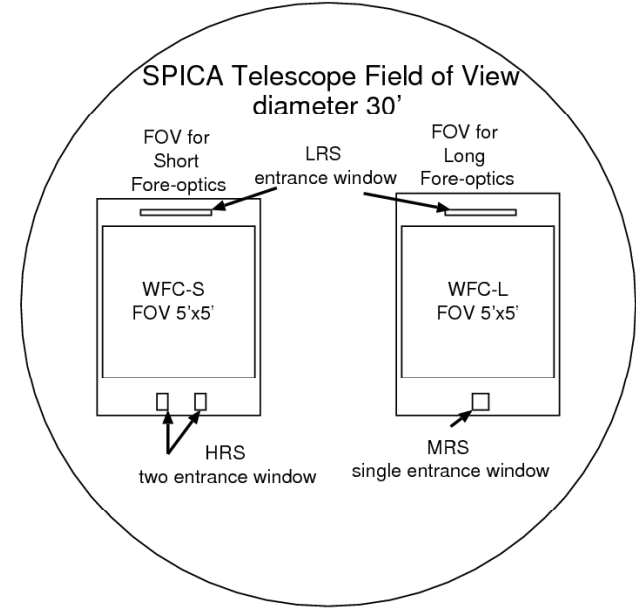


MCS : MIR Camera & Spectrometer

nickname wanted

MCS Team:
 PI: Hirokazu Kataza
 co-PI: Takehiko Wada
 co-PI: Itsuki Sakon
 co-PI: Naoto Kobayashi

General Outline
 Wide-field Imager & Spectrograph at 5-38 μ m
 Detectors:
 Si:As 2Kx2K @5-6K / Si:Sb 1Kx1K @ ~3K
 Channels:
 Wide-field Camera (WFC)
 Medium-Resolution Spectrometer (MRS)
 High-Resolution Spectrometer (HRS)
 Low-Resolution Spectrometer (LRS)
 Observing Mode:
 Imaging/spectroscopy with micro-scan/step-scan



Instrument Specifications

Specifications

WFC	WFC-L	WFC-S
array format	Si:Sb (1k x 1k)	Si:As (2k x 2k)
Wavelength coverage	20-38 μ m	5-25 μ m
Filter bands	20-38 μ m R=10	5-25 μ m R=5
pixel scale	0".293 /pix	0".146 /pix
FOV size	5' X 5'	5' X 5'
Sensitivity (point source, 1hr, 5 σ)	4.9 / 6.7 / 7.7 μ Jy 20 / 30 / 38 μ m	0.13 / 1.2 / 3.5 μ Jy 5 / 10 / 20 μ m

LRS	LRS-L	LRS-S
array format	Si:Sb (1k x 1k) Option: Si:As high dope 1kx1k	Si:As (2k x 2k)
Wavelength coverage	20-38 μ m (option:25-48 μ m)	5-26 μ m
disperser	Grating or Prism	Prism
Spectral resolution ($R=\lambda/\Delta\lambda$)	50-100	50-100
pixel scale	0".293 /pix	0".146 /pix
Slit length x width	2'.5 x 2".66	2.5' x 1".40
Sensitivity (point source, 600s, 1 σ for low background case)	64 / 84 / 108 / 136 μ Jy at 20 / 25 / 30 / 35 μ m	7.3/14/26/39 μ Jy at 7.5 / 10 / 15 / 20 μ m

MRS	MRS-L	MRS-S
array format	Si:Sb (1k x 1k)	Si:As (2k x 2k)
Wavelength coverage	19.5 μ m-36.1 μ m	10-20 μ m
Spectral resolution ($R=\lambda/\Delta\lambda$)	680@27.8 μ m	1460@13 μ m
pixel scale	0".485 /pix	0".403 /pix
Slit length x width x slices	12" x 2".5 x 5	12" x 1".2 x 5
FOV size	12" x 12".5	12" x 6"
Sensitivity (point source, 600s, 1 σ for low background case)	~600 μ Jy	~100 μ Jy

HRS	HRS-L	HRS-S
array format	Si:As (2k x 2k)	Si:As (2k x 2k)
Wavelength coverage	12 μ m-18 μ m	4-8 μ m
Spectral resolution ($R=\lambda/\Delta\lambda$)	20,000 - 30,000	30,000
pixel scale	0".48 /pix	0".288 /pix
Slit length x width	6".0 x 1".2	3".5 x 0".72
Main disperser	CdTe or KRS5 imm. Grat.	ZnSe immersion Grat.
Sensitivity (point source, 1hr, 5 σ)	1.2 mJy	0.8 mJy
Sensitivity (diffuse, 1hr, 5 σ)	4.2 MJy/sr	8.2 MJy/sr

Spacecraft Resources

Resources	Current Estimate	System Allocation
Cold Mass	46.9 kg with 20% margin	45 kg with 20% margin
Cold Volume (XYZ) [mm]	N/A	Specified by figure
Heat Lift at 1.7K [mW] (observing/standby)	2.6 / <0.013 (WFC & LRS) 2.6 / <0.013 (WFC & MRS) 1.3 / <0.013 (WFC & HRS) With 30% margin	2.1 / 0.3 with 30% margin
Heat Lift at 4.5K [mW] (observing/standby)	4.7 / 0.24 with 30% margin	4/ 0.4 with 30% margin
Electric Power [W] (observing/standby)	29 W without margin	35/ 35 with TBD margin

Brush up process of the specifications
 Successful detector development (High dope Si:As) – Wider LRS–L wavelength coverage
 Failure of immersion grating development – Adopt reflection echelle grating with more weight cost
 Failure of prism development for LRS-L – Limit the wavelength coverage
 Preference order against resource limit (especially weight resource):
 (1)WFC-L and S, (2)HRS-L, (3)MRS-L and S, (4) LRS-L, (5) LRS-S, (6) HRS-S
 We think that MRS-L without MRS-S loose scientific output significantly.