FORCAST CAPABILITIES FOR BASIC SCIENCE

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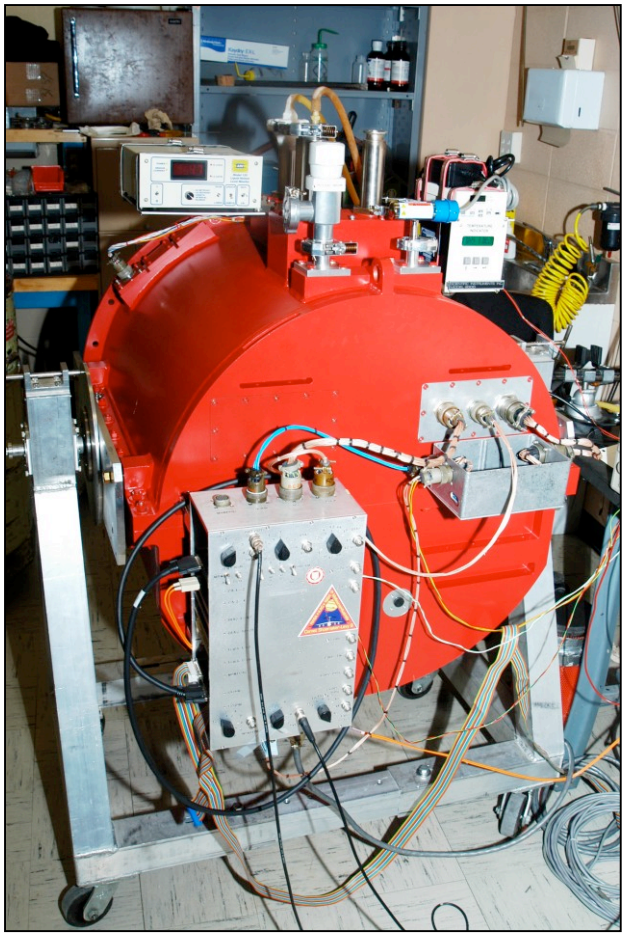
FORCAST is a Mid to Far IR (5-38μm) Camera

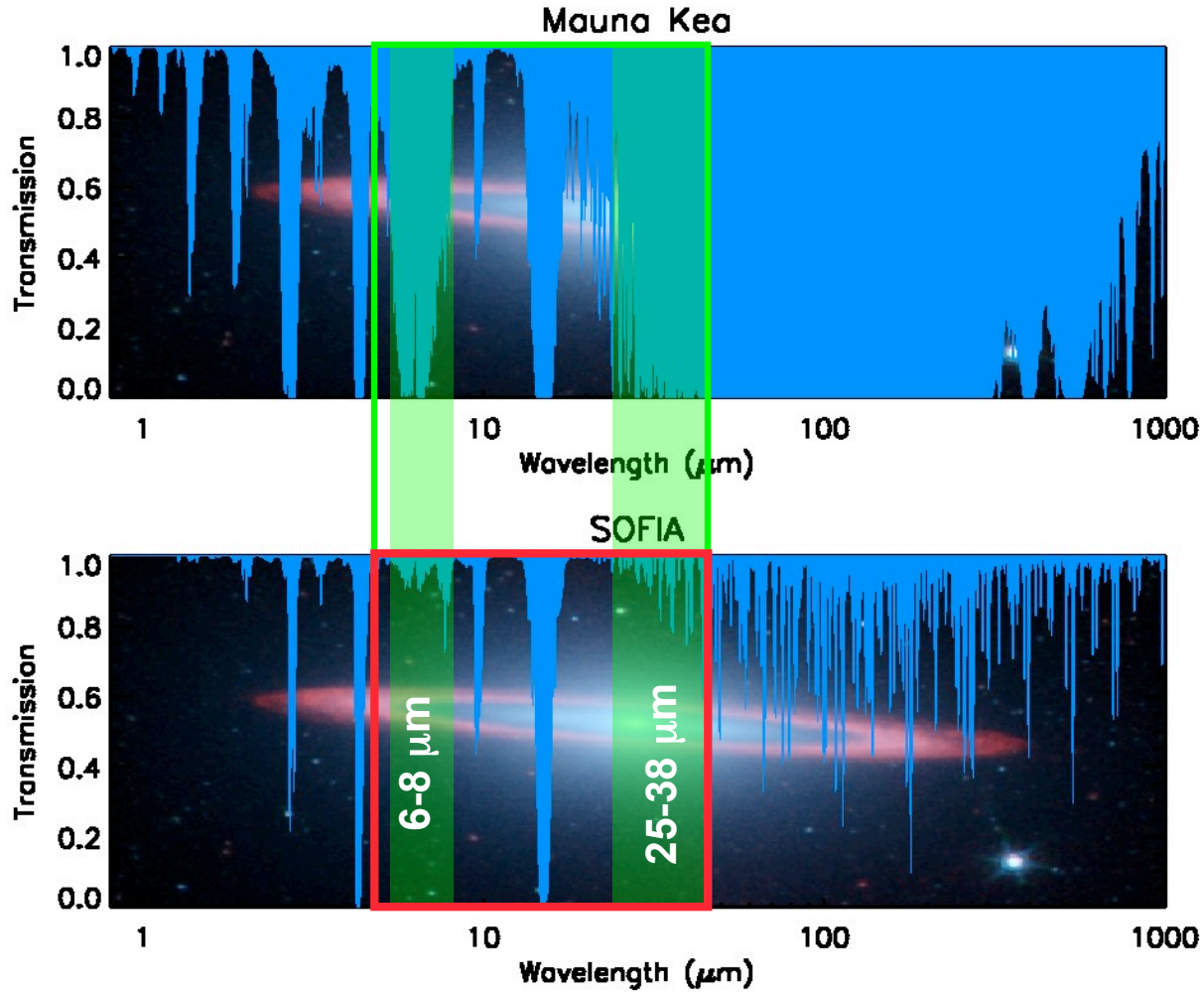
- First Light Facility Science Instrument for SOFIA developed at Cornell Univ.
- Dual-Channel Camera, 256x256 BIB arrays:
  - 5-25 μm (Si:As by DRS Tech)
  - 25-38 μm (Si:Sb by DRS Tech)
  - Diffraction-limited for λ > 15 μm
- Imaging through selectable filters in 5-38 μm range
- 0.75 arcsec/pixel → 3.2×3.2 arcmin FOV



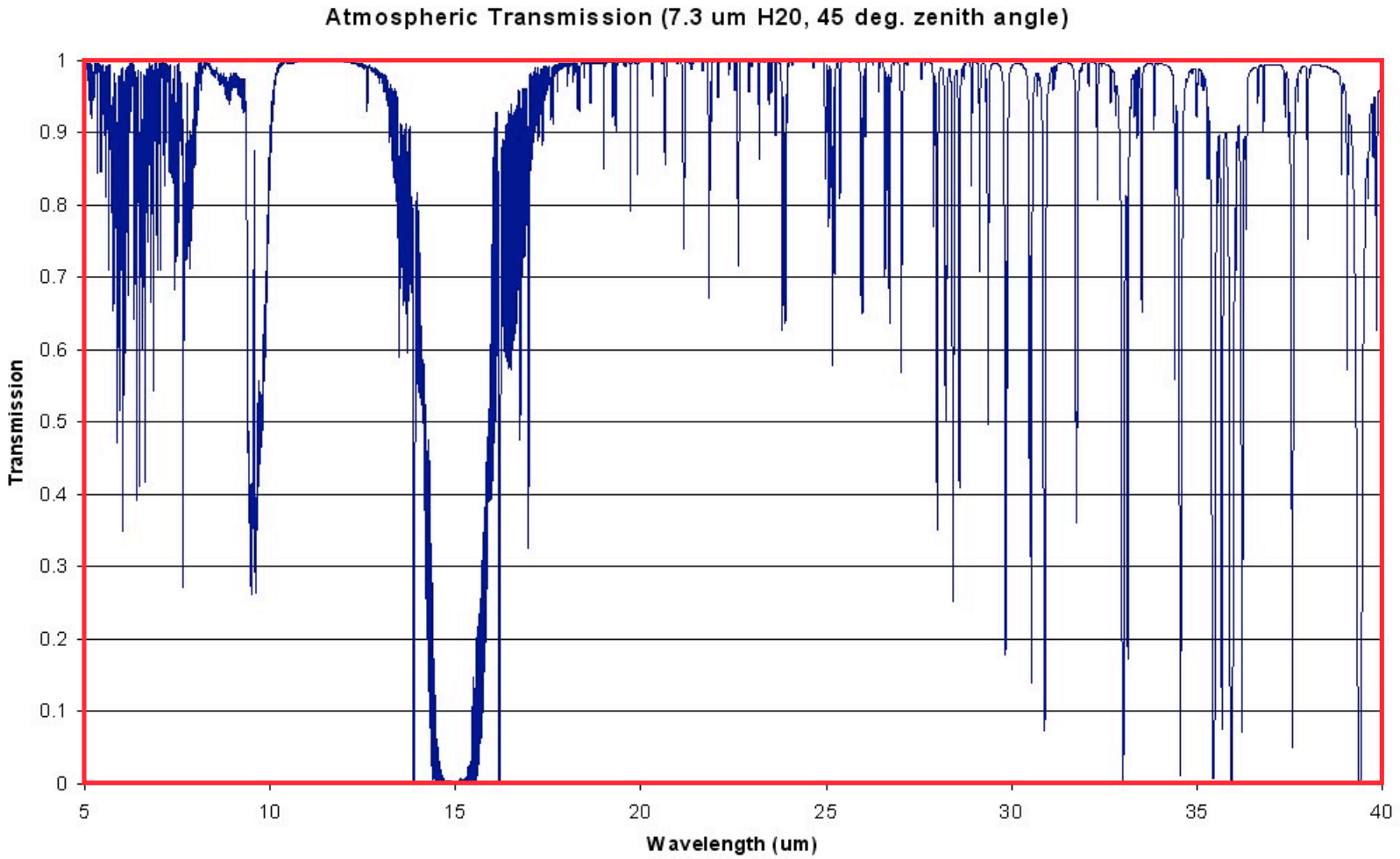
How can SOFIA with FORCAST contribute to IR Astronomy?

- Unique wavelength range (28-40 μm)
- Higher spatial resolution than *Spitzer*
  - Debris disks, star forming galaxies
- Observations of objects that are too bright for *Spitzer*
  - Galactic Center, Orion, star forming regions
- SOFIA can accommodate instrument upgrades over its 20 year lifetime
  - FORCAST to implement new detector arrays and spectroscopy mode

FORCAST will observe at wavelengths not available from the ground



FORCAST filters take advantage of the atmospheric windows that open at high altitude



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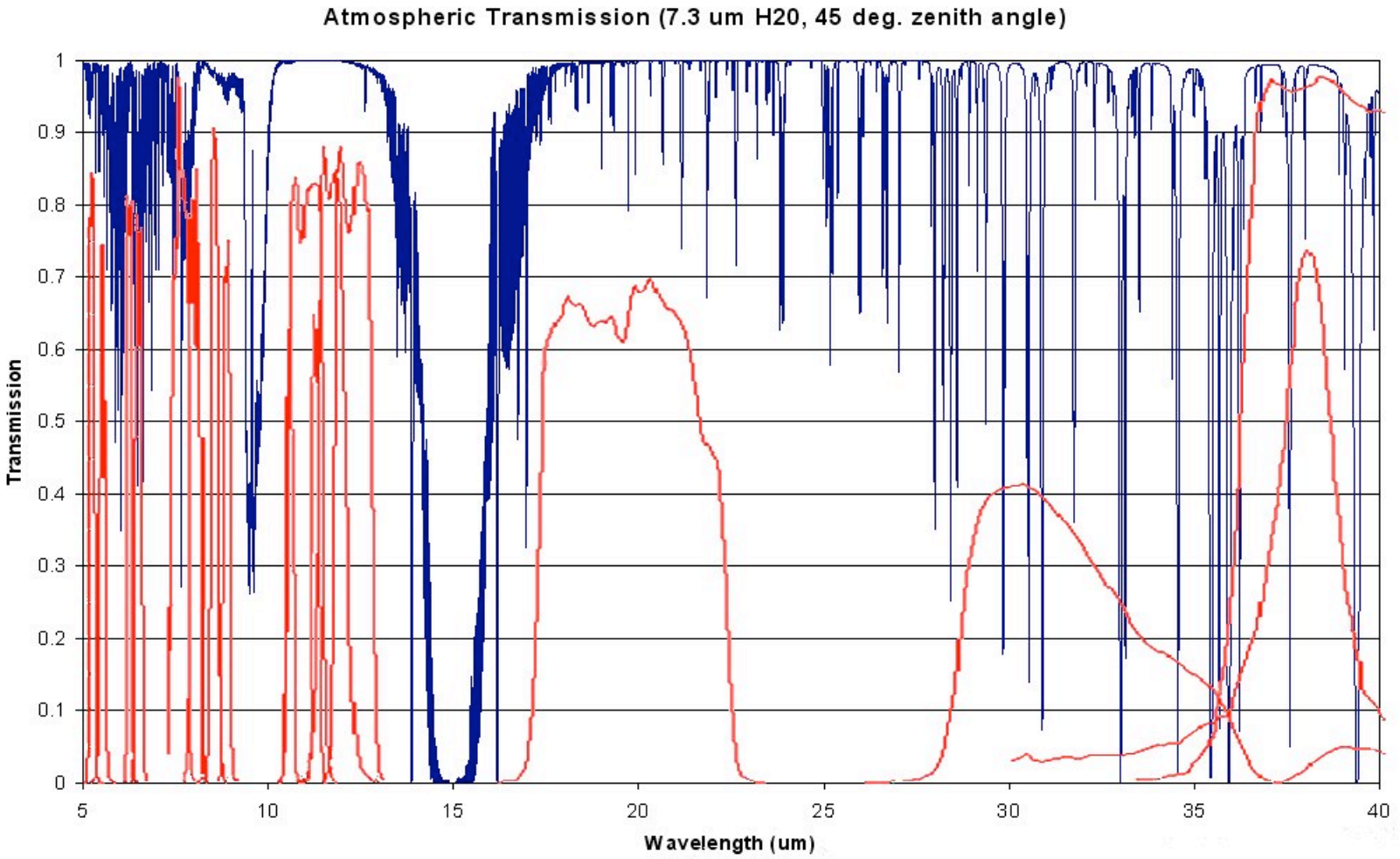


11 filters and dichroic will be available for Basic Science

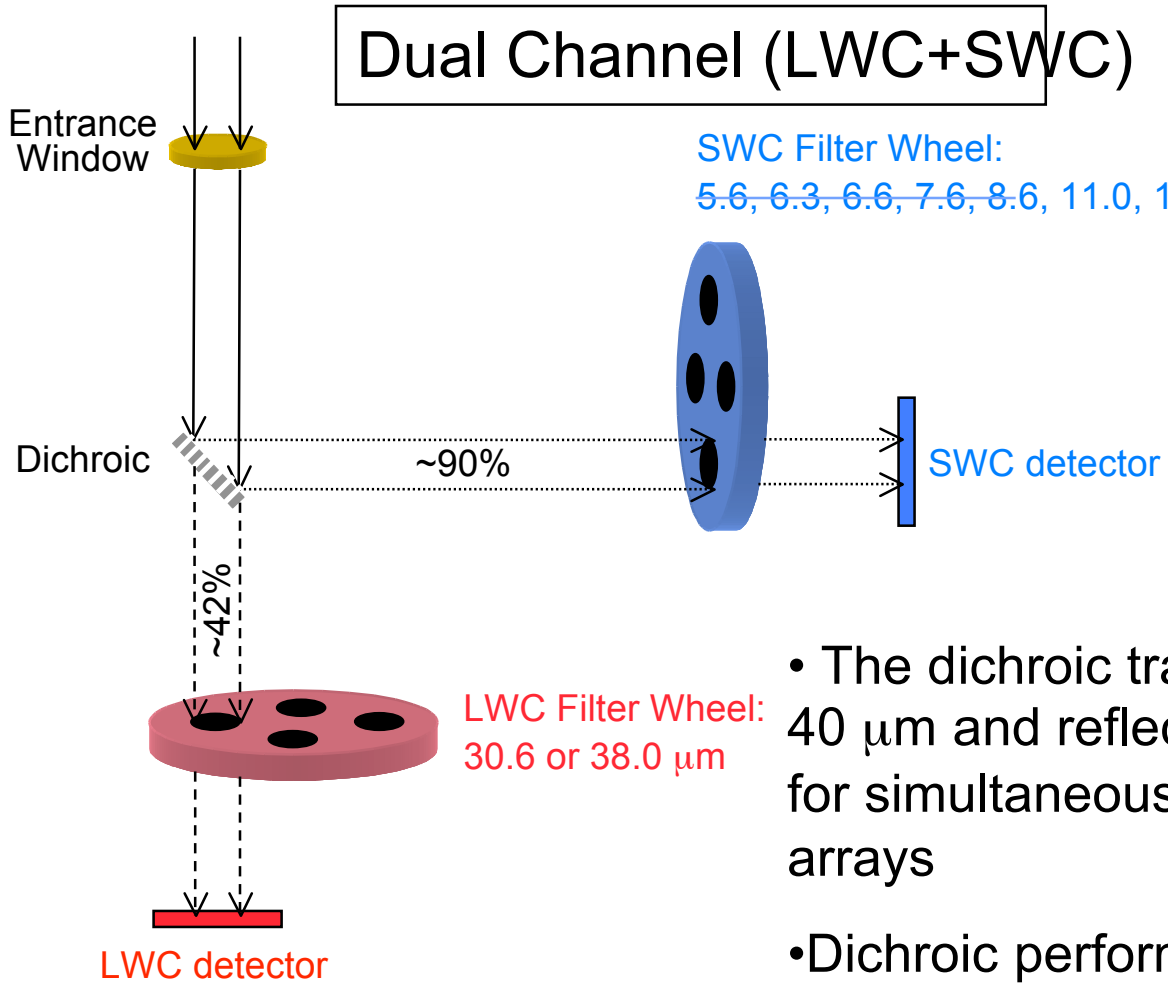
SWC Filter Wheel:
5.6, 6.3, 6.6, 7.6, 8.6, 11.0, 11.3, 12.3, or 19.5 μm

Dichroic

(transmits from 25-40 μm and reflects from 10-25 μm)

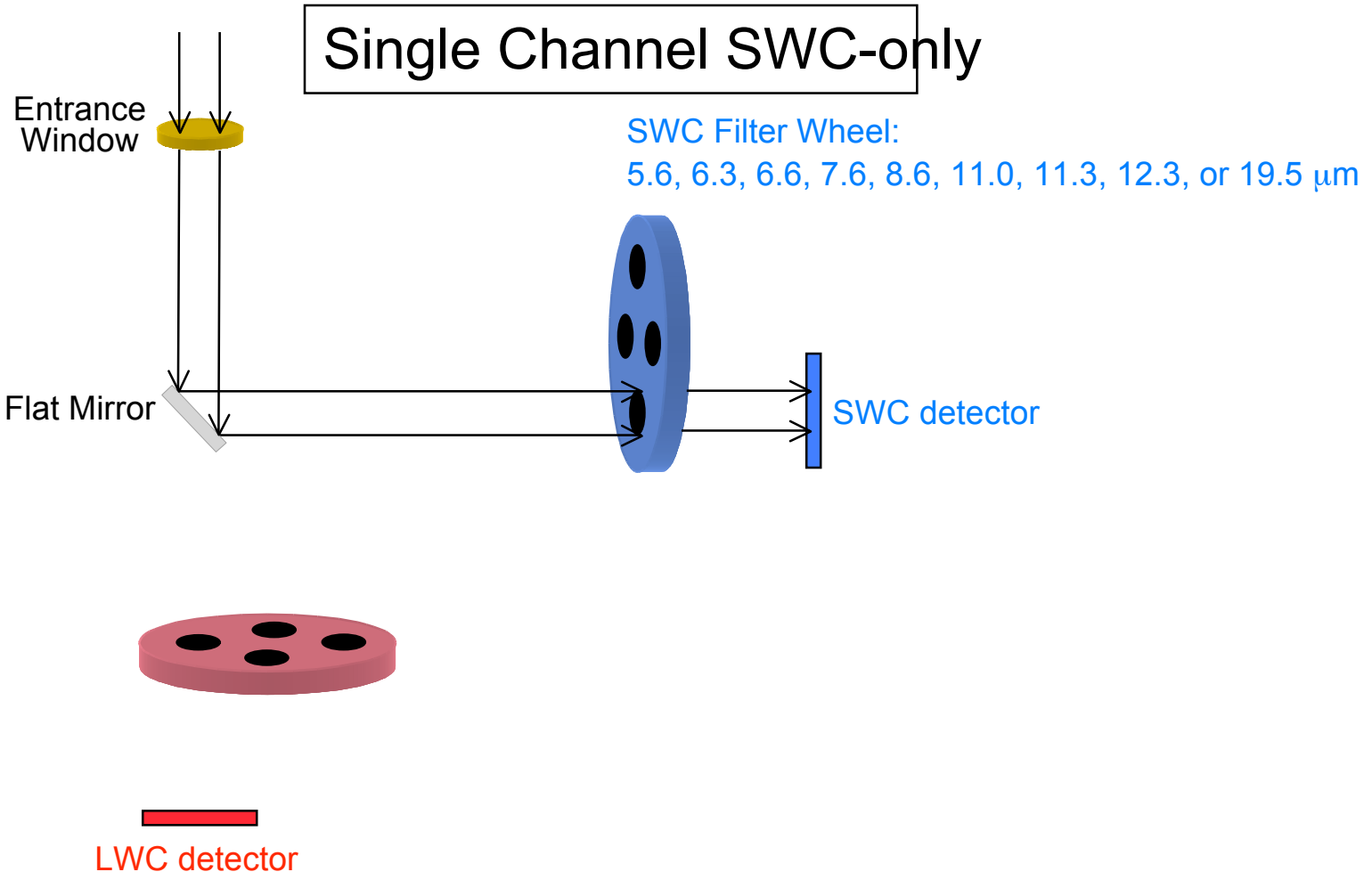
LWC Filter Wheel:
30.6 or 38.0 μm

11 filters and dichroic will be available for Basic Science



- The dichroic transmits from 25-40 μm and reflects from 10-25 μm for simultaneous imaging with both arrays
- Dichroic performance is poor at λ <10 μm

11 filters and dichroic will be available for Basic Science



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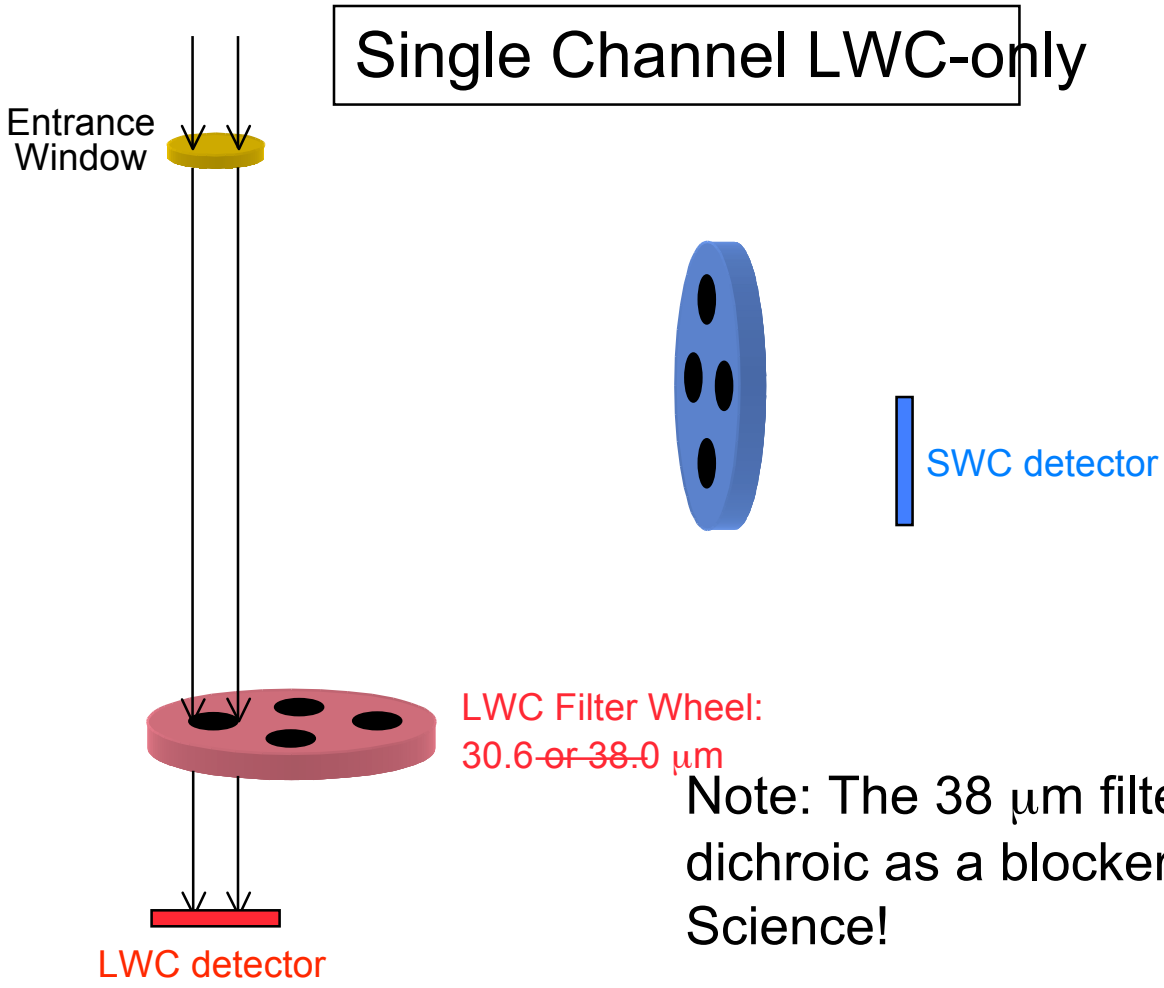


Note: The 38 μm filter will require the dichroic as a blocker for Early Science!

Examples of expected sensitivities for Basic Science

FORCAST Sensitivities with S/N=4 in 900s on-source

Filter	Single Channel		Dual Channel	
	Point (mJy)	Extended (mJy/pix)	Point (mJy)	Extended (mJy/Pix)
Short Wavelength Channel				
5.6 μm	39	5.0		
11.0 μm	44	5.4	46	5.7
19.5 μm	50	5.7	53	6.0
Long Wavelength Channel				
30.6 μm	144	13	214	20
38.0 μm			339	30

An on-line integration time calculator is available!

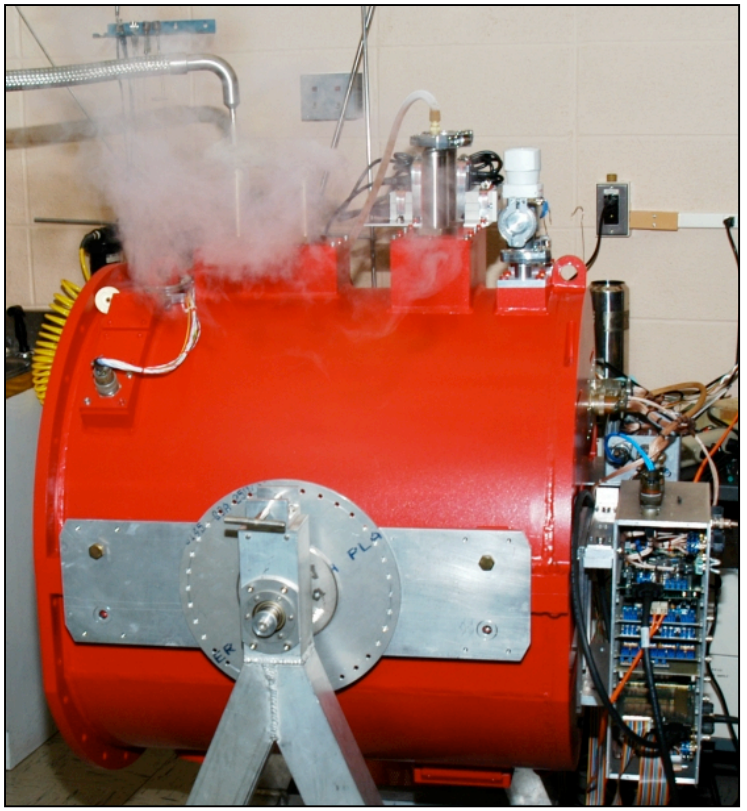
Google: **"SOFIA time estimator"**

FORCAST has 3 observing modes for Basic Science

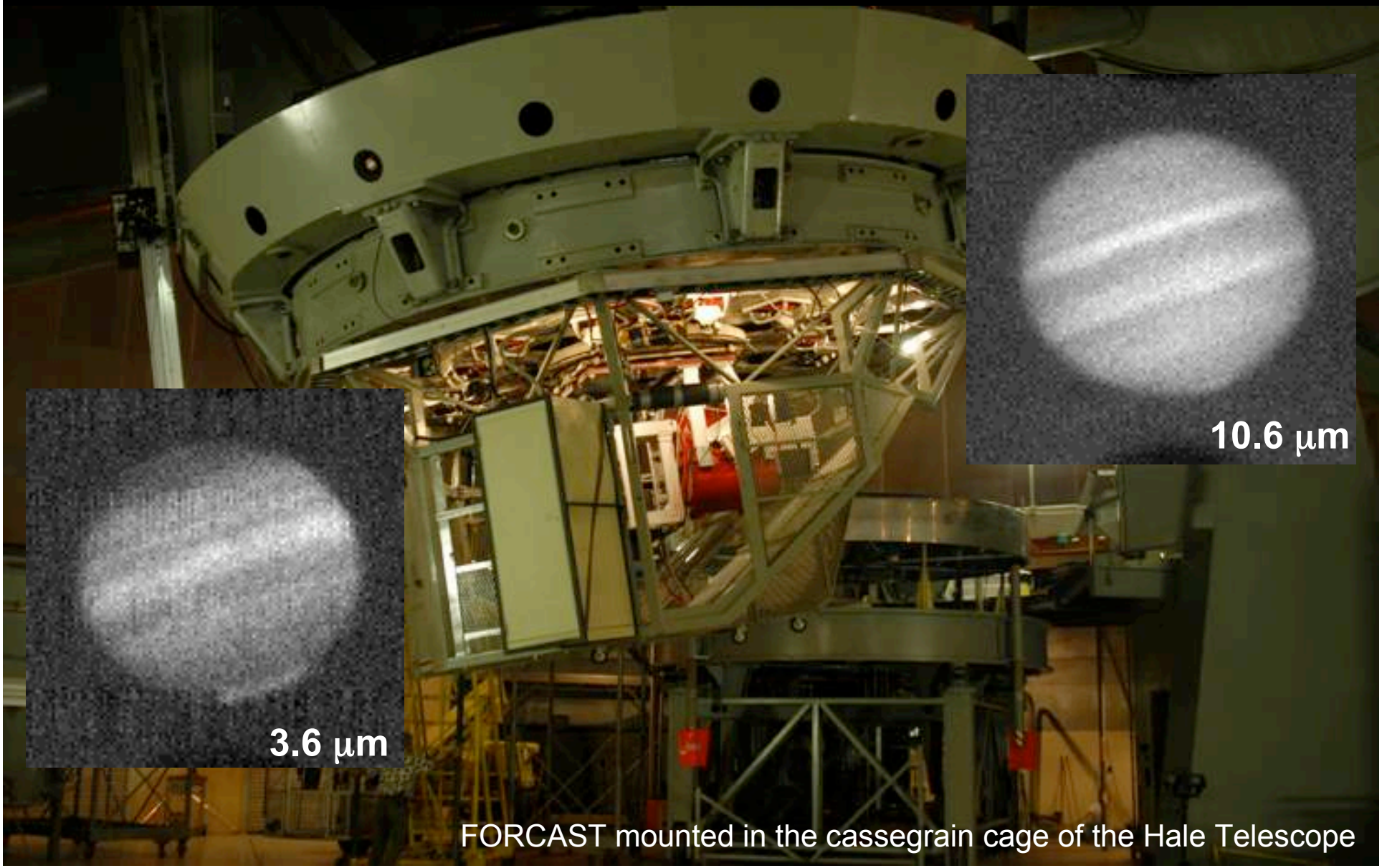
FORCAST Observing Mode	Mode Explanation and Usage
C2N	Classical two position chop and nod - Useful for point sources and compact objects - Chopping throws of few arcsec to ~5′
C2ND	Two position chop and nod with small dither (~15″) - Useful for extended objects smaller than the FOV
MOSMAP	Two position chop and nod with large offsets (≥ 3.2′) - Useful for extended objects larger than the FOV

Flux calibrations for Basic Science will be better than 20%

- General Observers will not specify calibration observations
- The observatory will provide baseline calibrations that will allow for absolute flux calibrations at the level of better than 20%



FORCAST has already been used at Palomar and is READY TO GO for SOFIA Early Science!



FORCAST mounted in the cassegrain cage of the Hale Telescope