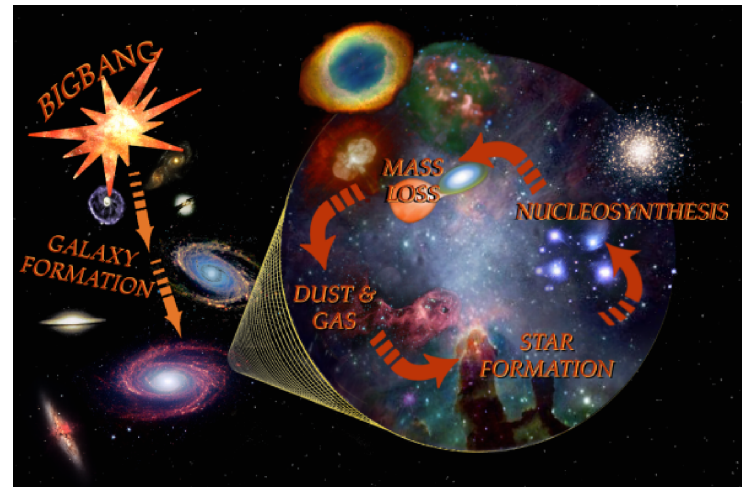


The Stratospheric Observatory for Infrared Astronomy (SOFIA)



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<http://www.sofia.usra.edu>

Outline

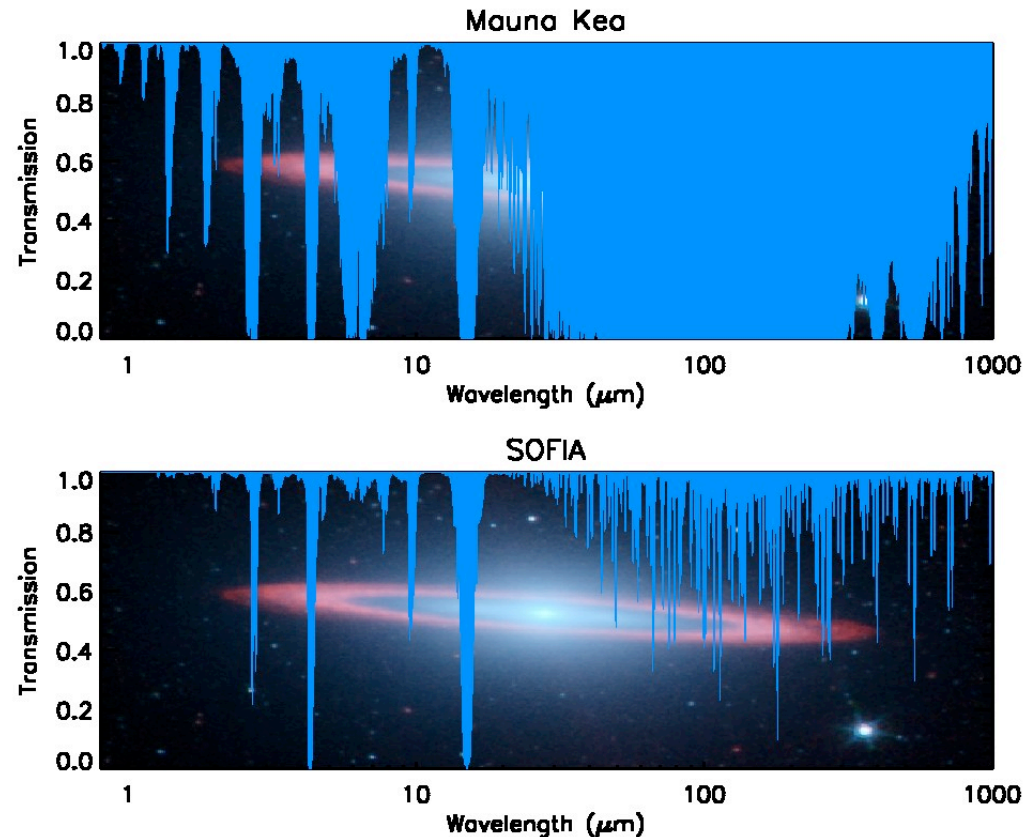
- *SOFIA Description and Status Report*
- *SOFIA Performance Specifications*
- *SOFIA Schedule and General Investigator (GI) Opportunities*
- *Summary*

SOFIA Overview

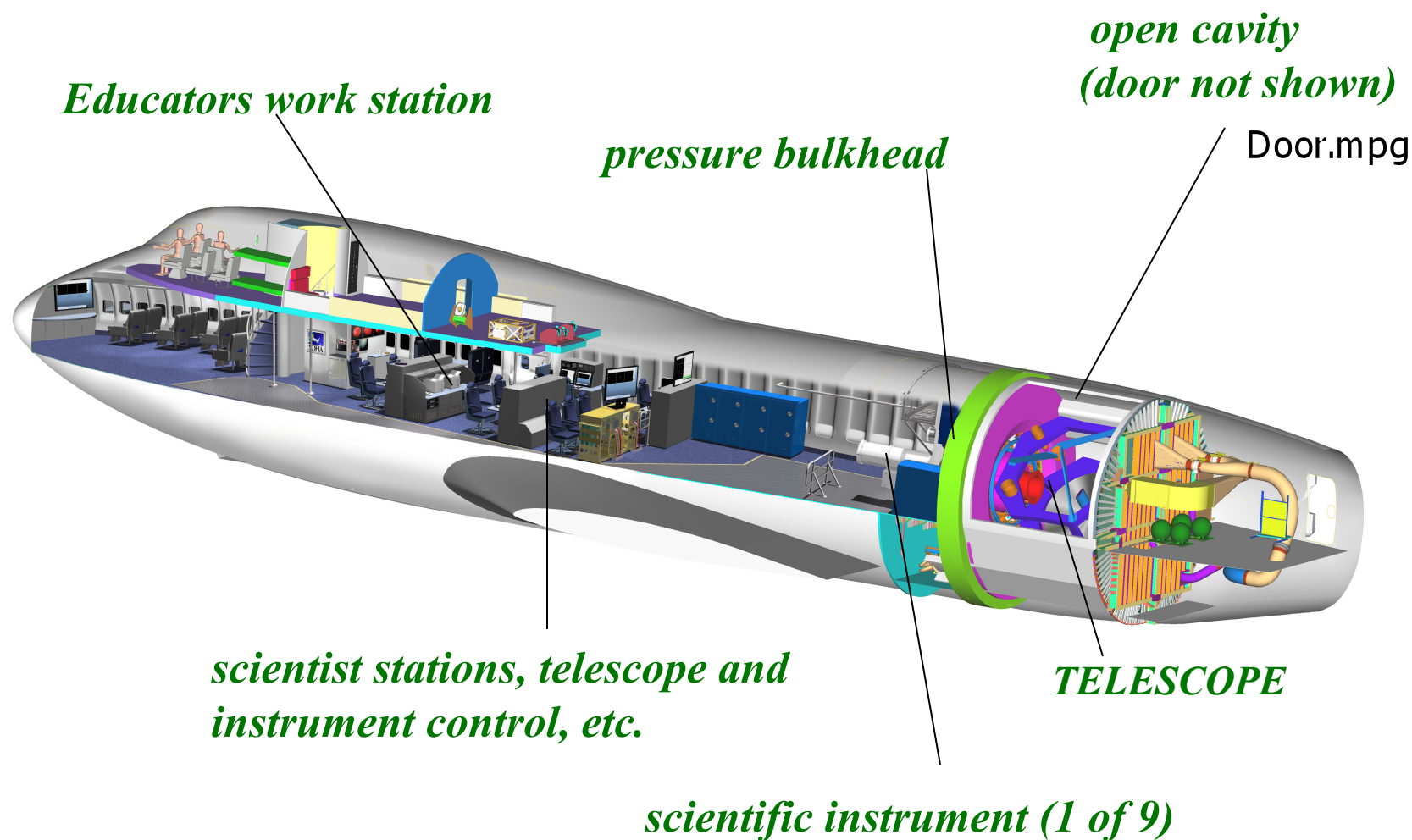
- *2.5 m telescope in a modified Boeing 747SP aircraft*
 - *Imaging and spectroscopy from 0.3 μm to 1.6 mm*
 - *Emphasizes the obscured IR (30-300 μm)*
- *Operational Altitude*
 - *39,000 to 45,000 feet (12 to 14 km)*
 - *Above > 99.8% of obscuring water vapor*
- *Joint Program between the US (80%) and Germany (20%)*
 - *First Light in 2009*
 - *20 year design lifetime –can respond to changing technology*
 - *Ops: Science at NASA-Ames; Flight at Dryden FRC (Palmdale- Site 9)*
 - *Deployments to the Southern Hemisphere and elsewhere*
 - *>120 8-10 hour flights per year*

The Advantages of SOFIA

- *Above 99.8% of the water vapor*
- *Transmission at 14 km >80% from 1 to 800 μm ; emphasis on the obscured IR regions from 30 to 300 μm*
- *Instrumentation: wide variety, rapidly interchangeable, state-of-the art – SOFIA is a new observatory every few years!*
- *Mobility: anywhere, anytime*
- *Twenty year design lifetime*
- *A near-space observatory that comes home after every flight*

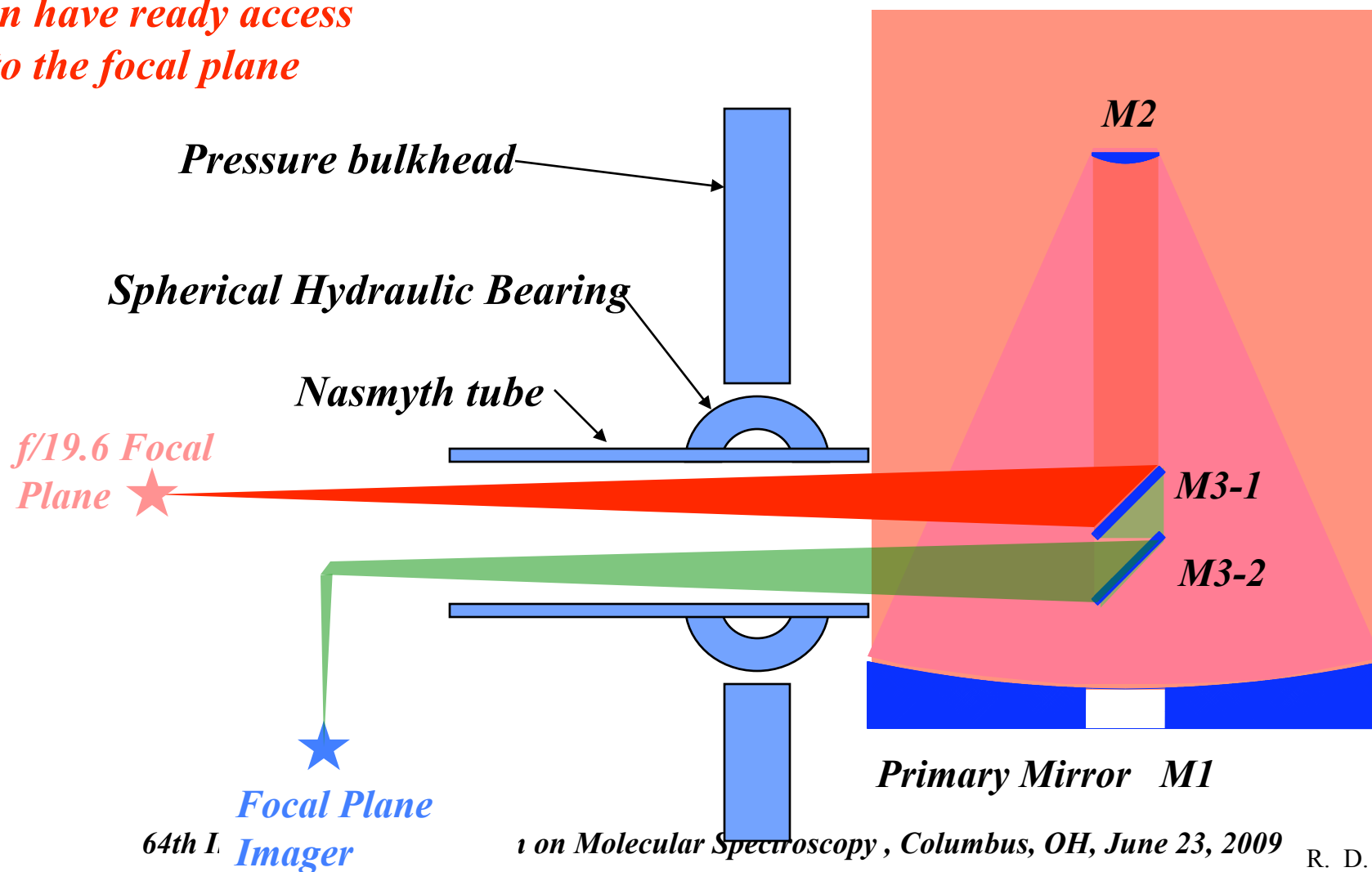


The SOFIA Observatory



Nasmyth: Optical Layout

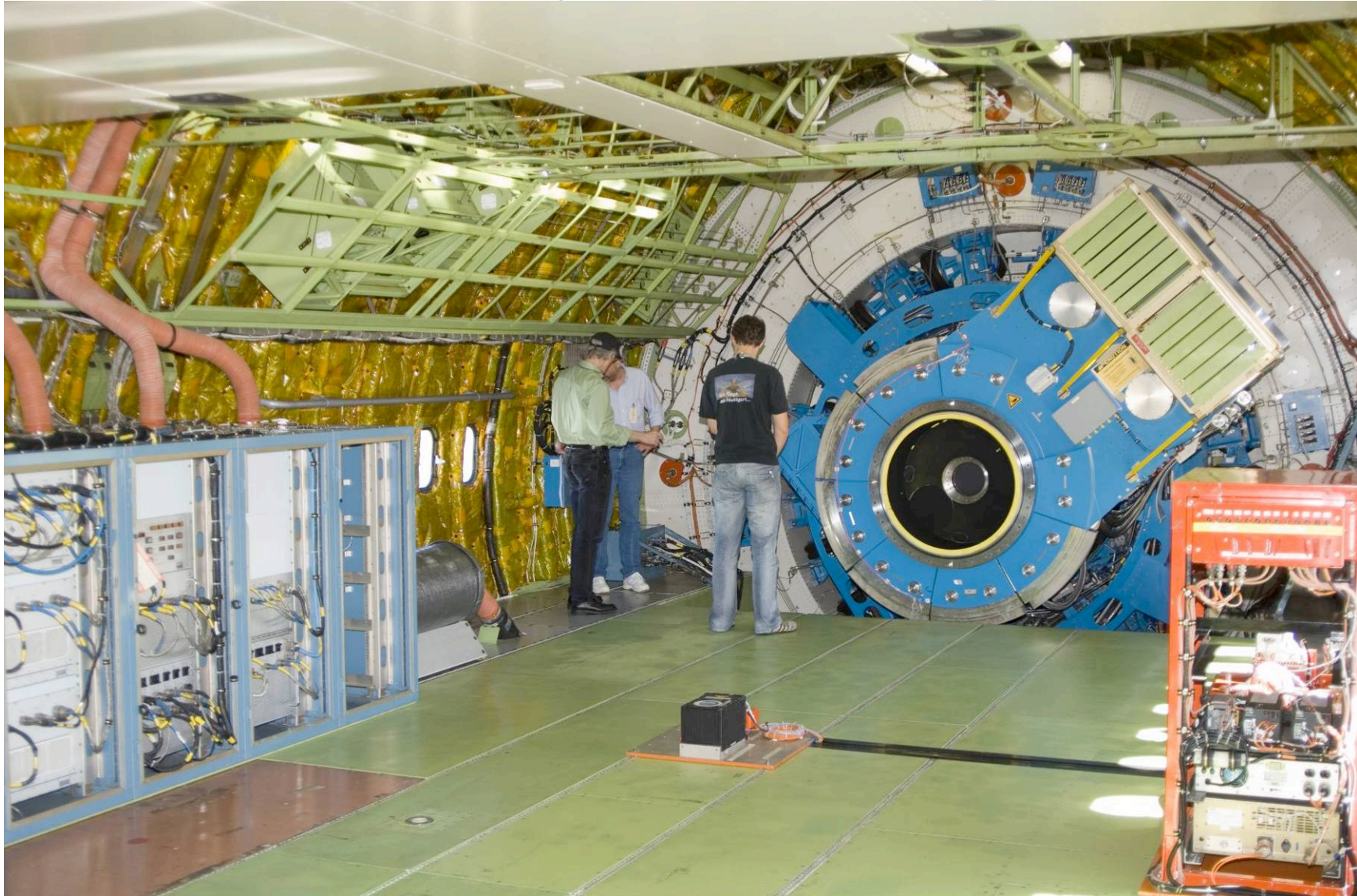
Observers in pressurized cabin have ready access to the focal plane



Primary Mirror Installed Oct. 8, 2008



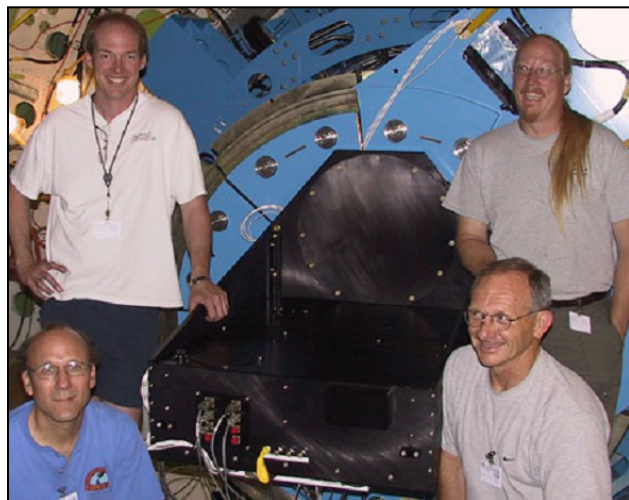
Back End of the SOFIA Telescope



SOFIA Science Vision Blue Ribbon Panel Review, October 24, 2008
64th International Symposium on Molecular Spectroscopy, Columbus, OH, June 23, 2009

R. D. Gehrz

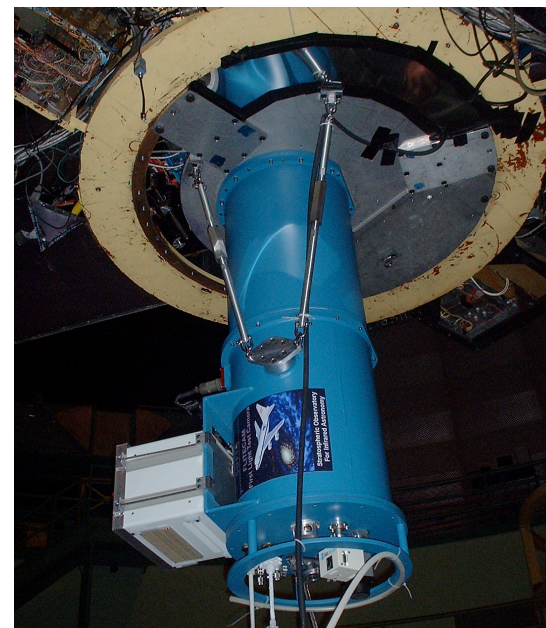
Four First Light Instruments



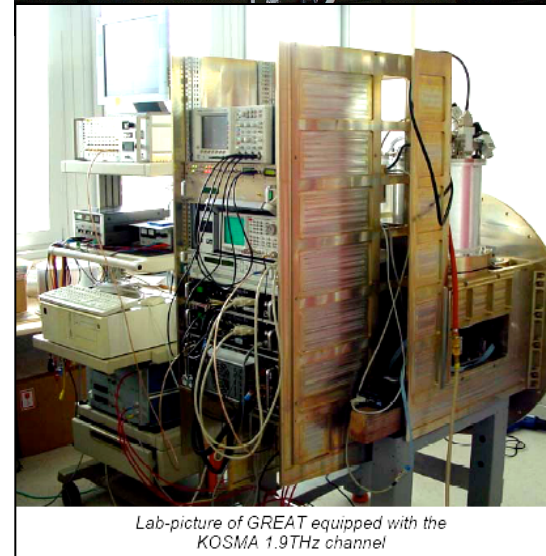
*Working/complete
HIPO instrument
in Waco on SOFIA
during Aug 2004*



*Working FORCAST
instrument at
Palomar in 2005*

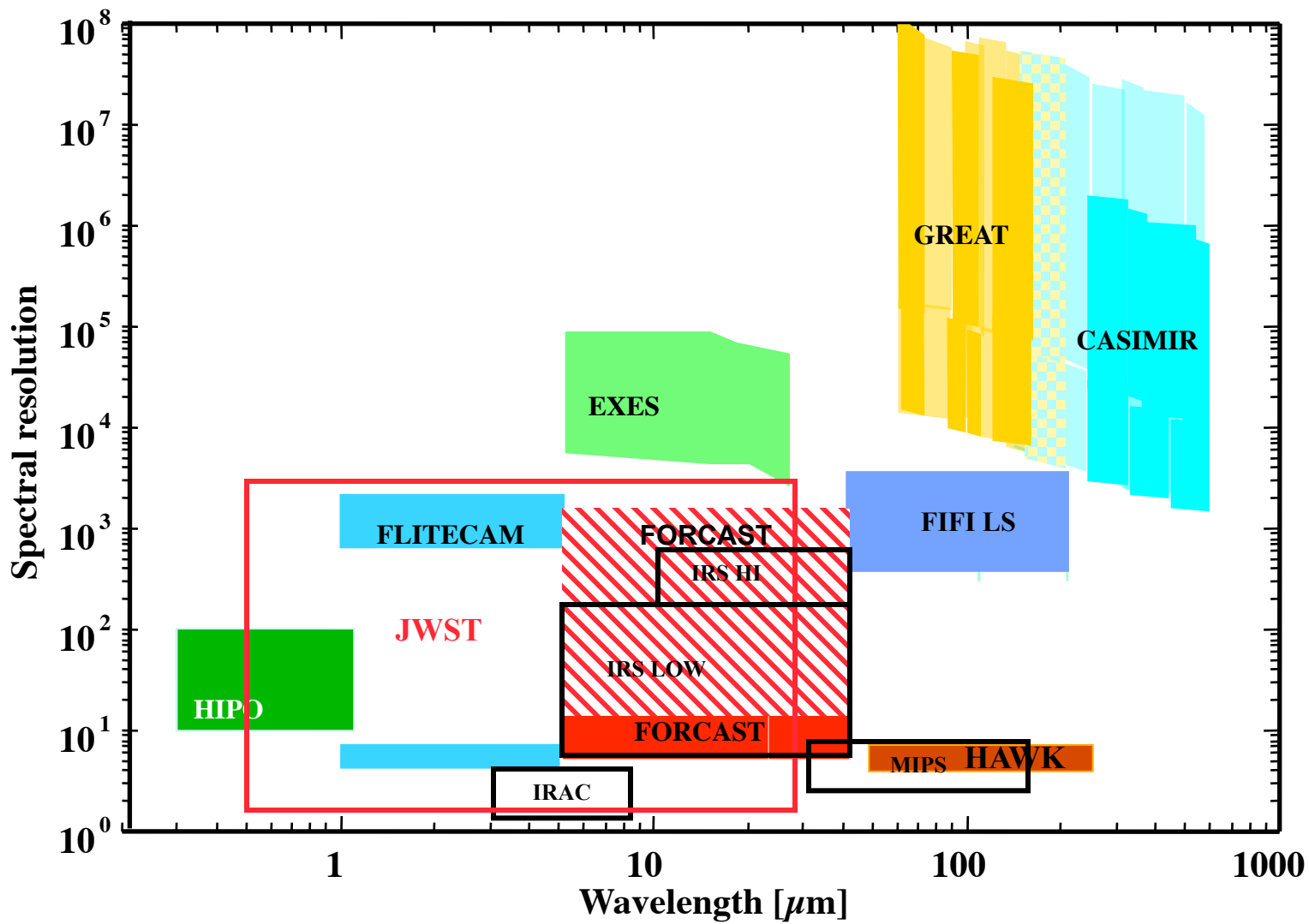


*Working/complete
FLITECAM
instrument at
Lick in 2004/5*

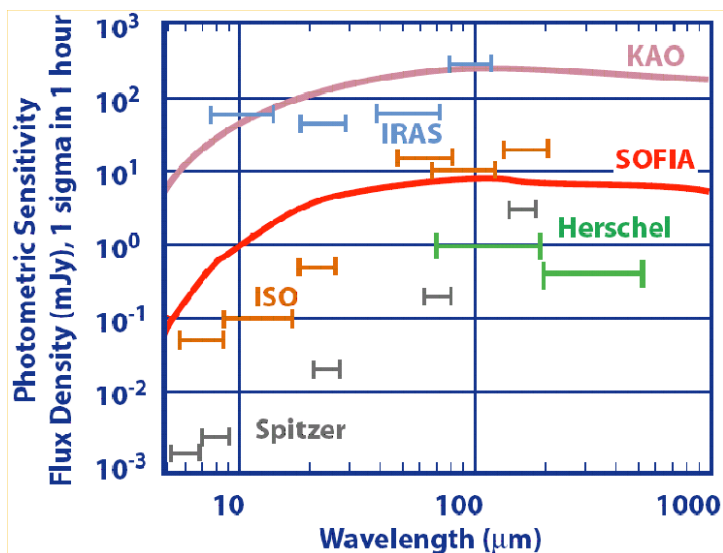


*Lab-picture of GREAT equipped with the
KOSMA 1.9THz channel*

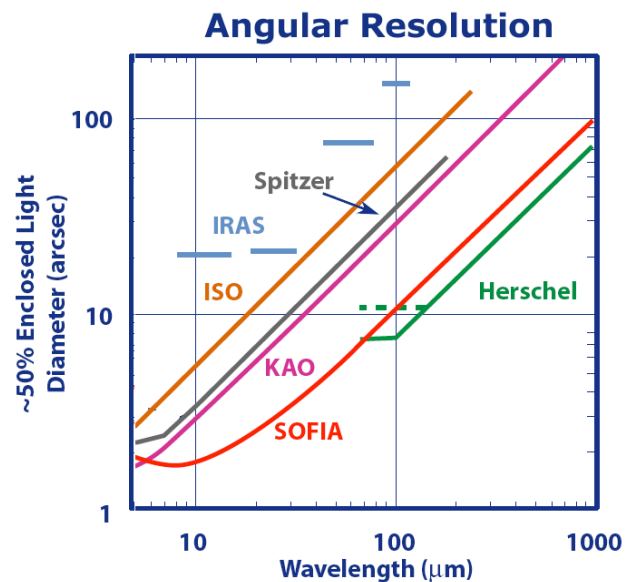
SOFIA First Generation Spectroscopy



Photometric Sensitivity and Angular resolution



SOFIA is as sensitive as ISO



SOFIA is diffraction limited beyond 25 μm ($\theta_{\text{min}} \sim \lambda/10$ in arcseconds) and can produce images three times sharper than those made by Spitzer

Early General Observer Opportunities

- *Open Door Flights will begin at Palmdale in late 2009*
- *First light images will be obtained during winter 2009/2010*
- *Early Short Science in 2010 with FORCAST (US 5-40 μm imager and GREAT (German heterodyne 60 to 200 μm Spectrometer)*
 - *Proposals are in and teams have been selected*
 - *Very limited number of flights (~3)*
 - *GO's will not fly*
- *Early Basic Science for GOs in 2010 with FORCAST and GREAT*
 - *Draft call was released in Jan 2009*
 - *Final call to be released in December 2009*
 - *Longer period (~15 Flights)*
- *General Observer (GO) Science: First Call for proposals in late 2010*
 - *~20 flights per year until full science operations begin in 2014*

SOFIA Instrumentation Development Program

- *The next call for instruments will be at First Science ~ FY '10*
- *The instrumentation development program will include:*
 - *New science instruments, both FSI and PSI*
 - *Studies of instruments and technology*
 - *Upgrades to present instruments*
- *There will be additional calls every 3 years*
- *There will be one new instrument or upgrade per year*
- *Funding for new instruments and technology is ~\$10 M/yr*

Summary

- *The Program is making progress!*
 - *Full envelope closed door flight testing is complete.*
 - *Open door flights will begin in Fall of 2009*
 - *First light will be in early 2010*
- *SOFIA will be a premier facility for far-IR and submm astronomy for many years*



Our Web site: <http://www.sofia.usra.edu/>

This talk: <http://www.sofia.usra.edu/Science/speakers/index.html>

Backup

SOFIA's First-Generation Instruments

Instrument	Type	$\lambda\lambda$ (μm)	Resolution	PI	Institution
HIPO (Available 2010)	fast imager	0.3 - 1.1	filters	E. Dunham	Lowell Obs.
FLITECAM * (Available 2010)	imager/grism	1.0 - 5.5	filters/R~2000	I. McLean	UCLA
FORCAST * (Available 2009)	imager/(grism?)	5.6 - 38	filters/(R~2000)	T. Herter	Cornell U.
GREAT (Available 2009)	heterodyne receiver	62 - 65 111 - 12 158 - 187 200 - 240	$R \sim 10^4 - 10^8$	R. Güsten	MPIfR
CASIMIR (Available 2011)	heterodyne receiver	250 -264, 508 -588	$R \sim 10^4 -10^8$	J. Zmuidzinas	Caltech
FIFI LS ** (Available 2009)	imaging grating spectrograph	42 - 110, 110 - 210	$R \sim 1000 - 2000$	A. Poglitsch	MPE
HAWC * (Available 2011)	imager	40 - 300	filters	D. A. Harper	Yerkes Obs.
EXES (Available 2011)	imaging echelle spectrograph	5 - 28.5	$R \sim 3000 - 10^5$	J. Lacy	U. Texas Austin

** Facility-class instrument*

*** Developed as a PI-class instrument, but will be converted to Facility-class during operations*