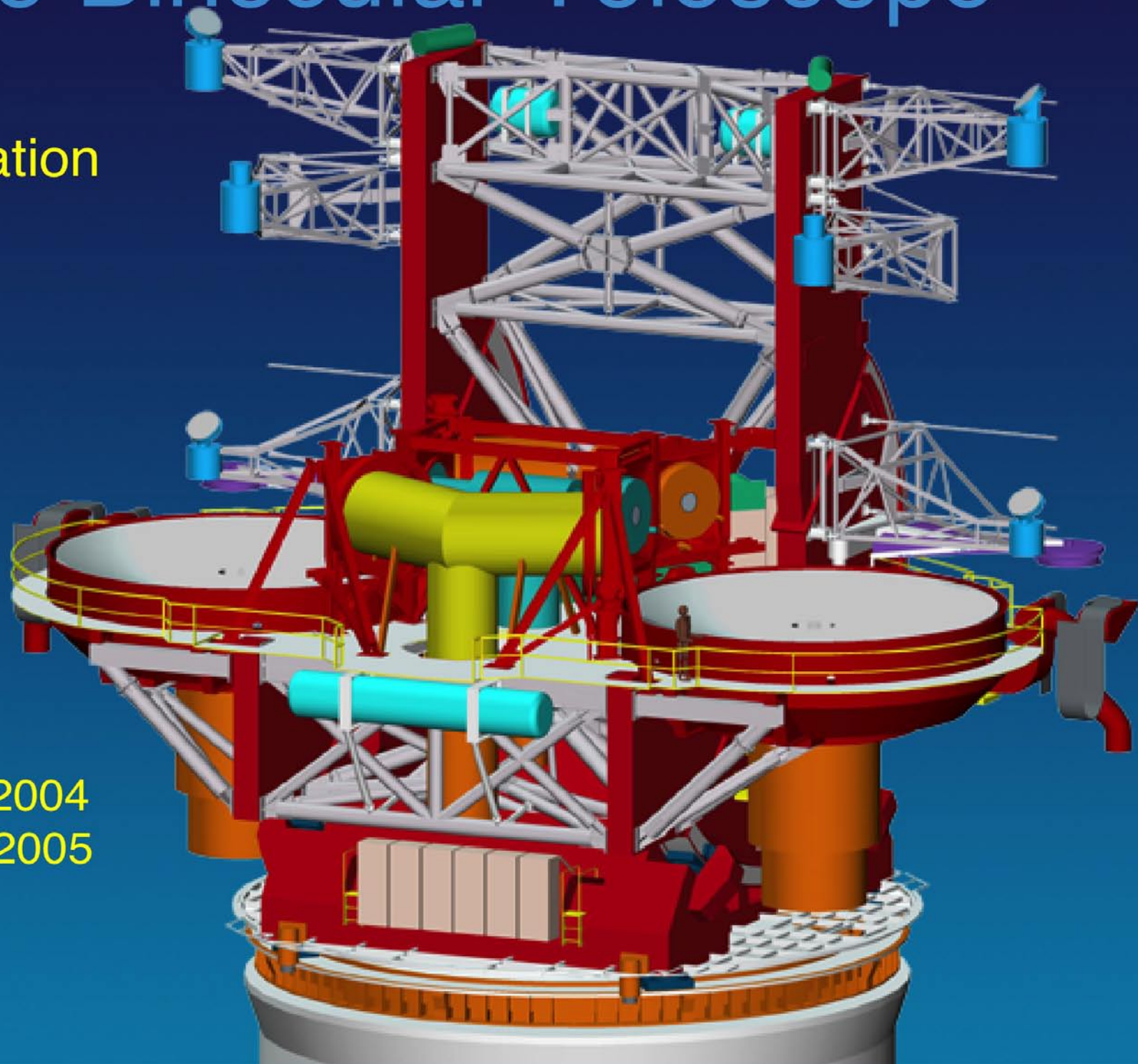


The Large Binocular Telescope

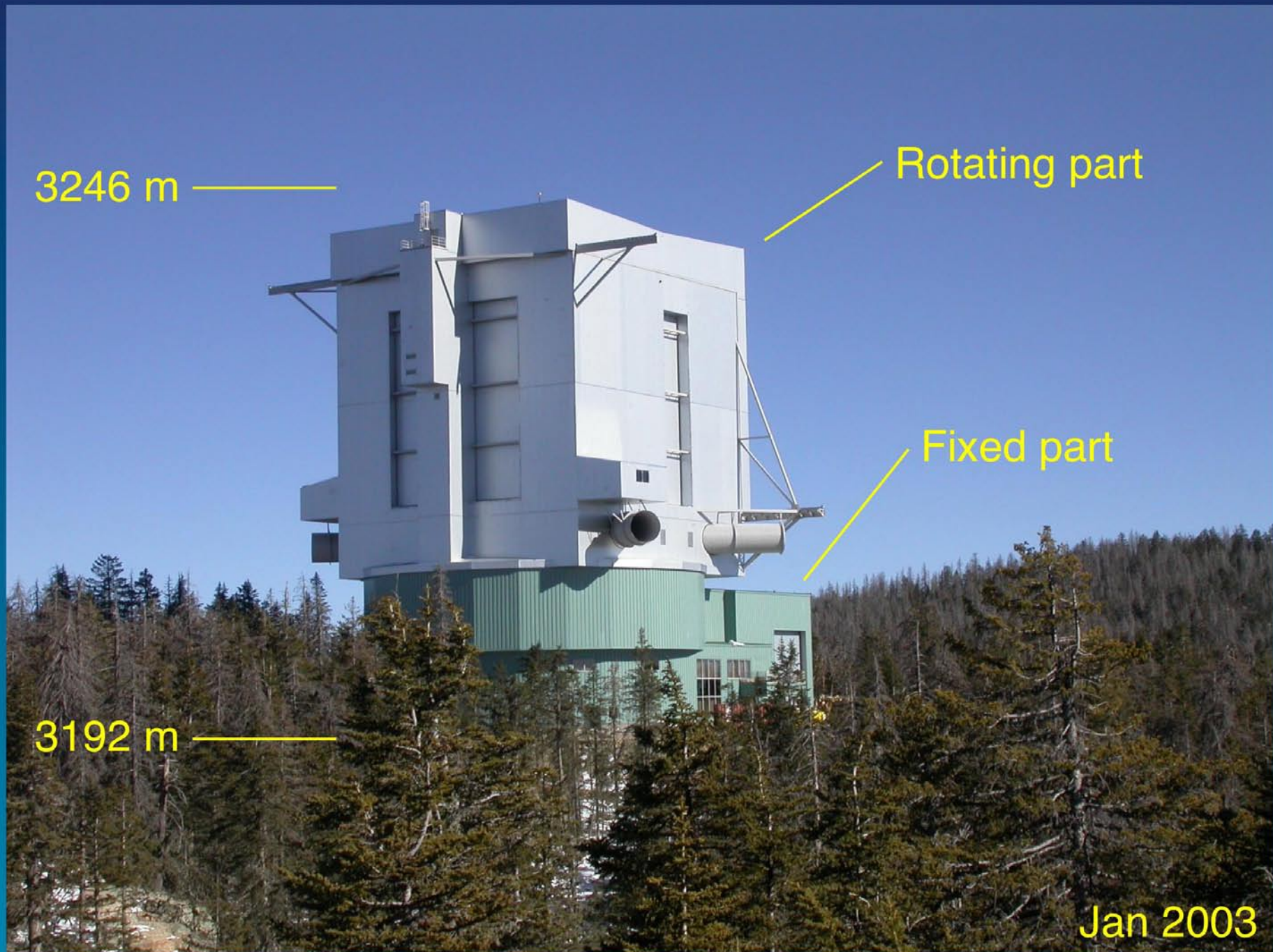
- 2 x 8.4 m
- flexible configuration
- AO secondaries
- Gregorian

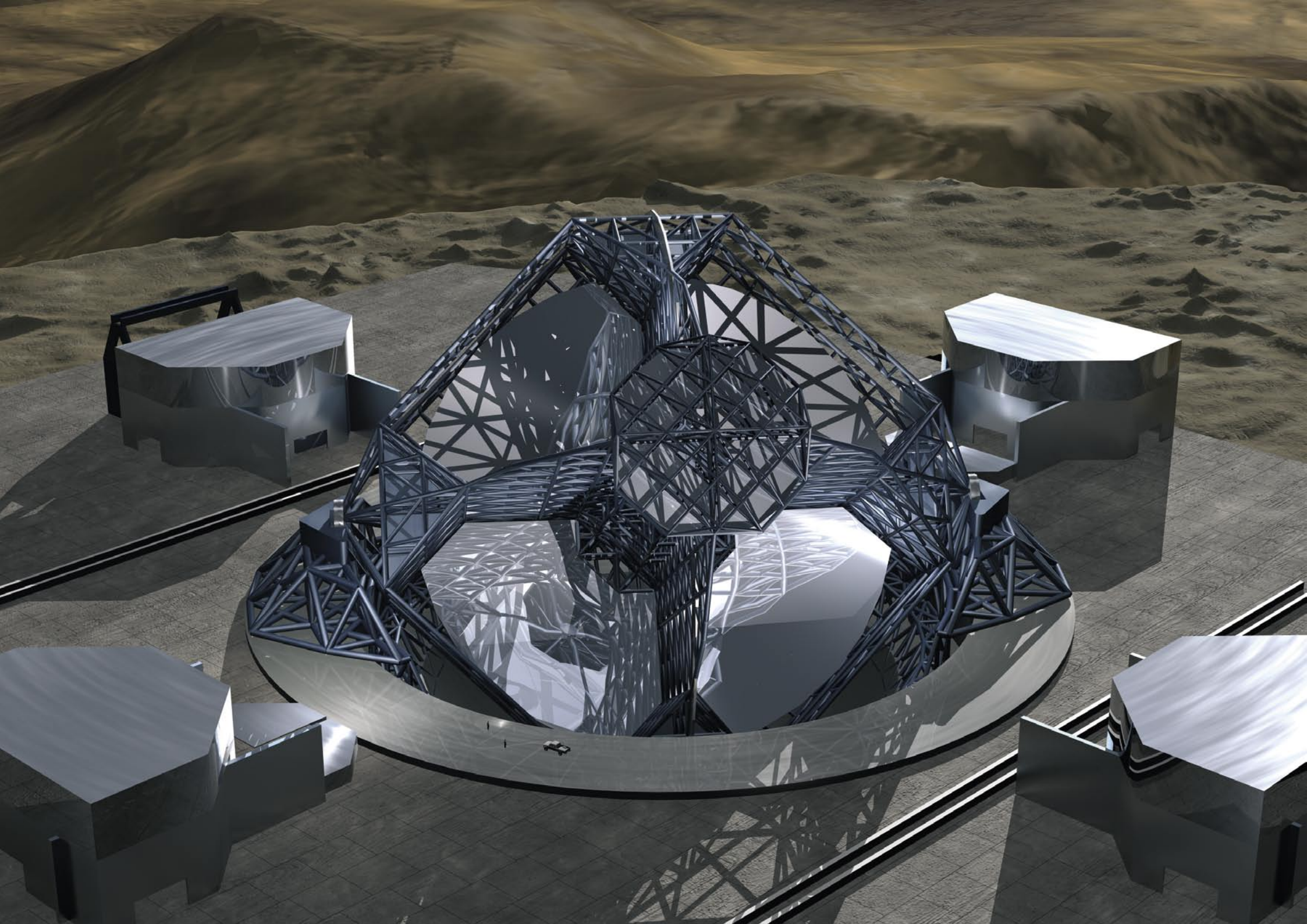
- 10 focal stations
 - 2 prime
 - 2 direct
 - **3 shared**

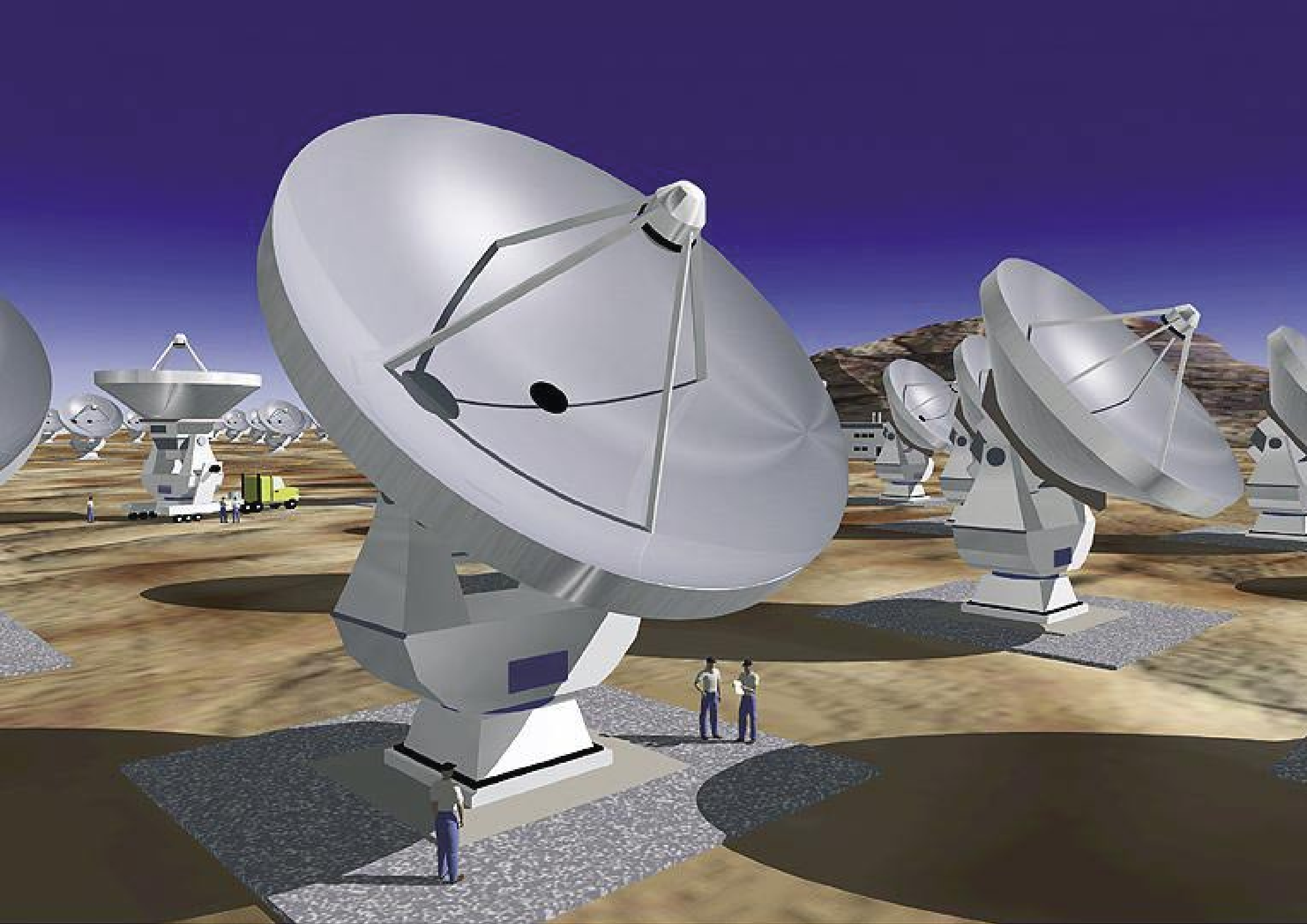


First Light - Sept. 2004
Second Light - Nov. 2005

LBT Enclosure on Mt. Graham



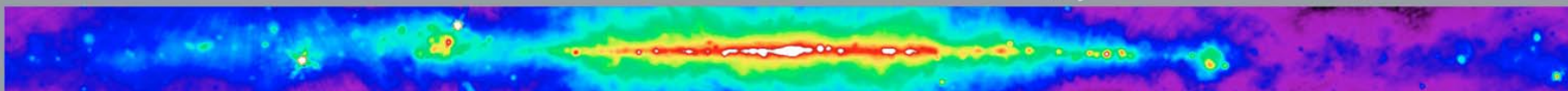




Multiwavelength Milky Way

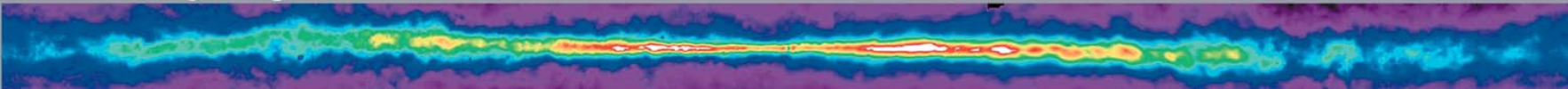
Radio Continuum

408 MHz Bonn, Jodrell Banks, & Parkes



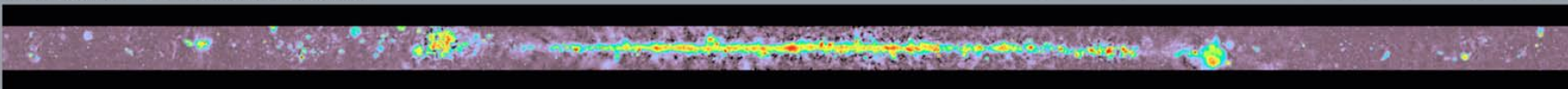
Atomic Hydrogen

21 cm Leiden-Dwingeloo, Maryland-Parkes



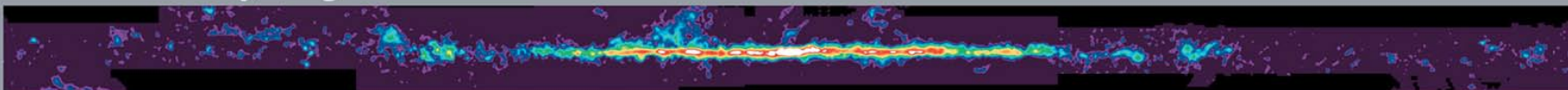
Radio Continuum

2.4-2.7 GHz Bonn & Parkes



Molecular Hydrogen

115 GHz Columbia-GISS



Infrared

12, 60, 100 μm IRAS



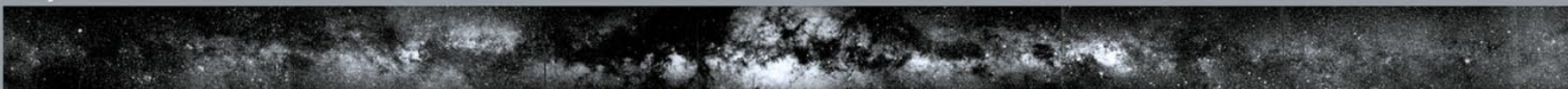
Near Infrared

1.25, 2.2, 3.5 μm COBE/DIRBE



Optical

Laustsen et al. Photomosaic



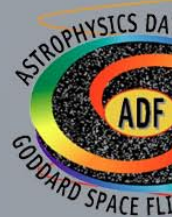
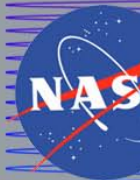
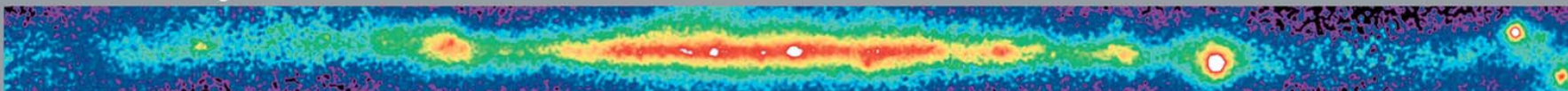
X-Ray

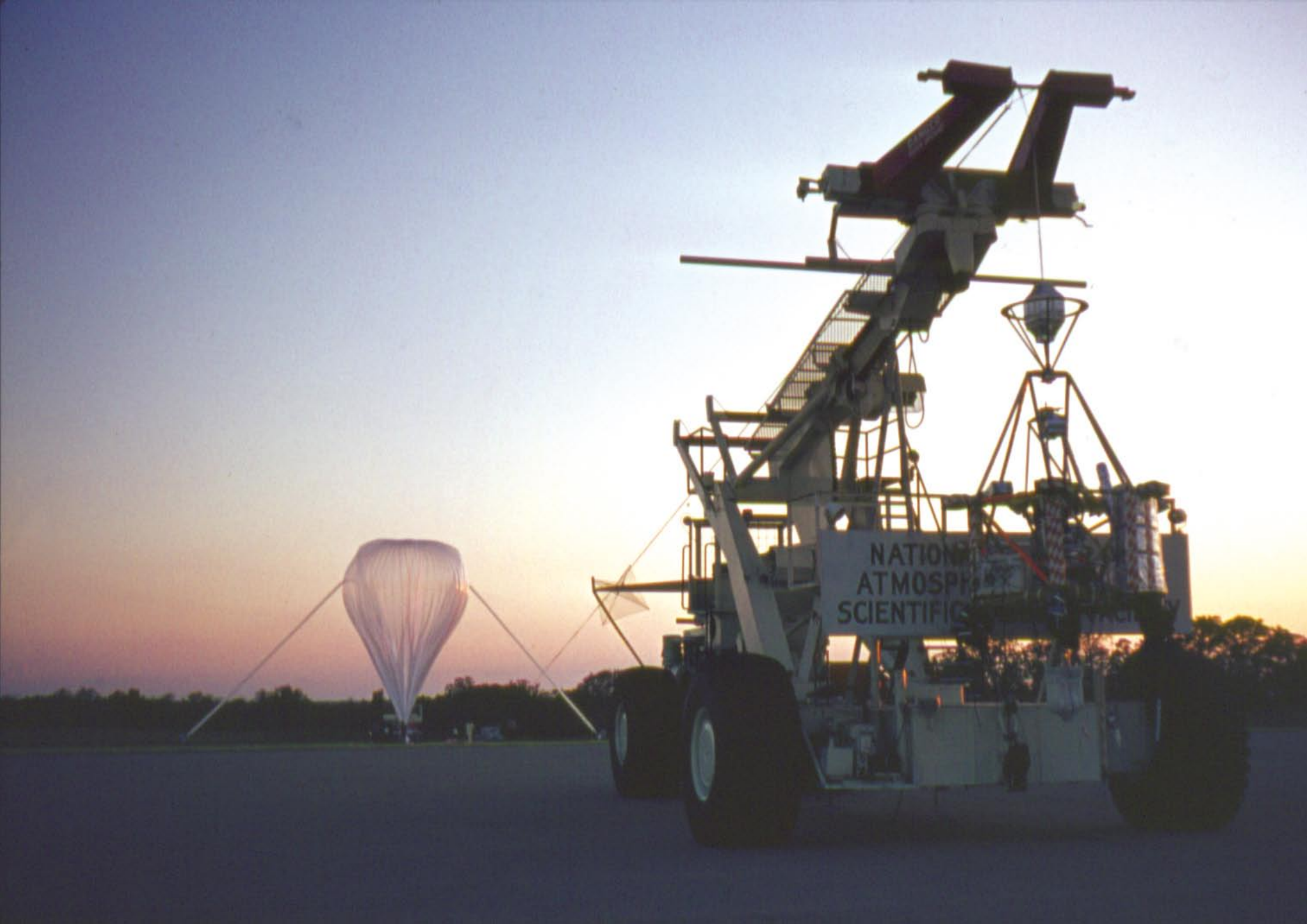
0.25, 0.75, 1.5 keV ROSAT/PSPC



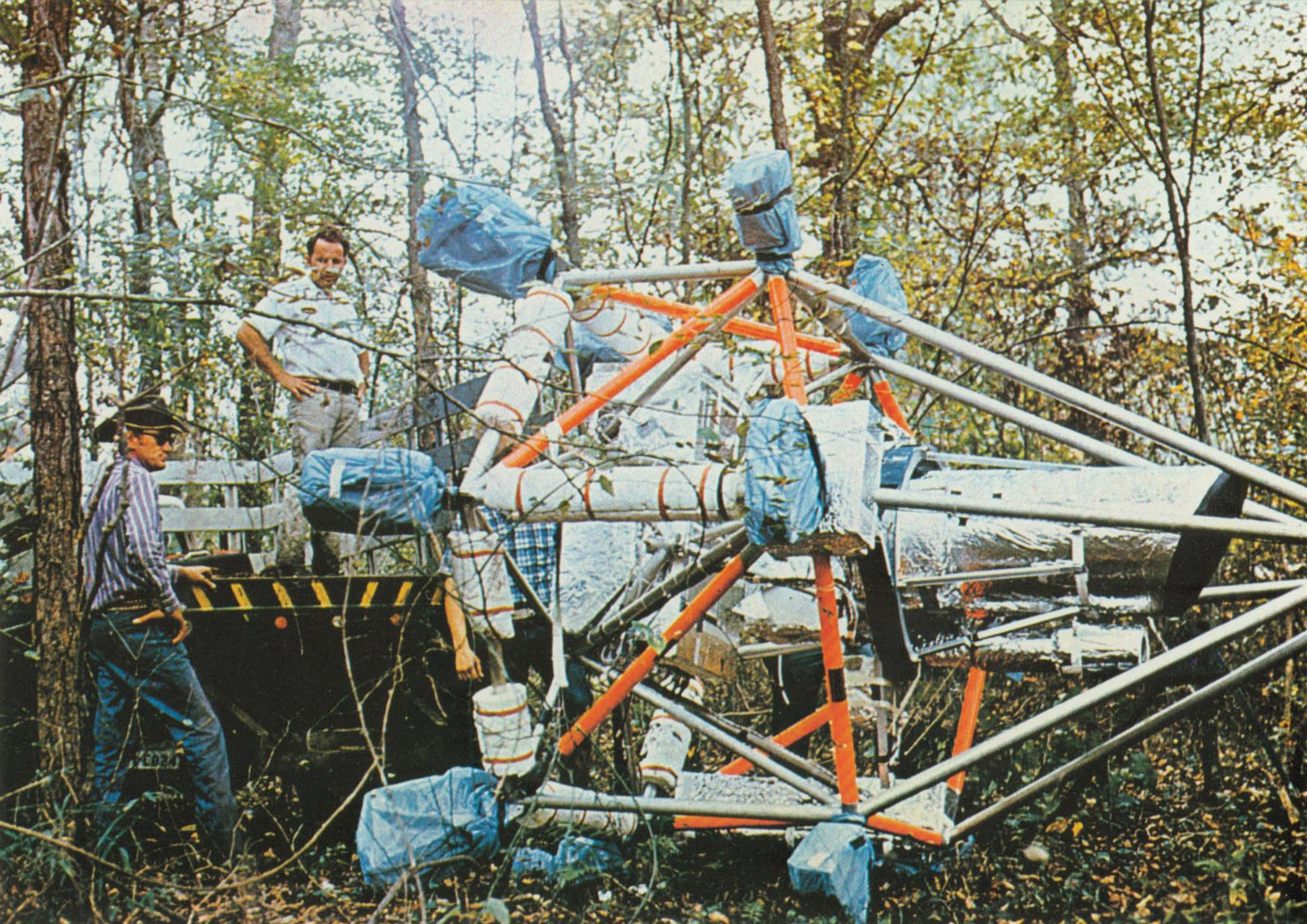
Gamma Ray

>100 MeV CGRO/EGRET





NATIONAL
ATMOSPHERIC
SCIENTIFIC SERVICE

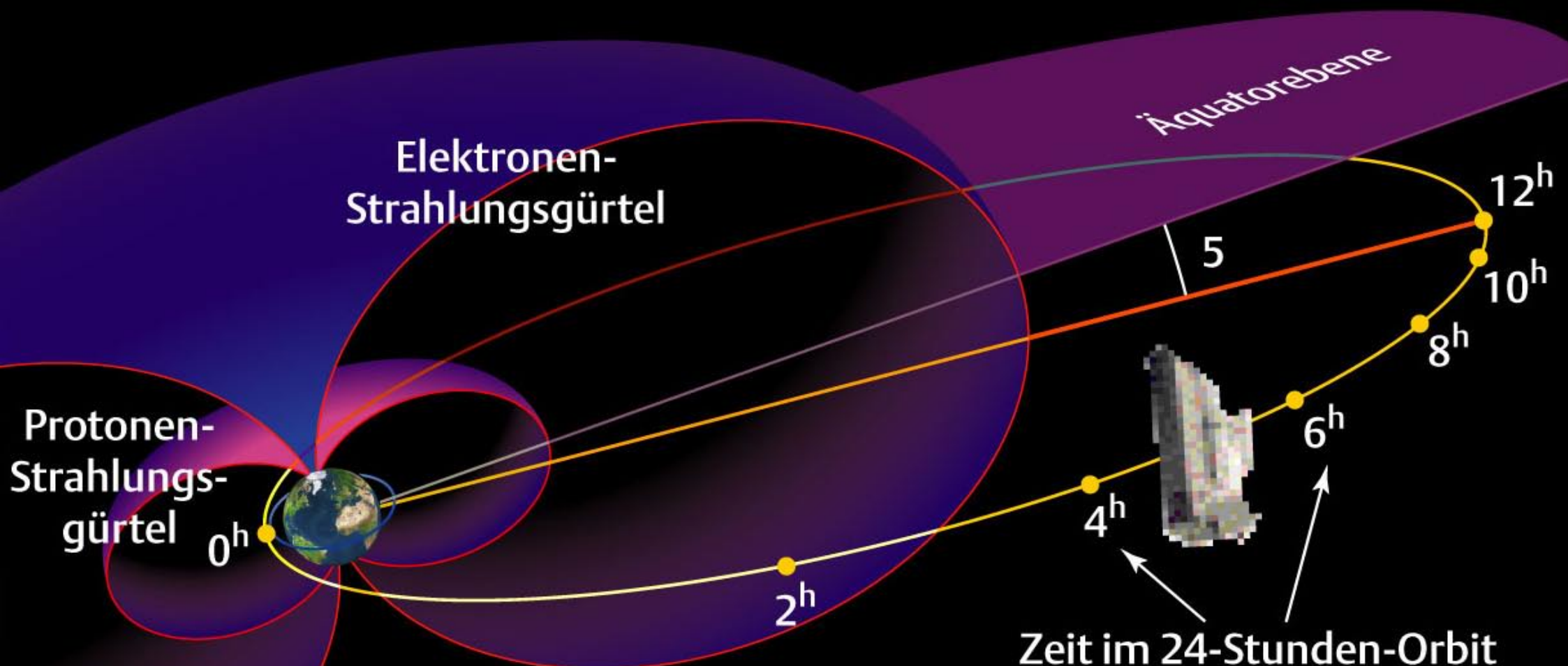




Tests ESTEC



Launch 17 Nov. 1995



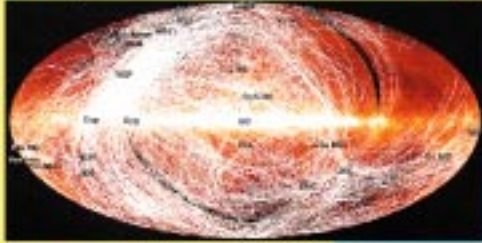
Zeit im 24-Stunden-Orbit

Apogäumshöhe: 70500 km
Perigäumshöhe: 1000 km
Umlaufdauer: 24 Stunden

ISOPHOT - New Technologies

$\lambda \sim 2.5 \dots 240 \mu\text{m}$

175 μm Serendipity Survey



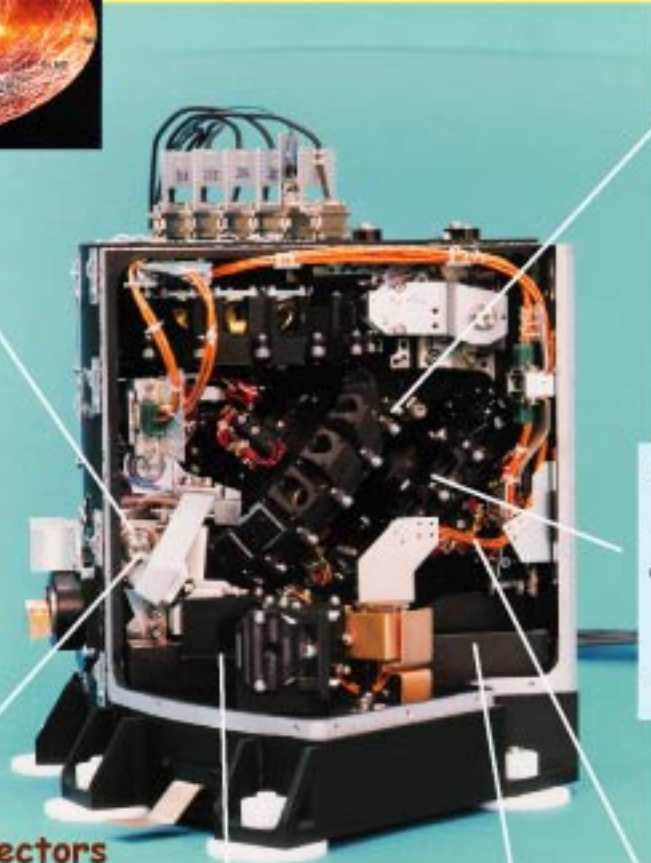
MPIA, CISS

Cold filter wheel

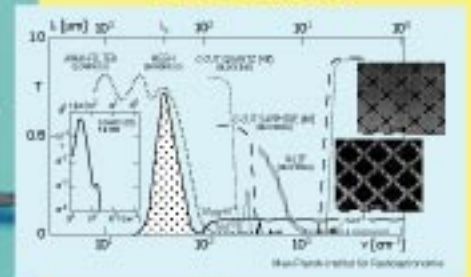


Without 22

Zeiss, Dornier



FIR filters



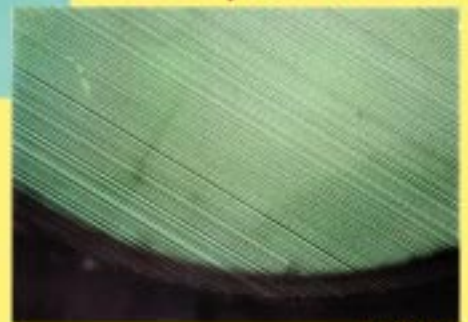
MPIfR

Stressed Ge:Ga detectors Cold read-out electronics



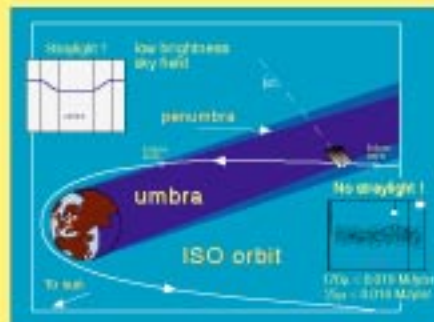
IMEC, Battelle

FIR polarizers



MPIfR

FIR black and baffles



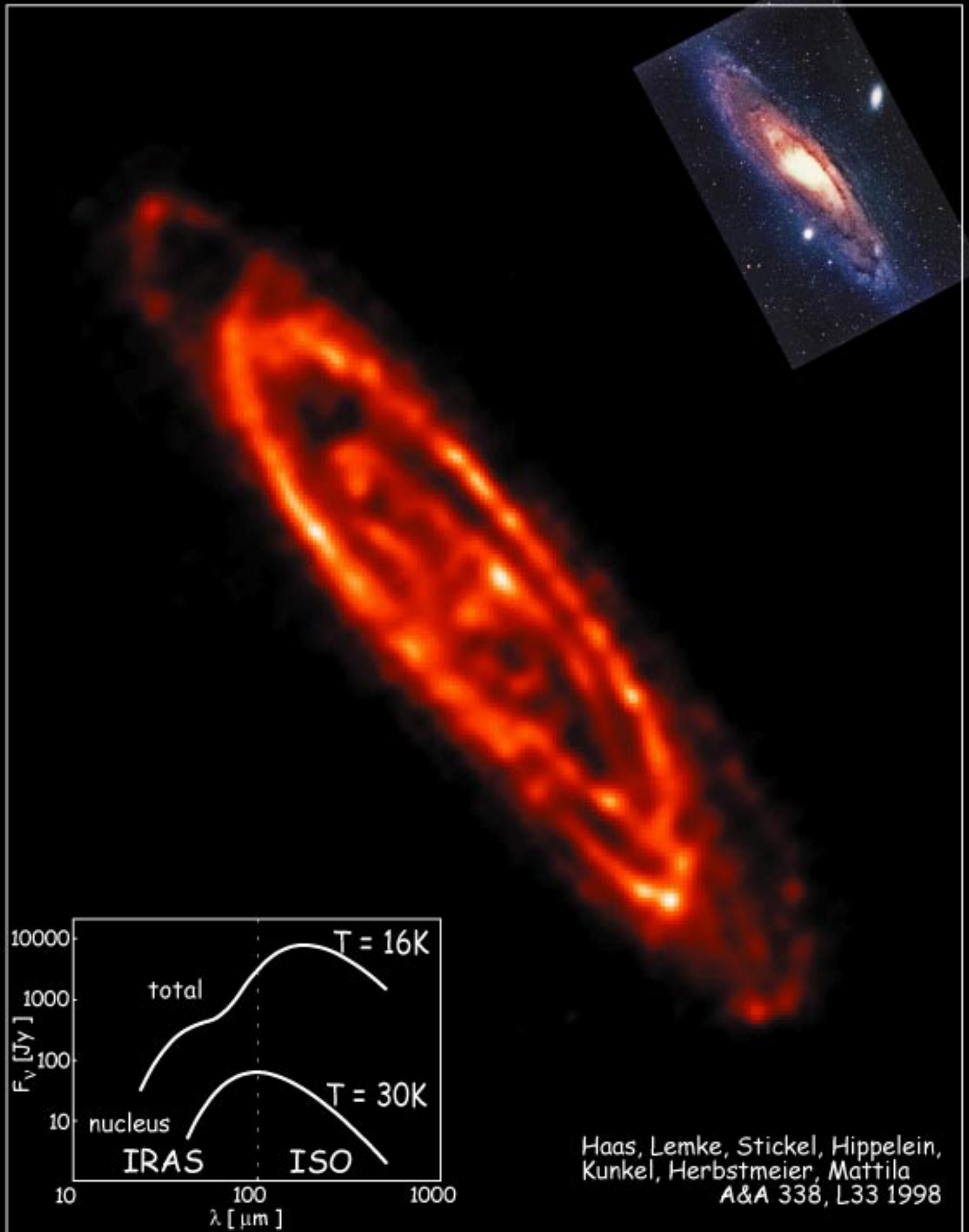
Zeiss, Herberts, MPIA

Cold chopper

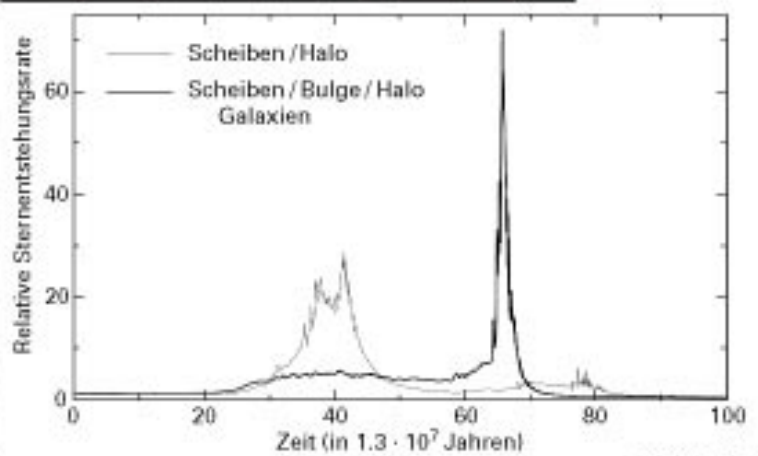
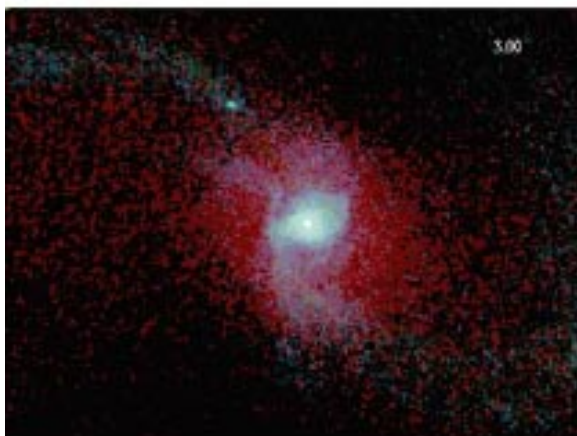
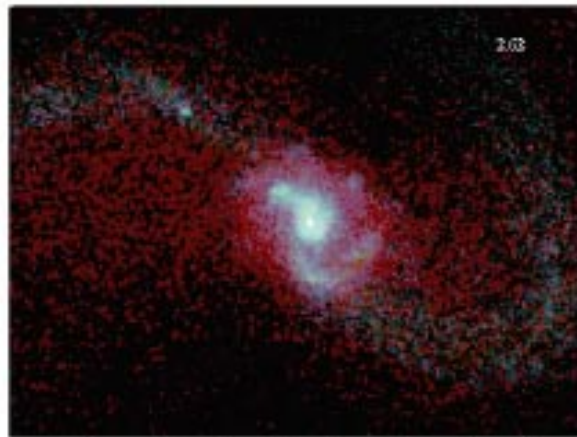
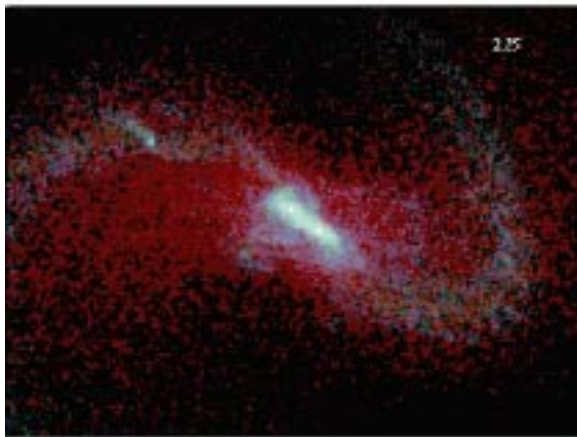
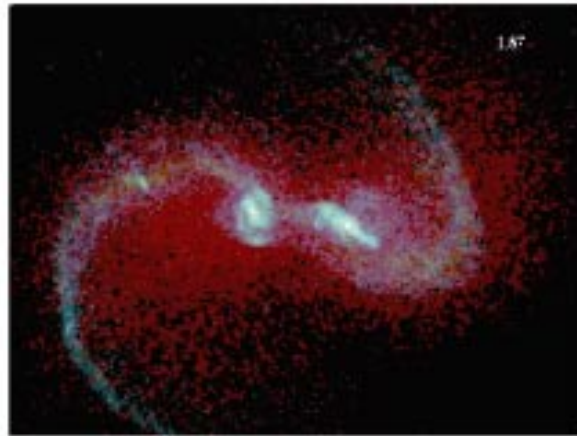
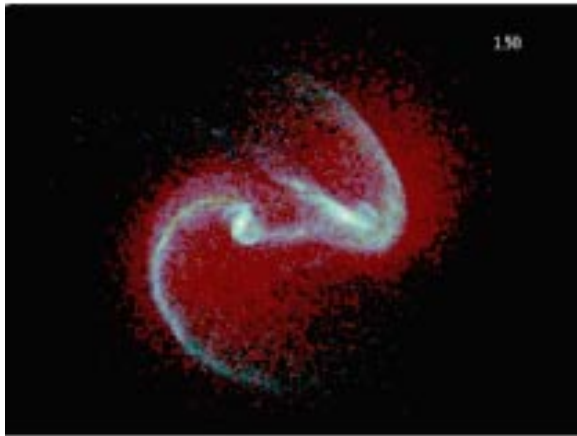
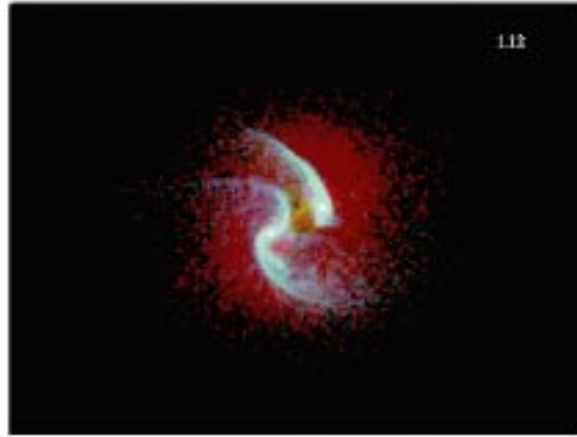
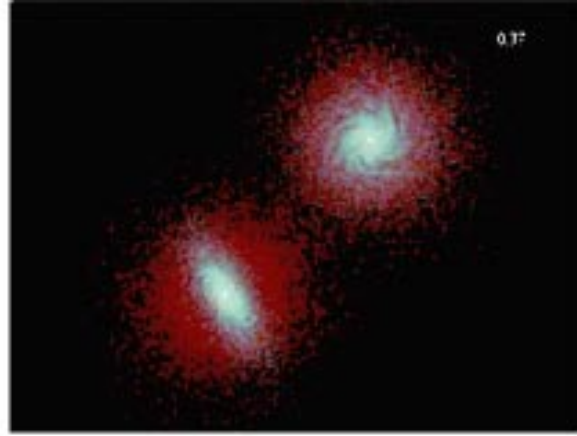
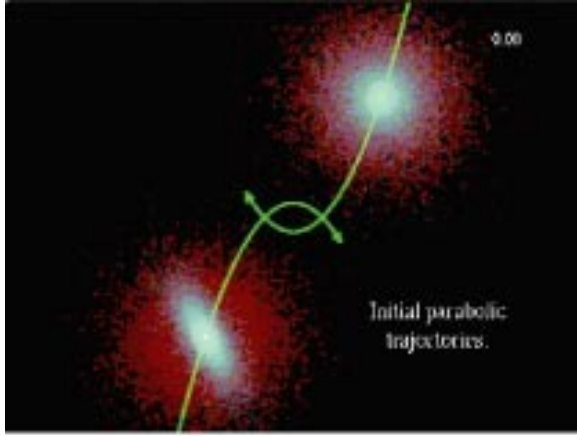


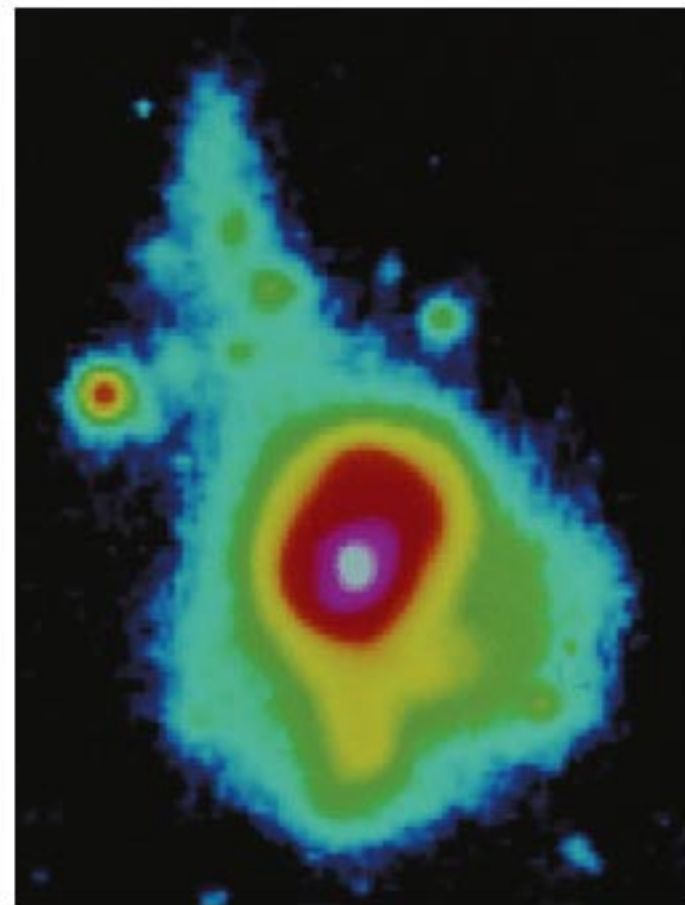
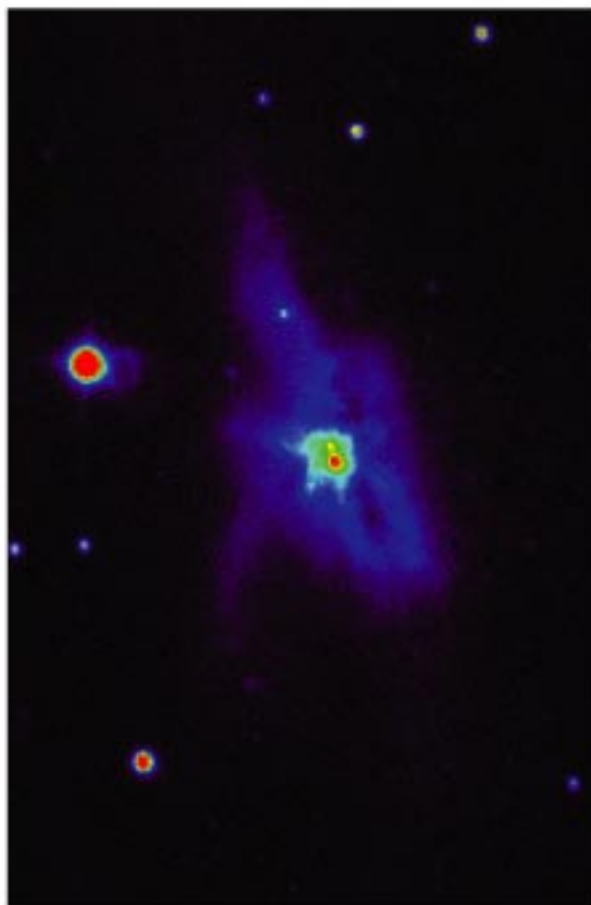
Zeiss, MPIA

175 μ m Map of the Andromeda Galaxy M31

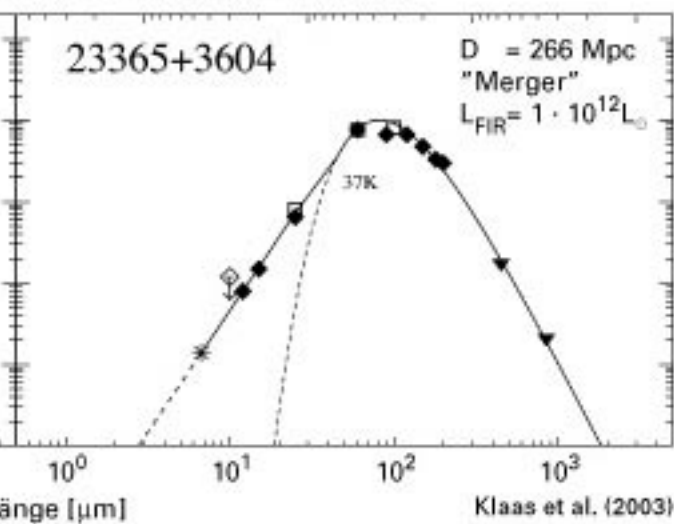
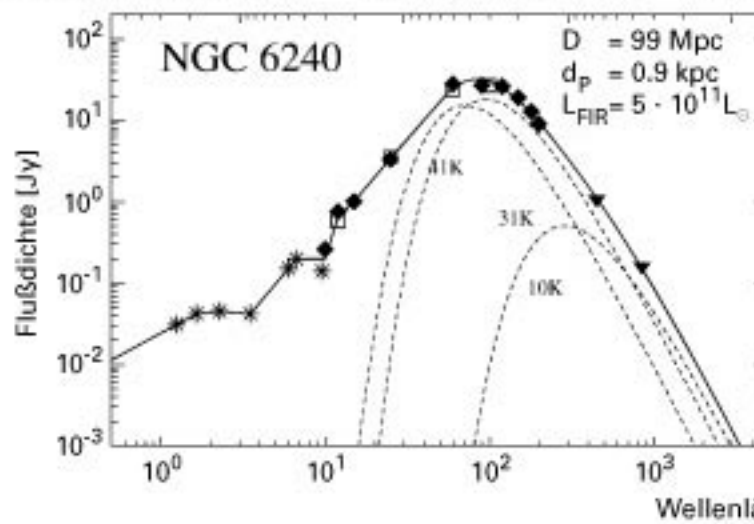
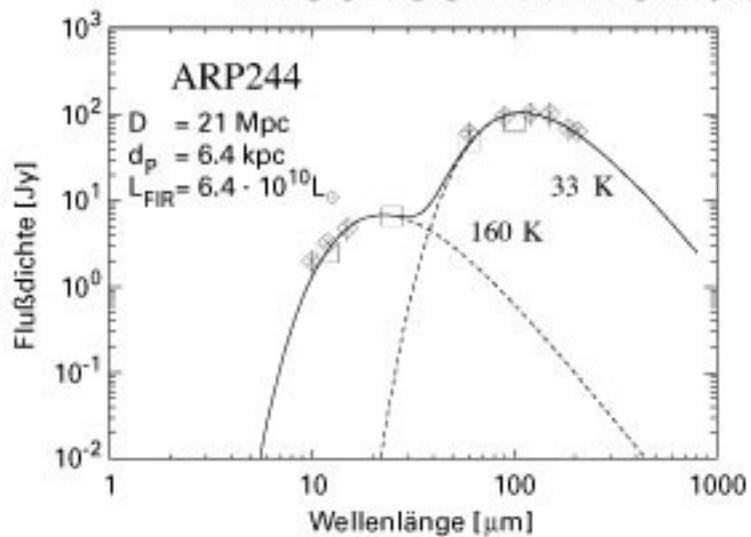


Simulation einer Galaxienverschmelzung

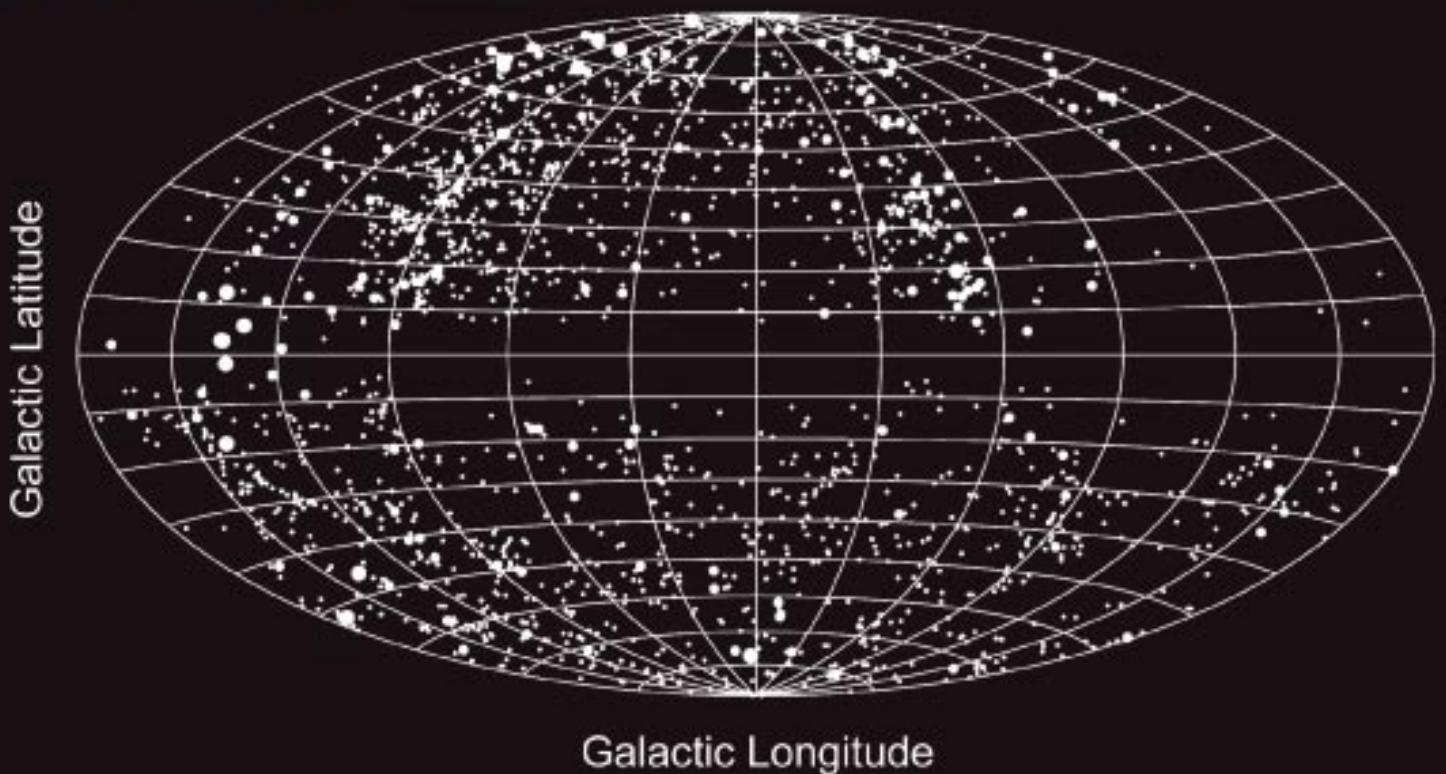
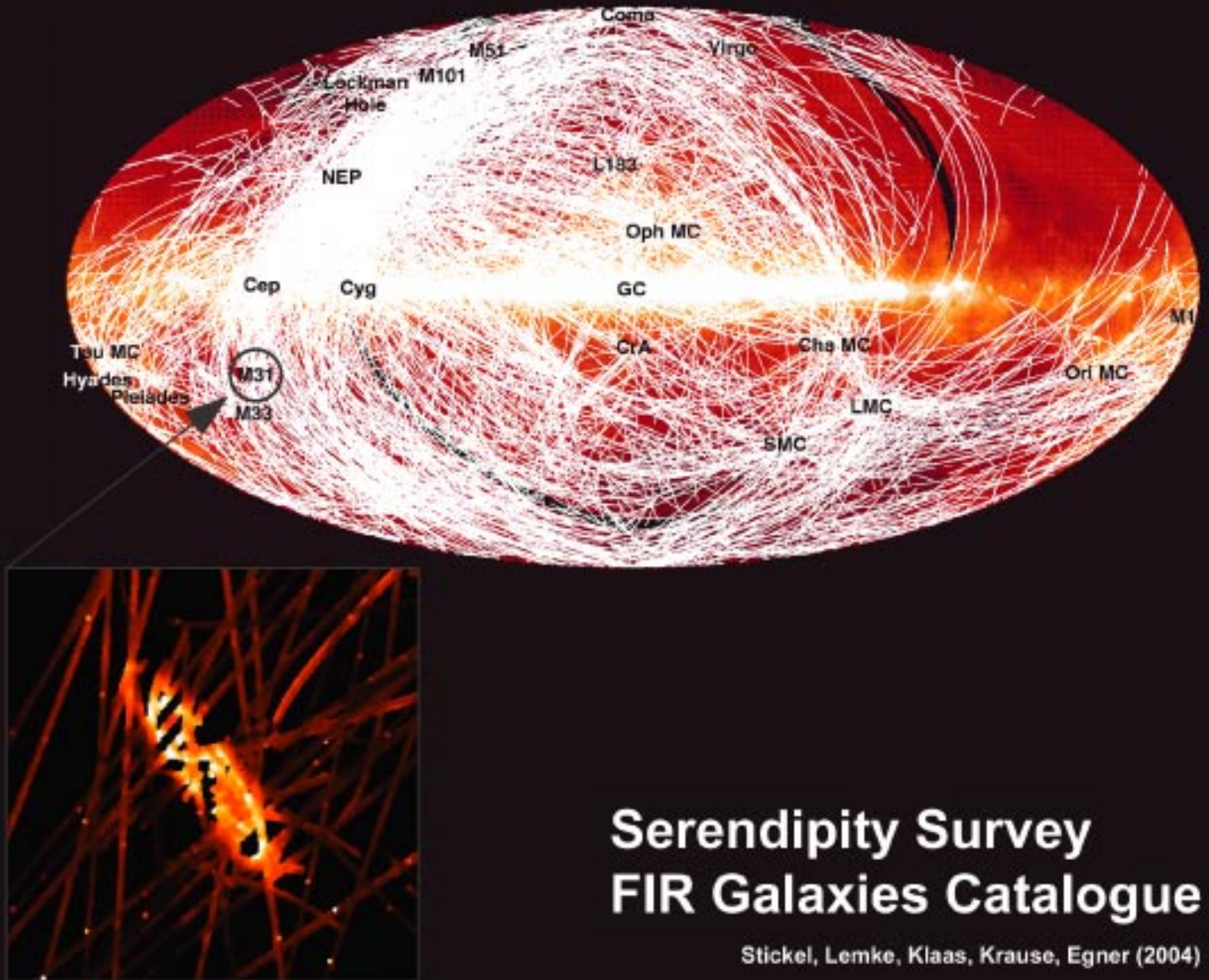




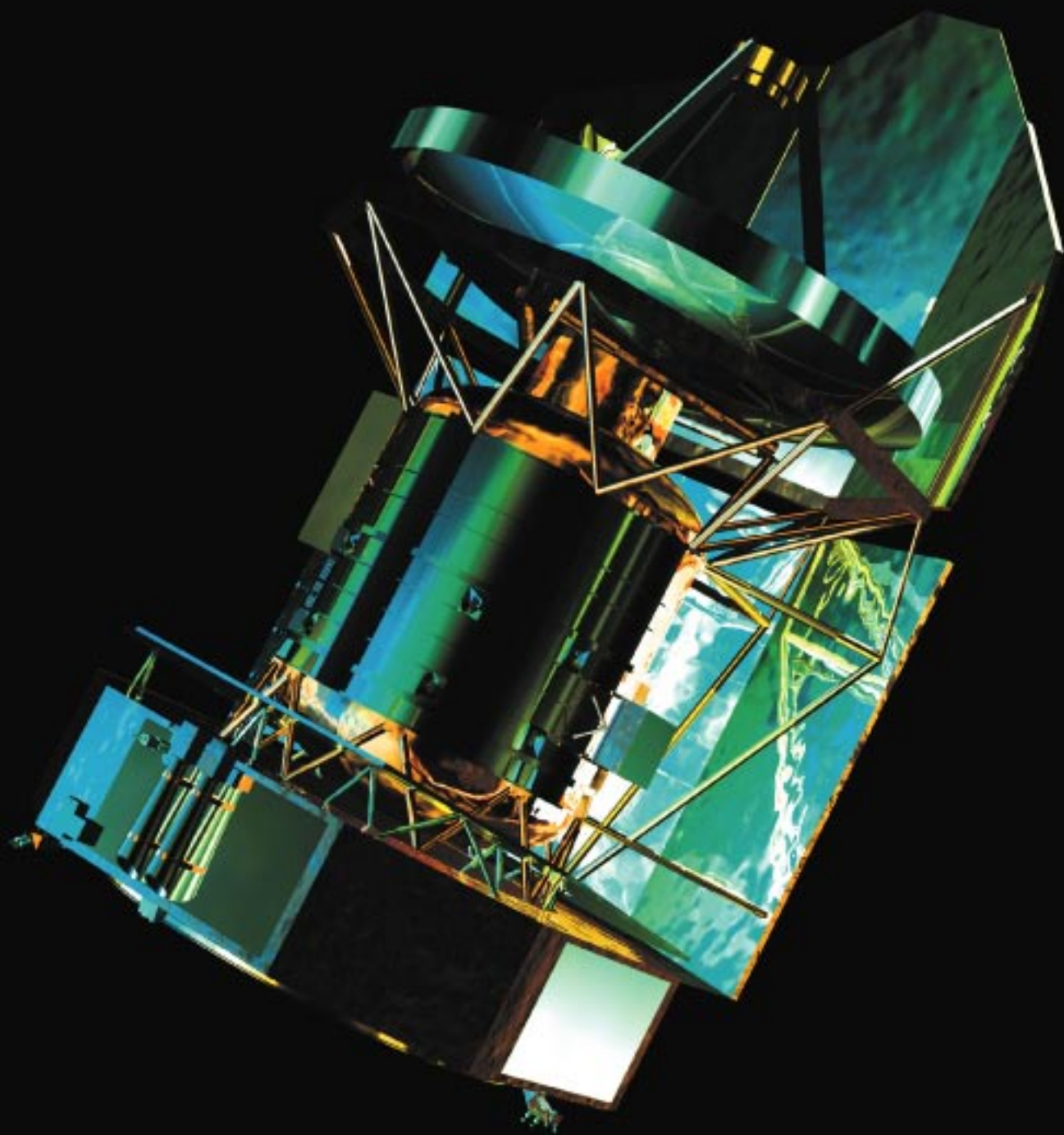
Wechselwirkende Galaxien – ISOPHOT Infrarotspektren



ISOPHOT Zufallsdurchmusterung 170 μ m

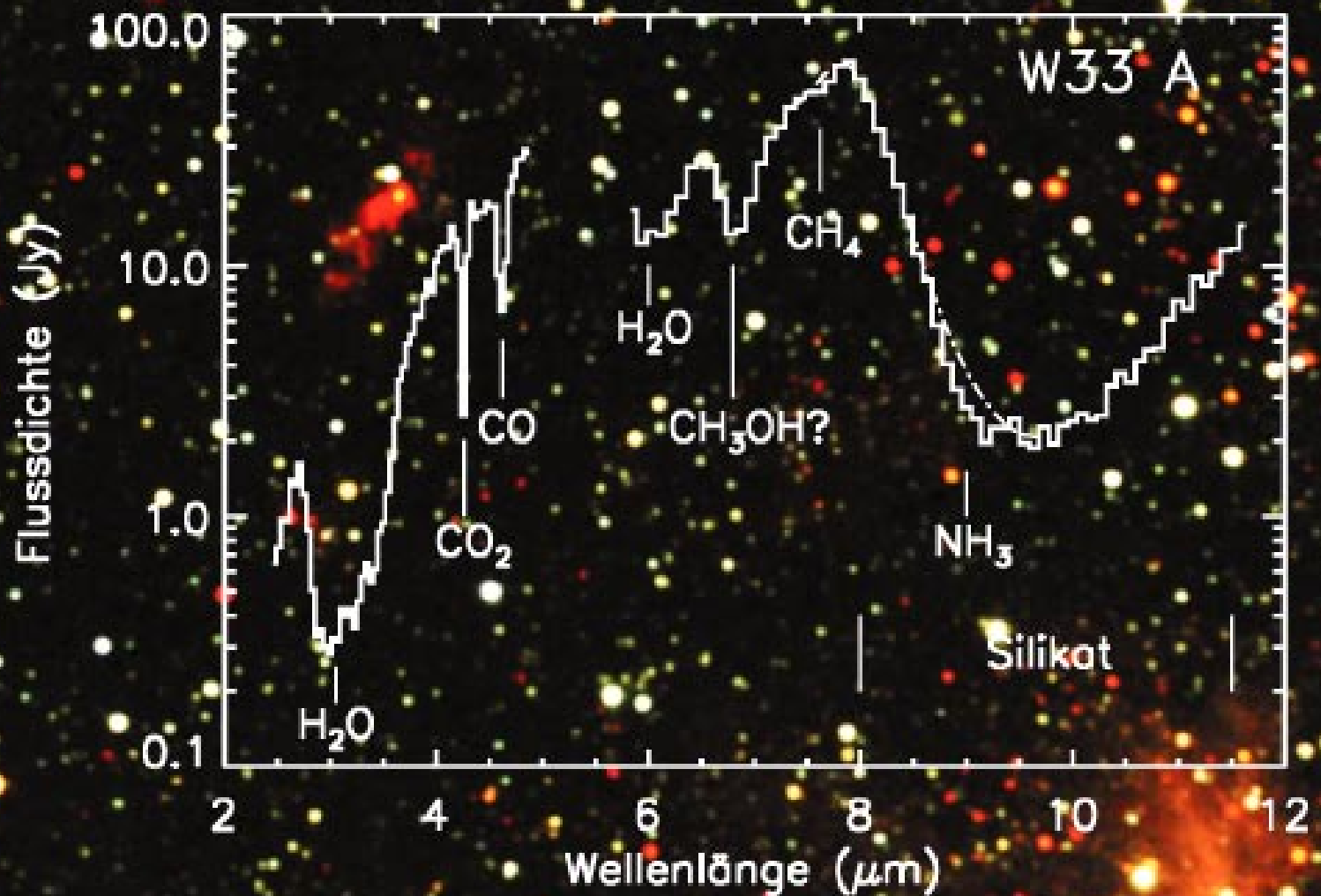


HERSCHEL



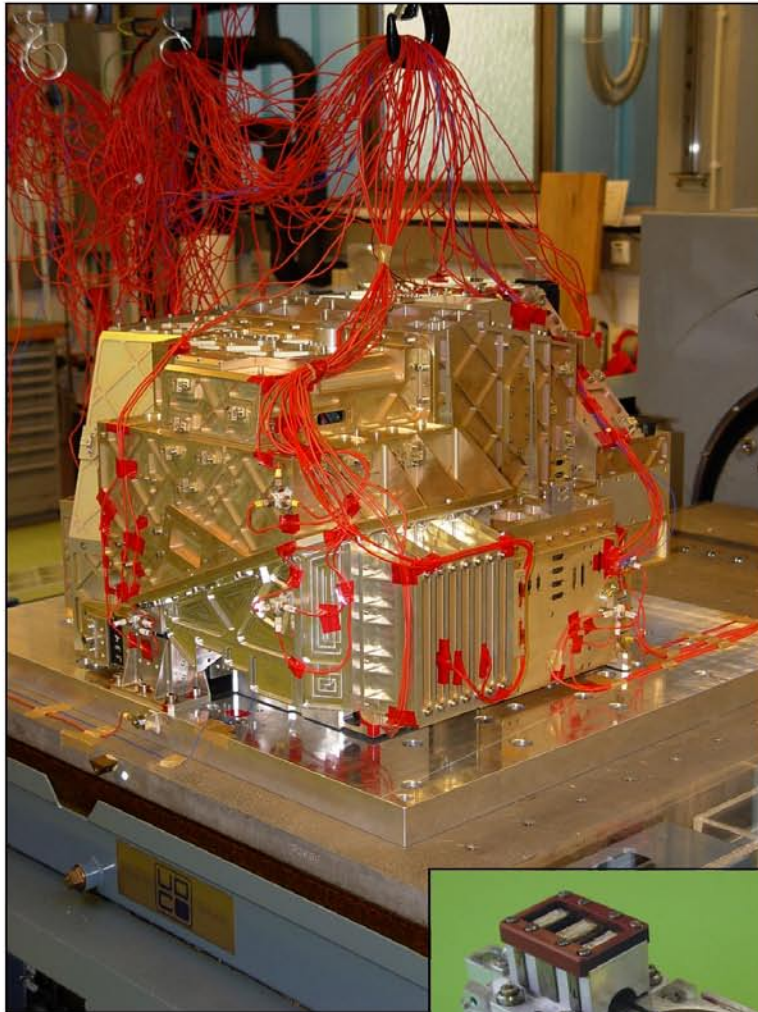
ISOPHOT-Spektrophotometer

Entdeckung von Kohlendioxid-, Methan- und Ammoniak
in Sternentstehungsgebieten

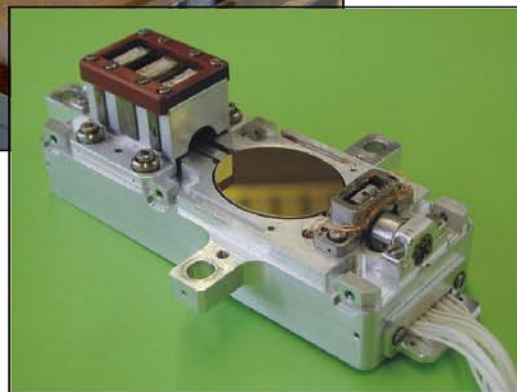


PACS-Instrument für HERSCHEL

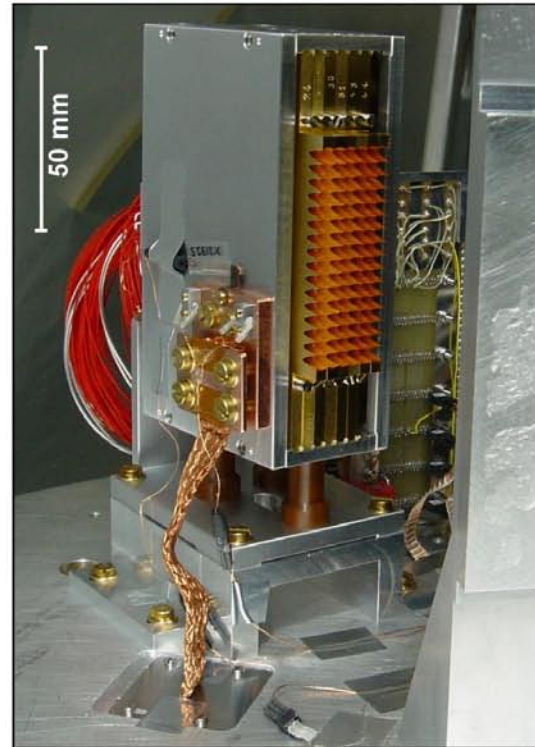
Fokalebenen-Chopper



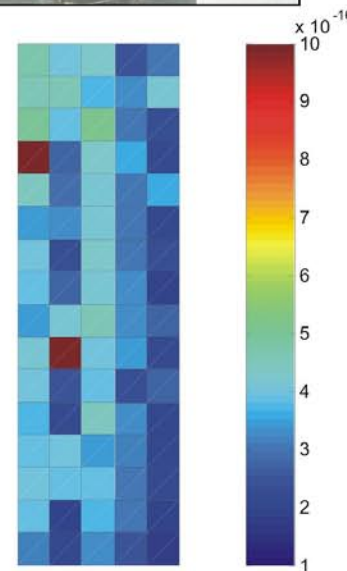
KT



MPIA/ZEISS



MPIA



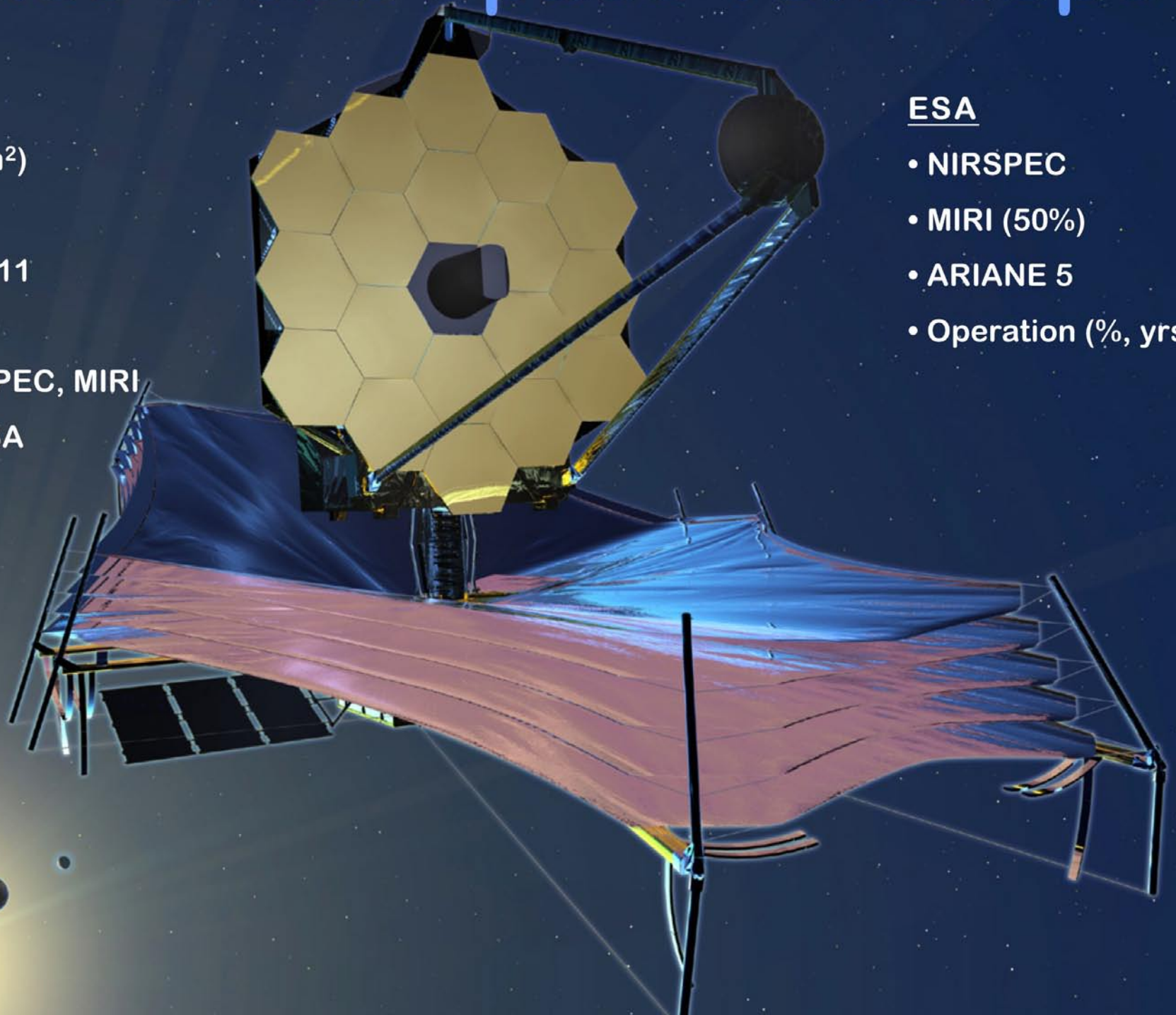
James Webb Space Telescope

JWST

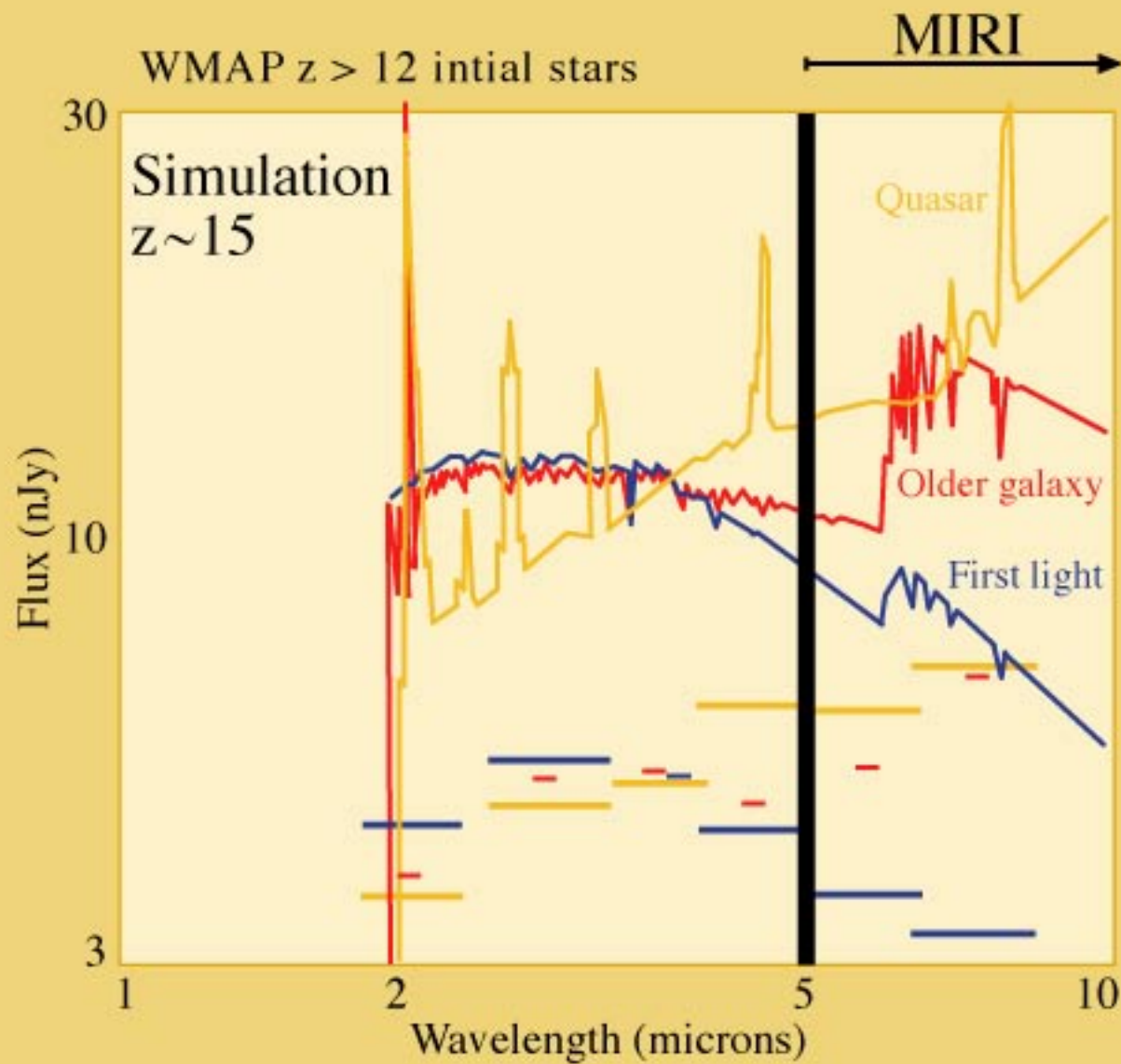
- D, ~6,5m (>29m²)
- L2, T<50K
- Launch Aug 2011
- 5...10 yrs
- NIRCAM, NIRSPEC, MIRI
- NASA, ESA, CSA

ESA

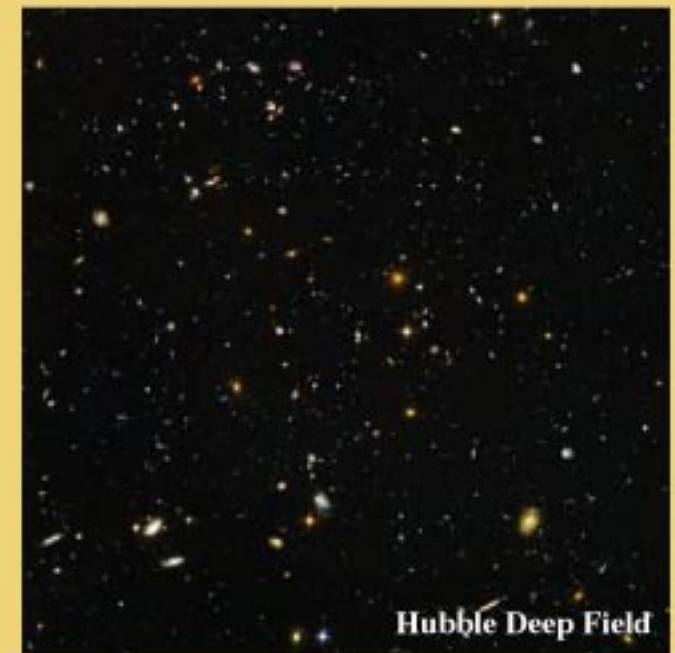
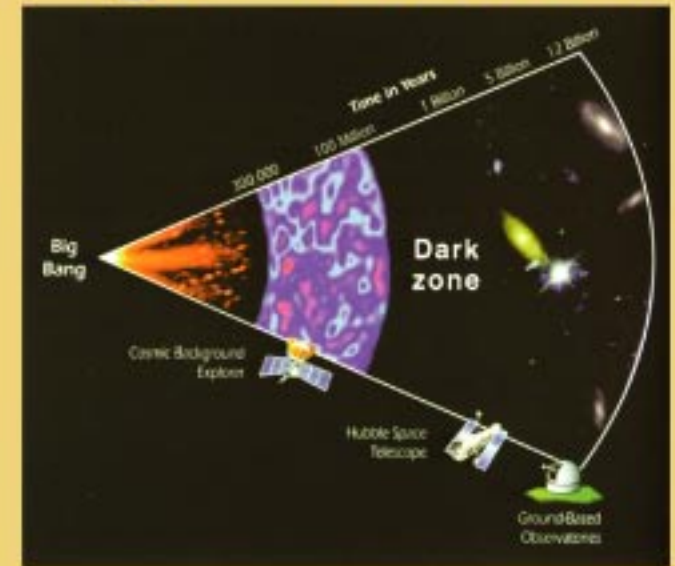
- NIRSPEC
- MIRI (50%)
- ARIANE 5
- Operation (% , yrs?)



MIRI - Probing Nature of First Light Candidates

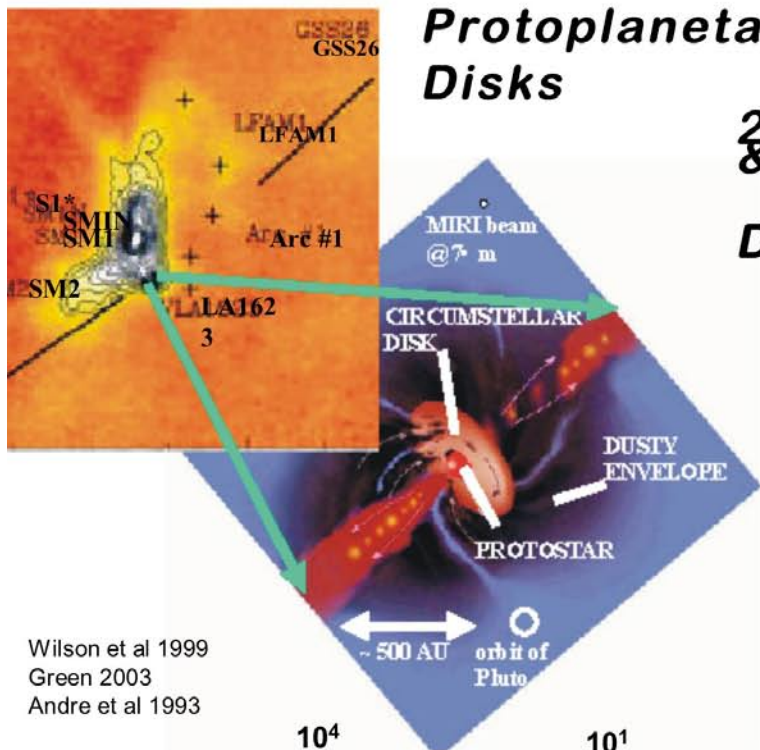


Galaxy models: Brzual, Charlot 1993; Cen 2002
 Quasar model: Haiman, Loelke 2001



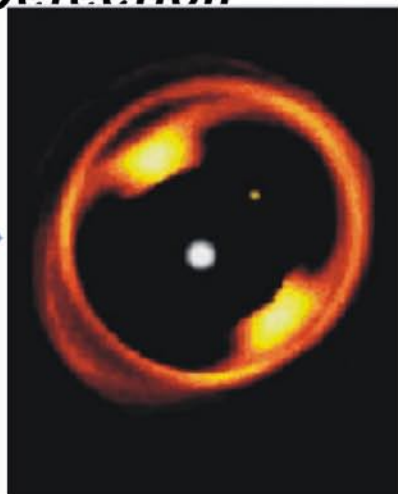
MIRI – Formation of Stars and Protoplanetary Systems

1. Protostars and Protoplanetary Disks



Wilson et al 1999
Green 2003
Andre et al 1993

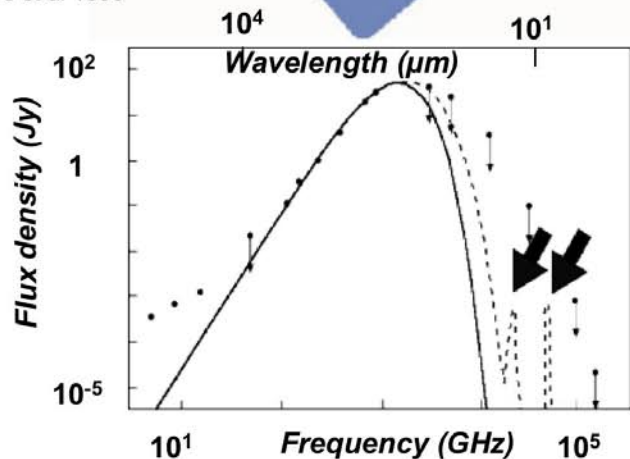
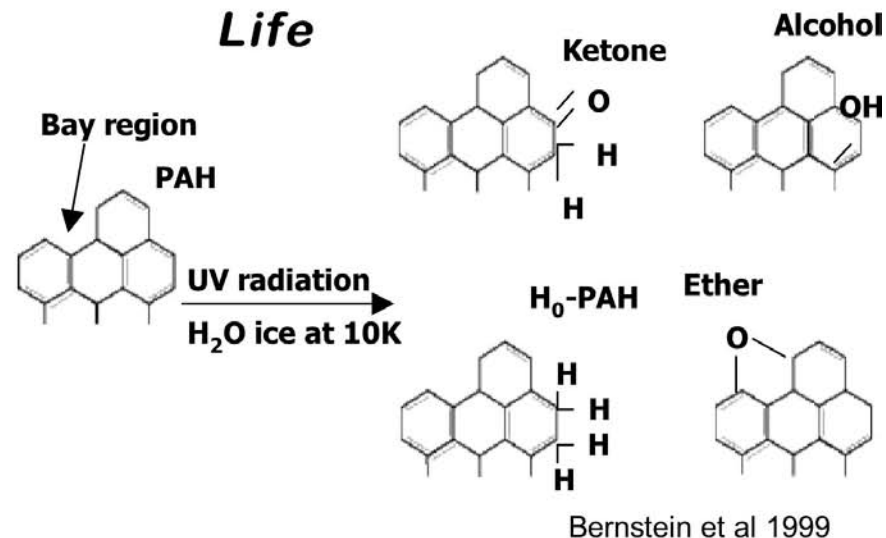
2. Debris Disks & Planet Detection



Wilner et al 2002

- Vega disk with planet D~25 arcsec
- „Jupiter’s“ detectable at $\lambda \sim 24 \mu\text{m}$ to $r \leq 10 \text{ pc}$
- Coronagraph

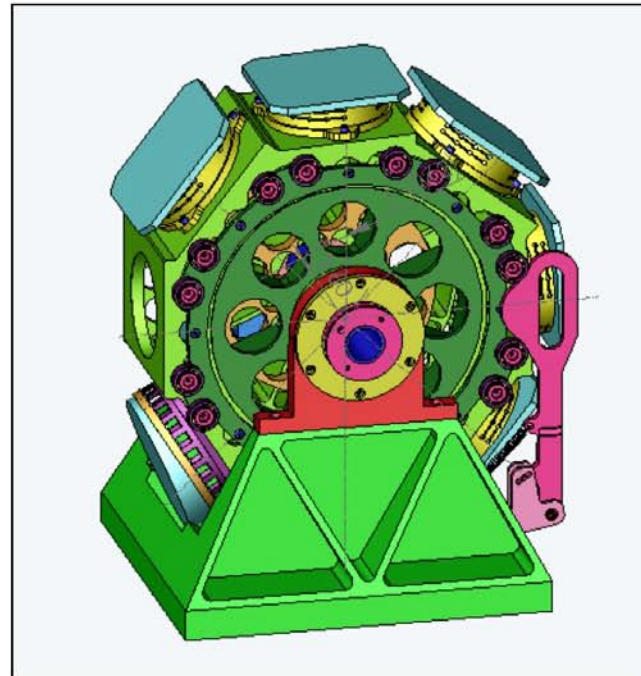
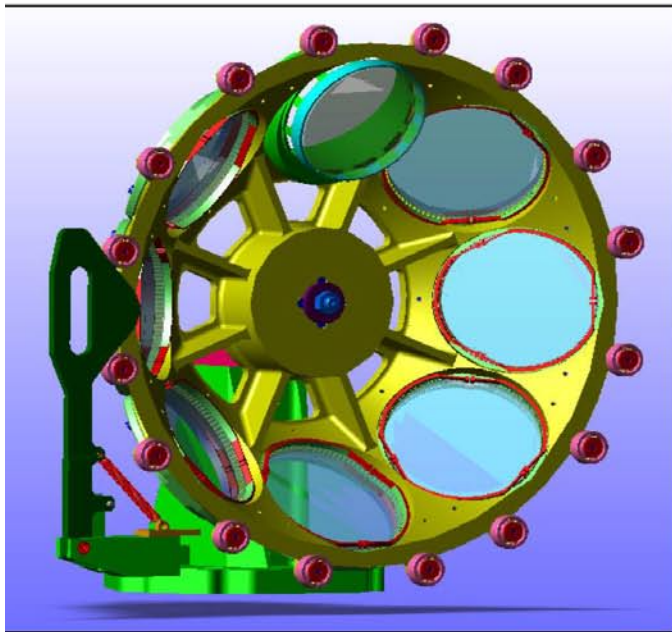
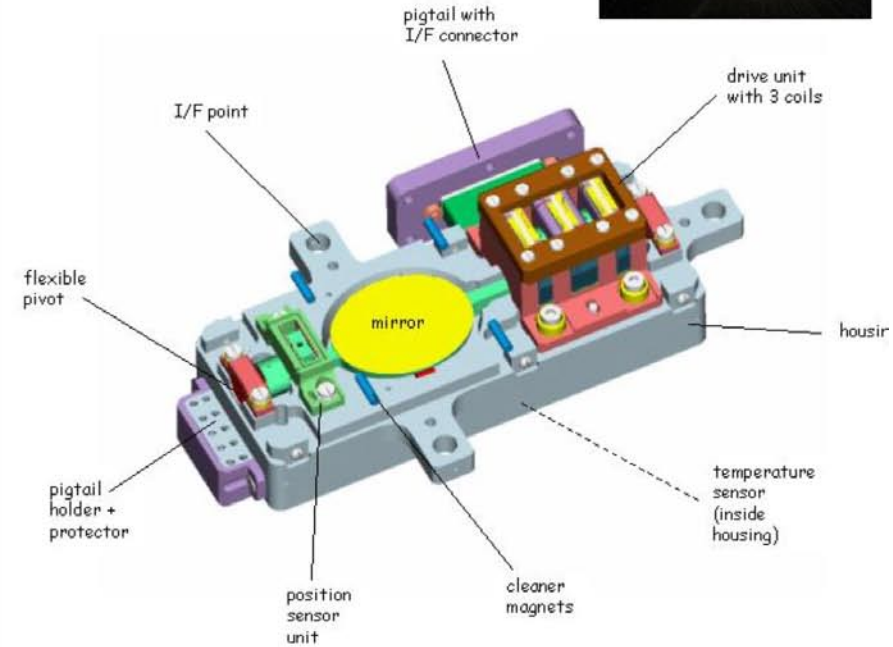
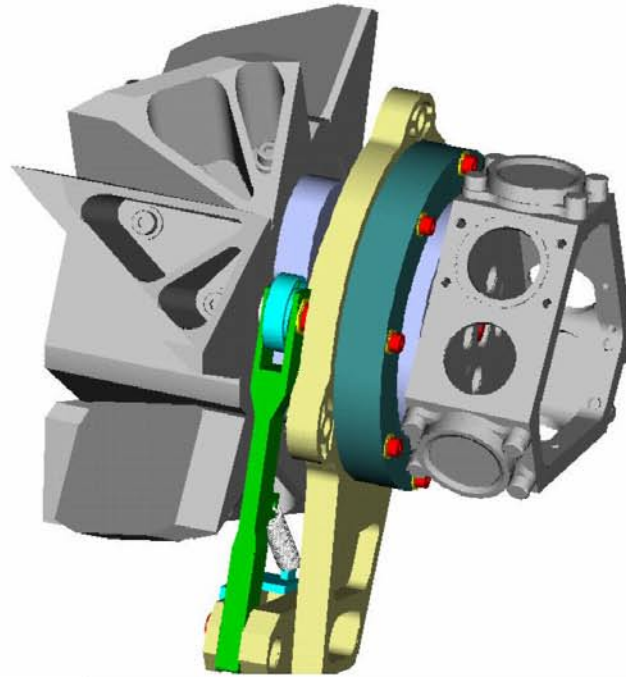
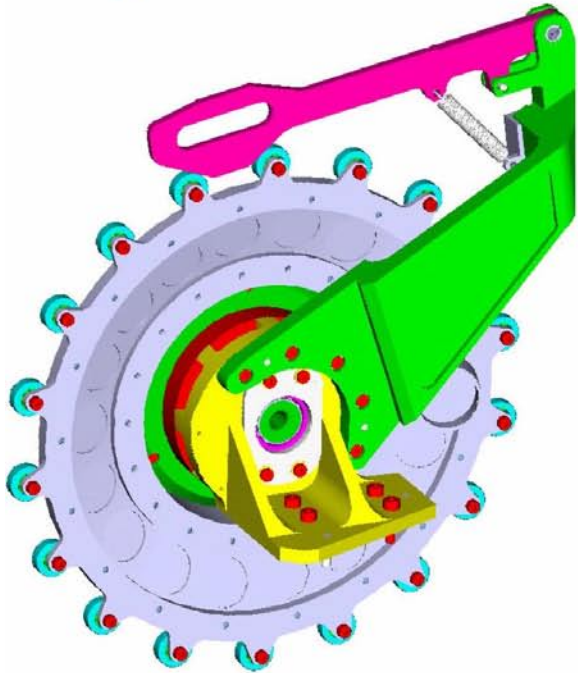
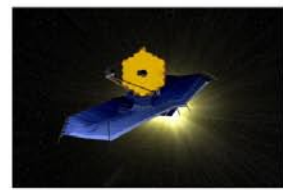
3. Precursors of Life



- 0.1 arcsec imaging
- $d < 200 \text{ pc} \Rightarrow \text{Res.} \sim 30 \text{ AU}$

- Prebiotic molecules in IS clouds ?
- MIRI spectra $\lambda/\Delta\lambda \sim 3000, 5 \dots 15 \mu\text{m}$

Kryomechanismen JWST-MIRI und -NIRSPEC



MPIA, ZEISS, MOOG

Strategy for Infrared Space Observatories at MPIA

(Status March 2004)

