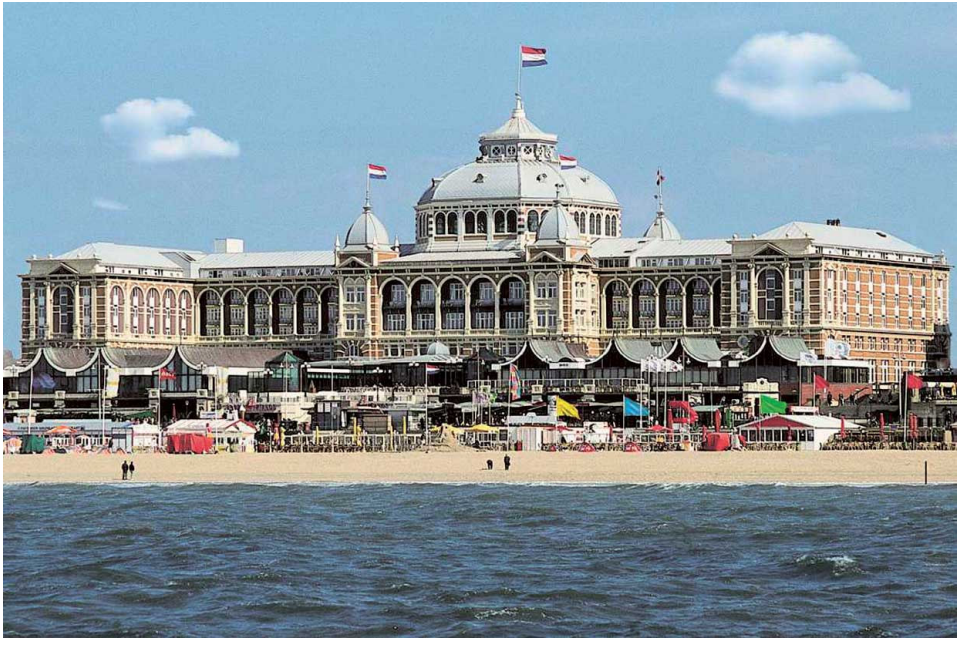
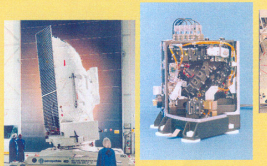


ISO / ISOPHOT Calendar






75 76 77 78 79 1980 81 82 83 84 1985 86 87 88 89 1990 91 92 93 94 1995 96 97 98 99 2000 01 02 03 04 2005

Scientific and Technical Studies

Selections

Development Phase

Mission

Postoperational Phase

Active Archive Phase

Virtuell Observatory

ESA: Final Decision for ISO

Annoulcment of Opportunity

Instrument Selection

Feasibility Studies PHT

PHT Industrial Contract

Delivery PHT AMTM

Calibration Phase PHT starts

Delivery PHT FM

Launch ISO 17 Nov. 1995

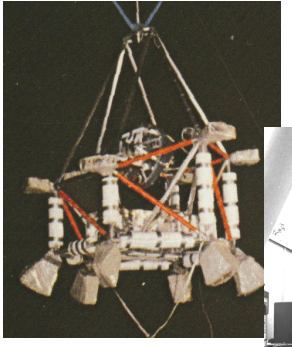
LHe Boil off 08 Apr 98

Postoperational Phase

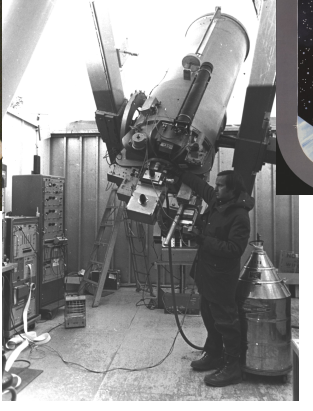
Final ISO Archive

MPIA 02

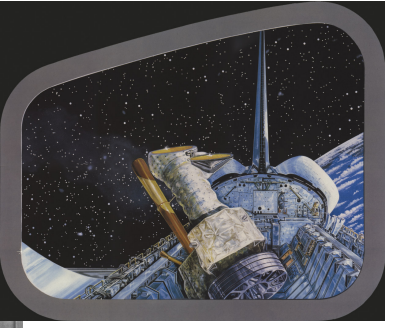
Infrared Astronomy before ISO…



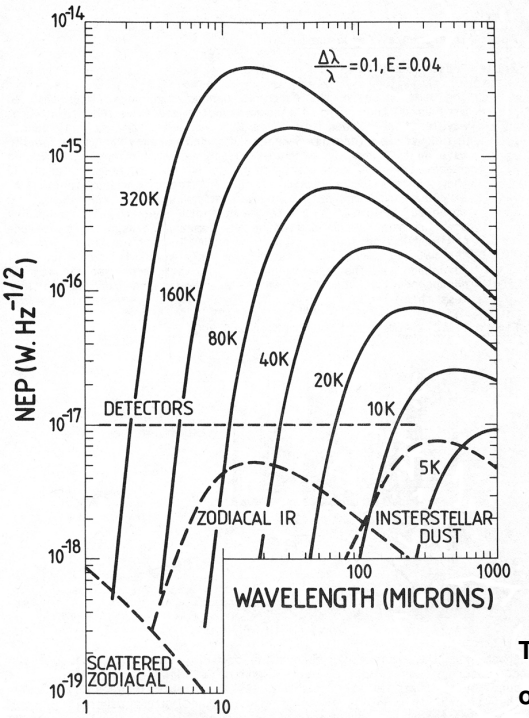
~ 1970



~ 1972



~ 1980



Thermal background limitation of infrared detectors

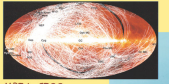
Four Focal Plane Instruments of ISO

Instrument	Principal Investigator	Wavelengths [µm]
ISOCAM MIR-Camera and Spectrophotometer	C. Cesarsky, F-Paris	2…18
ISOPHOT FIR-Photometer NIR-Spectrophotometer	D. Lemke, D-Heidelberg	2.5…240
SWS Spectrometer	Th. De Grauw, NL-Groningen	2…45
LWS Spectrometer	P. Clegg, UK-London	2…195

ISOPHOT - New Technologies

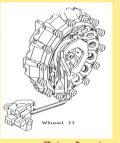
λ ~ 2.5 ... 240 μm

175μm Serendipity Survey

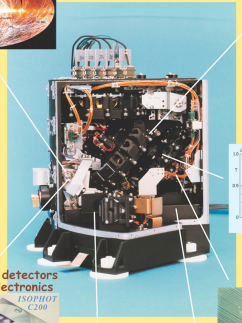


MPIA, CISS

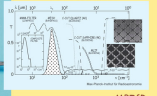
Cold filter wheel



Zeiss, Dornier

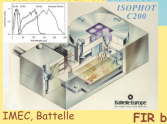


FIR filters



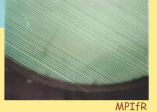
MPIfR

Stressed Ge:Ga detectors
Cold read-out electronics



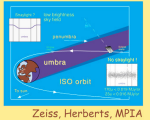
IMEC, Battelle

FIR polarizers



MPIfR

FIR black and baffles

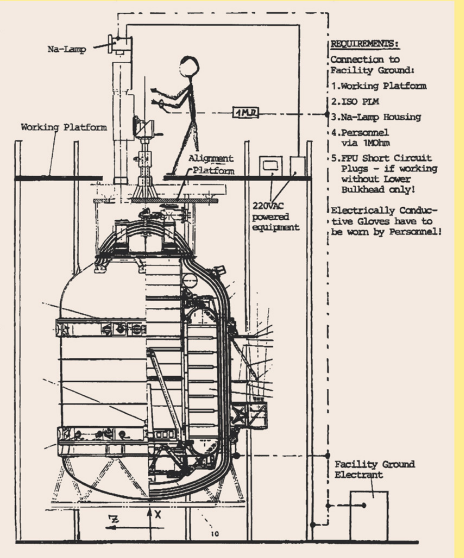


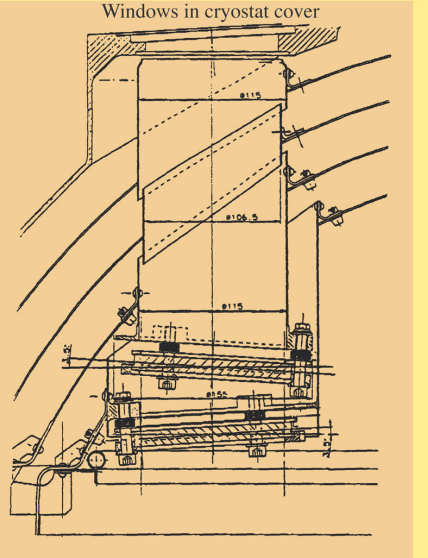
Zeiss, Herberts, MPIA

Cold chopper

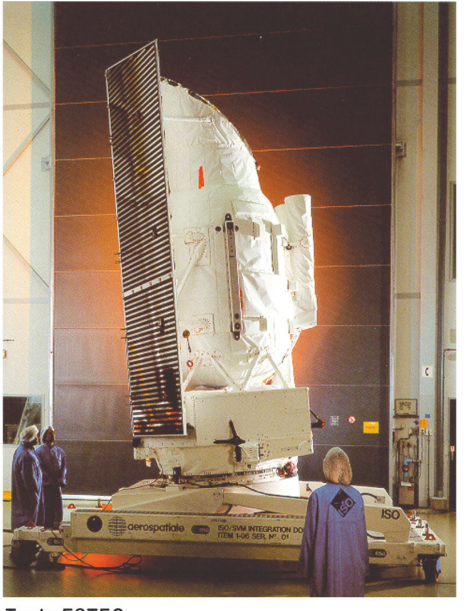
Zeiss, MPIA

Integrated System Tests ➔ ISOPHOT signals in saturation

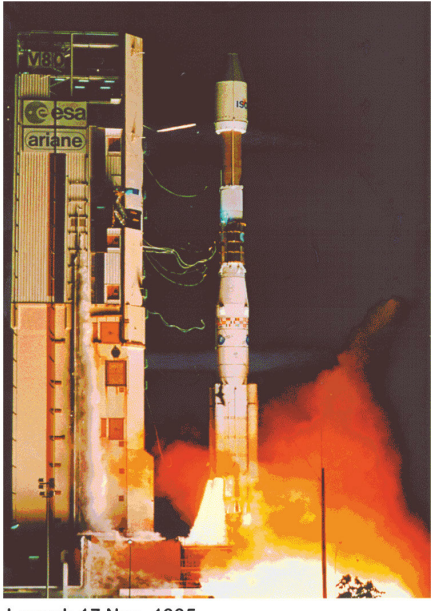




Infrared Space Observatory



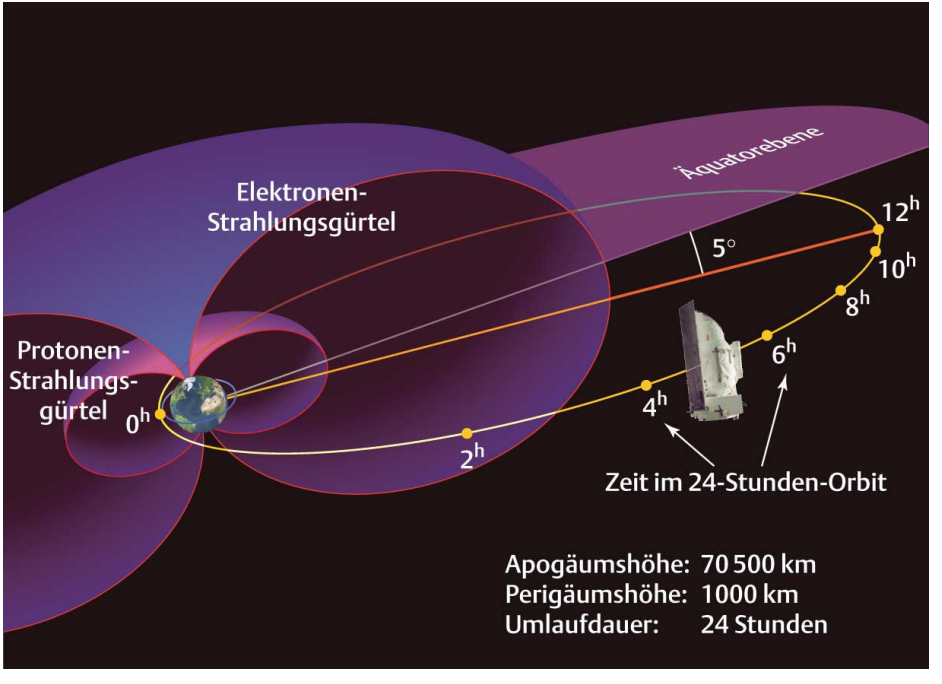
Tests ESTEC

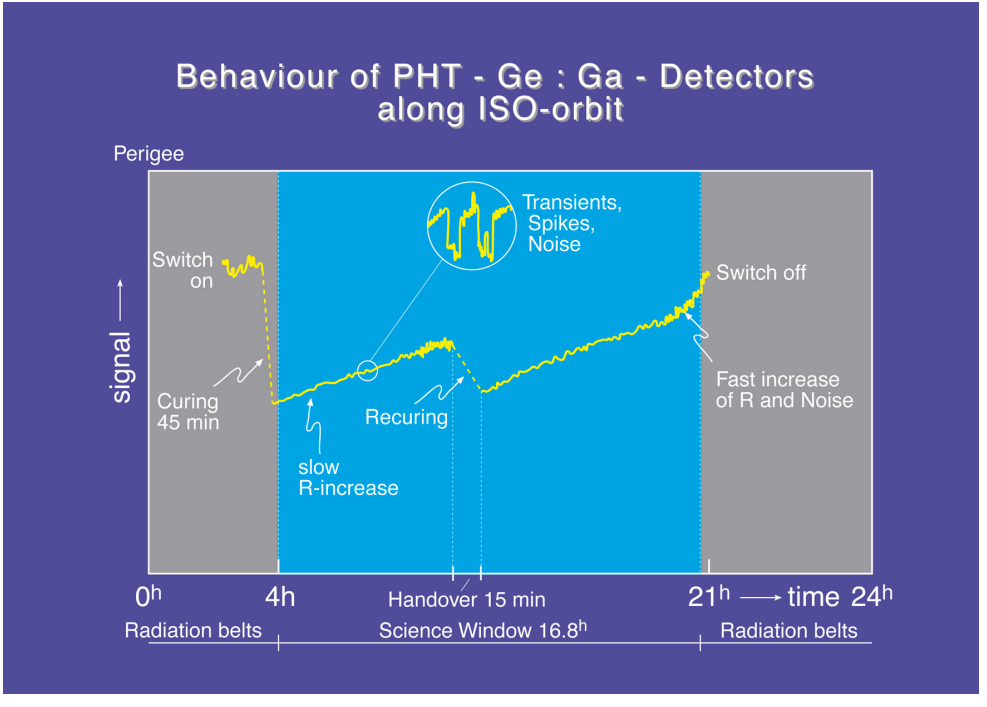


Launch 17 Nov. 1995

VILSPA 1996,

15 m Antenna


Äquatorebene
Elektronen-
Strahlungsgürtel
Protonen-
Strahlungs-
gürtel
5°
12h
10h
8h
6h
4h
2h
0h
Zeit im 24-Stunden-Orbit
Apogäumshöhe: 70 500 km
Perigäumshöhe: 1000 km
Umlaufdauer: 24 Stunden

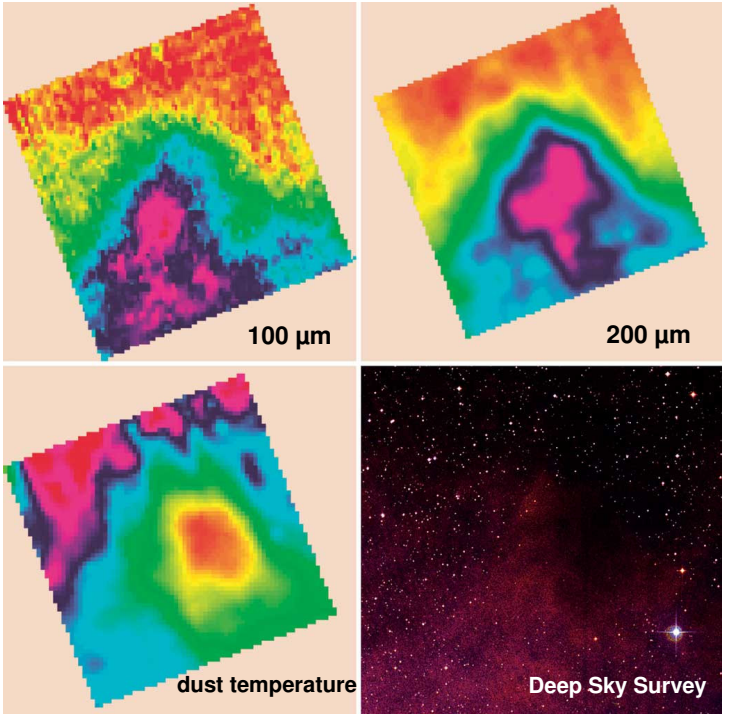

Behaviour of PHT - Ge : Ga - Detectors
along ISO-orbit
Perigee
signal
Switch
on
Curing
45 min
slow
R-increase
Recuring
Transients,
Spikes,
Noise
Switch off
Fast increase
of R and Noise
0h
4h
Handover 15 min
21h
time 24h
Radiation belts
Science Window 16.8h
Radiation belts

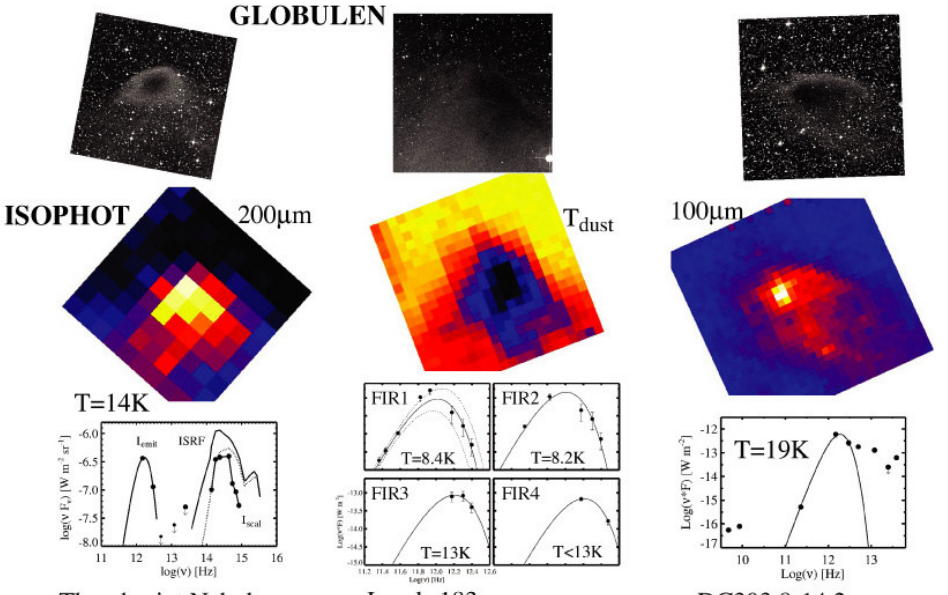
ISOPHOT-Collaboration

Budapest (H) and Heidelberg (D)

Visits to MPIA

1. Péter Ábrahám (1995-2001)
   - Calibration (PHT-S, chopped photometry, faint sources, beam profiles, transient corrections,…)
   - Zodiacal light
   - TTau stars
2. Victor Tóth (2001-2004)
   - Beam profiles
   - Stray light
   - Molecular clouds, globules
3. Csaba Kiss (2000, 2003-2004)
   - Calibration mini maps
   - Cirrus confusion, EBL fluctuation
   - FCS calibration
4. Lajos Balázs


100 µm
200 µm
dust temperature
Deep Sky Survey



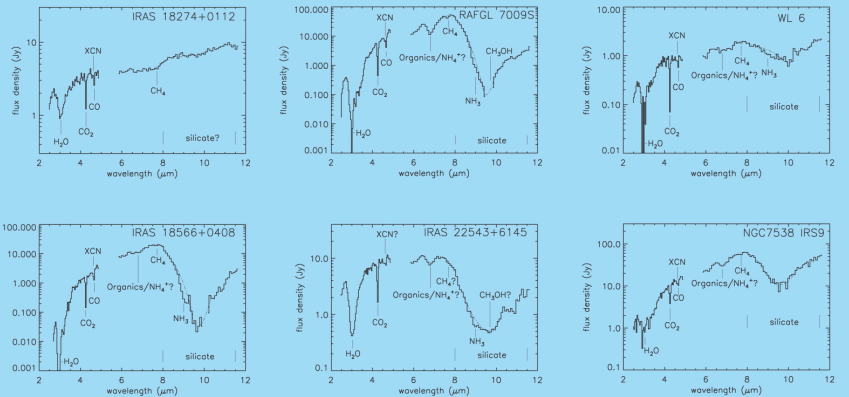
Thumbprint Nebula:
no star formation

Lynds 183:
pre-protostellar sources

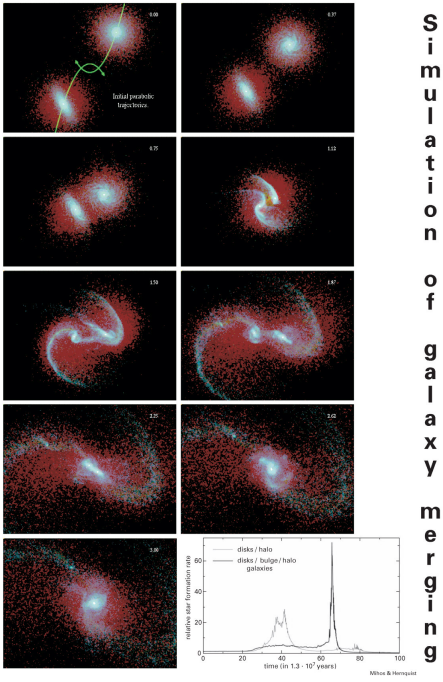
DC303.8-14.2:
embedded protostar

The ISOPHOT–S legacy of interstellar ices

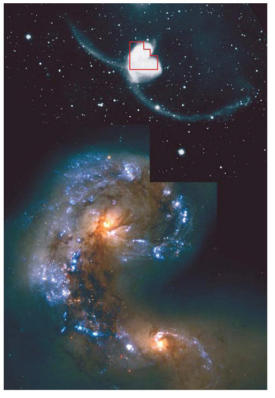
(101 sources: 68 young objects, 33 evolved stars)

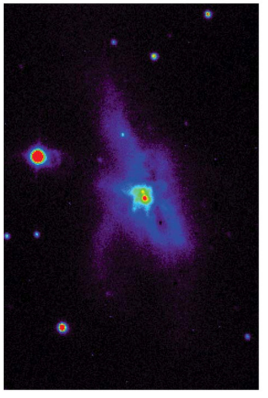


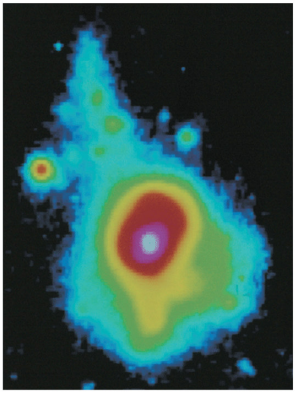
Simulation of galaxy merging



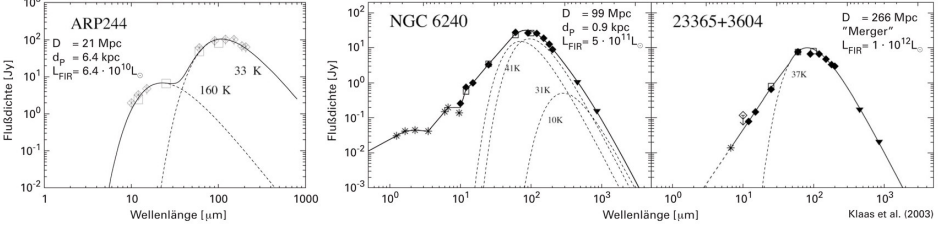
Mihos & Hernquist

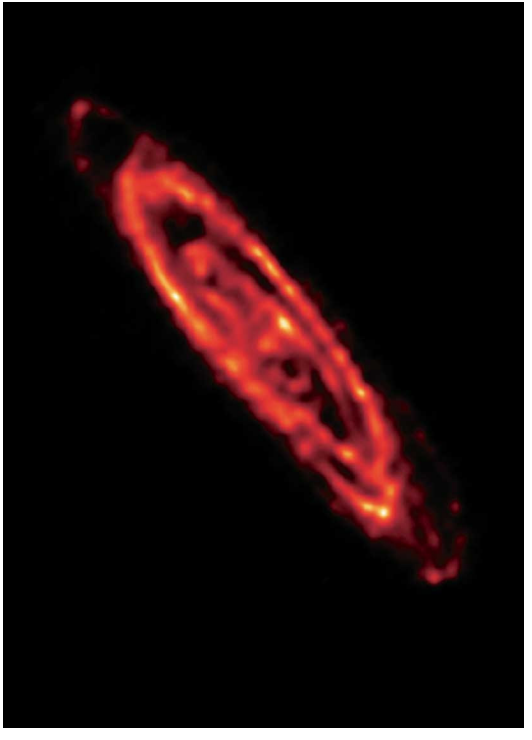






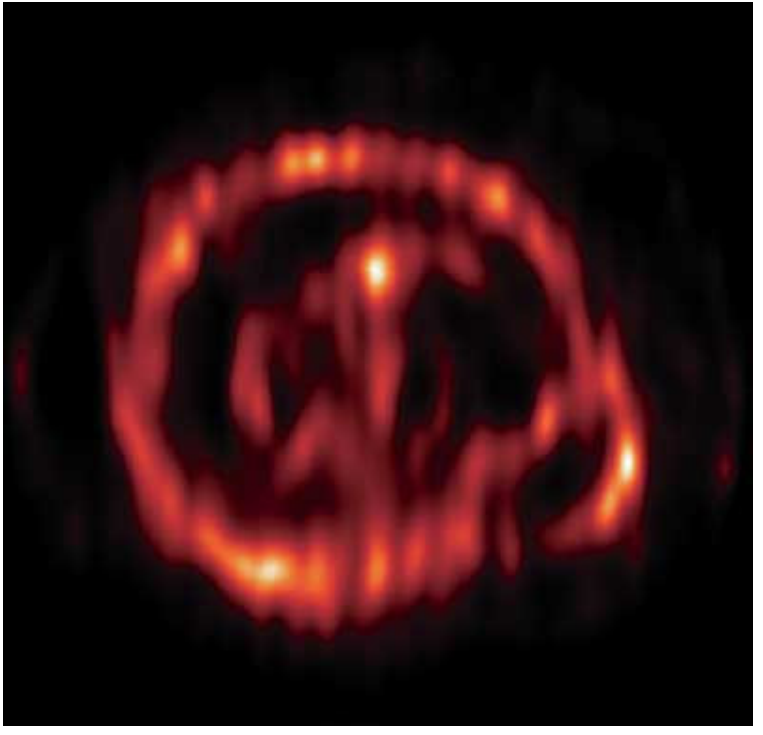
Wechselwirkende Galaxien – ISOPHOT Infrarotspektren





M 31

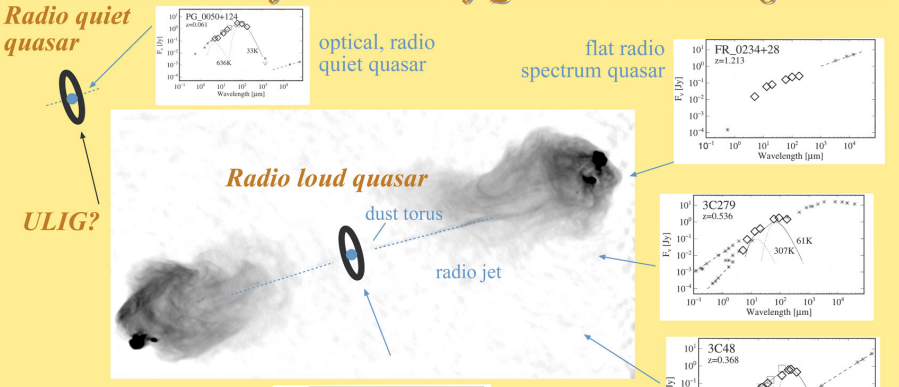
170 µm



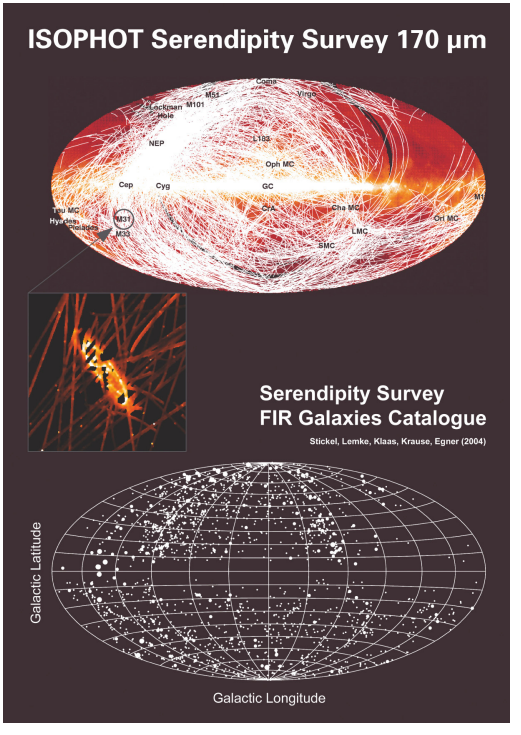
M 31

170 µm

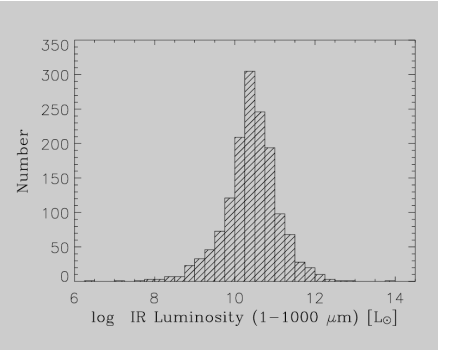
ISO checks the Unified Scheme of Quasars and Radio galaxies:

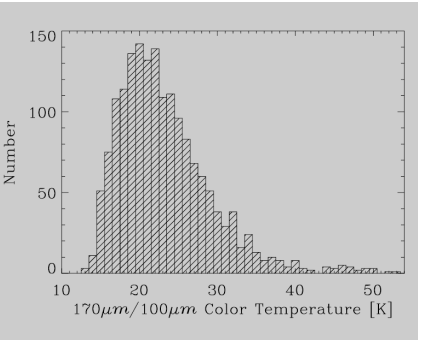


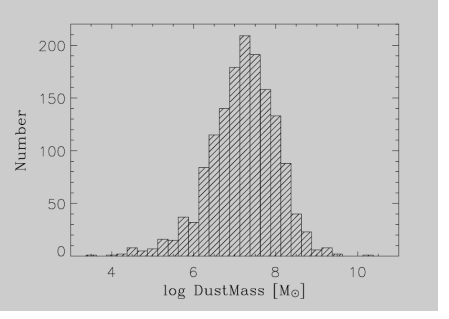
Martin Haas, Rolf Chini, Klaus Meisenheimer, Dietrich Lemke, Manfred Stickel, Ulrich Klaas, Ernst Kreysa

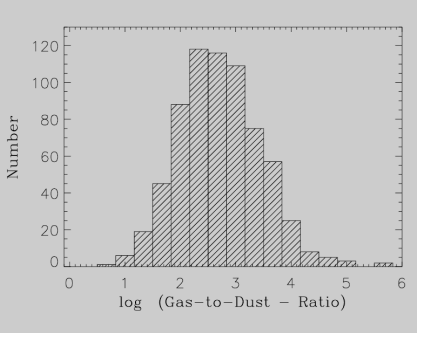

ISOPHOT Serendipity Survey 170 µm
Coma
M51
Virgo
Bootes
M101
NEP
L183
Oph MC
Cep
Cyg
GC
Tau MC
Hyades
Pleiades
M31
M33
Cha MCs
Ori MC
LMC
SMC
Serendipity Survey
FIR Galaxies Catalogue
Stickel, Lemke, Klaas, Krause, Egner (2004)
Galactic Latitude
Galactic Longitude

Statistical Results from ISOSS: Galaxies







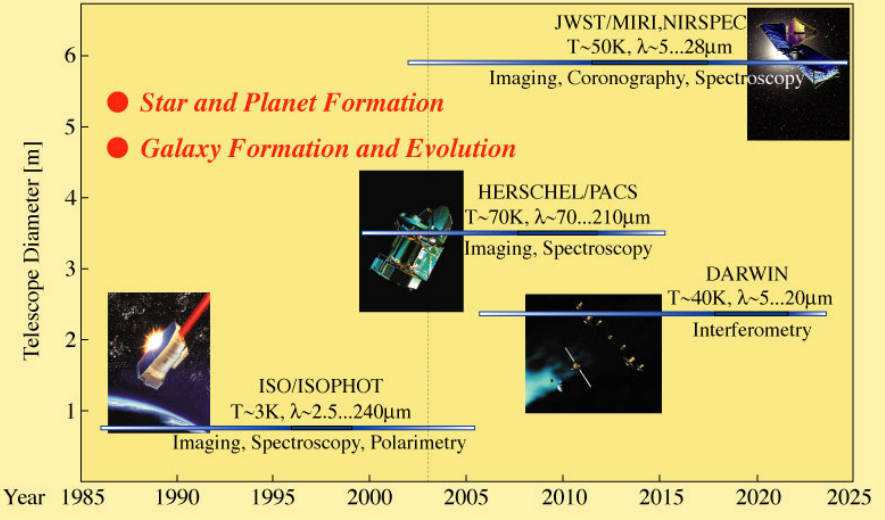


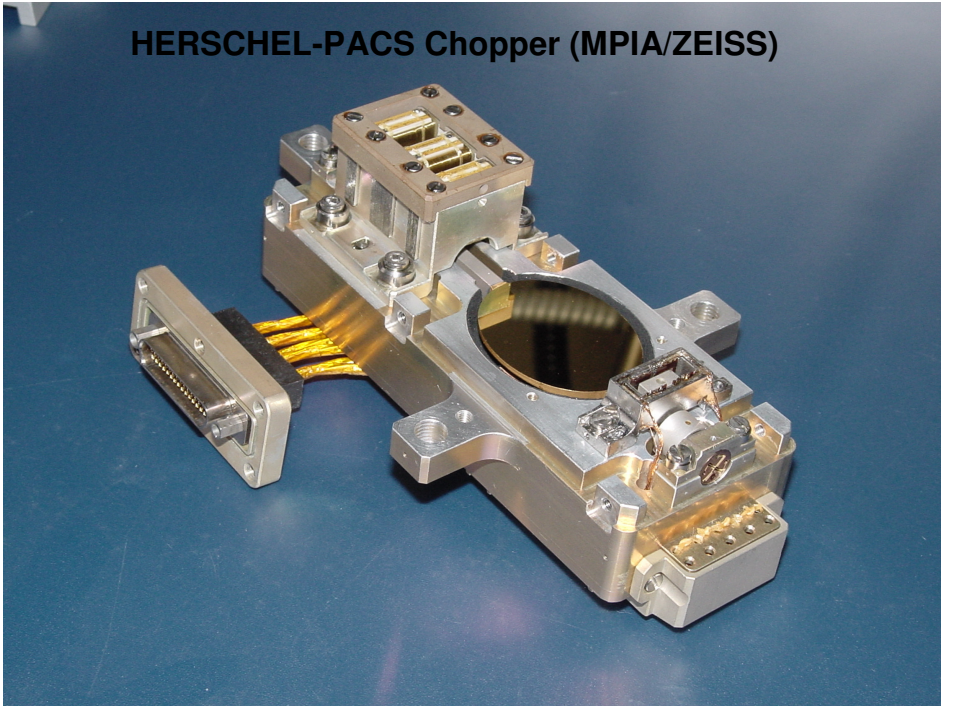
Publication statistics (~March 2006)

Total	1326		
With Data	1201		
No Data	125		
With OT Data Only	345		
With OT Data	746		
With GT Data Only	380		
With GT Data	742		
With non-metapropid Data Only	62		
With non-metapropid Data	245		
CAM data	399	1 paper per	8 hours
CAM OT data	184		
CAM GT data	264		
LWS data	311	1 paper per	6 hours
LWS OT data	203		
LWS GT data	167		
PHT data	341	1 paper per	9 hours
PHT OT data	192		
PHT GT data	209		
SWS data	512	1 paper per	6 hours
SWS OT data	364		
SWS GT data	301		

Strategy for Infrared Space Observatories at MPIA

(Status March 2004)

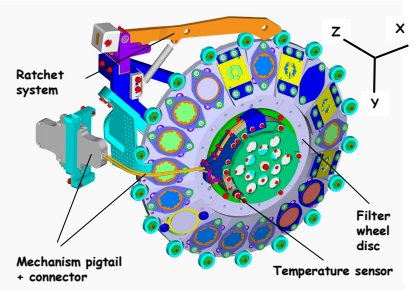


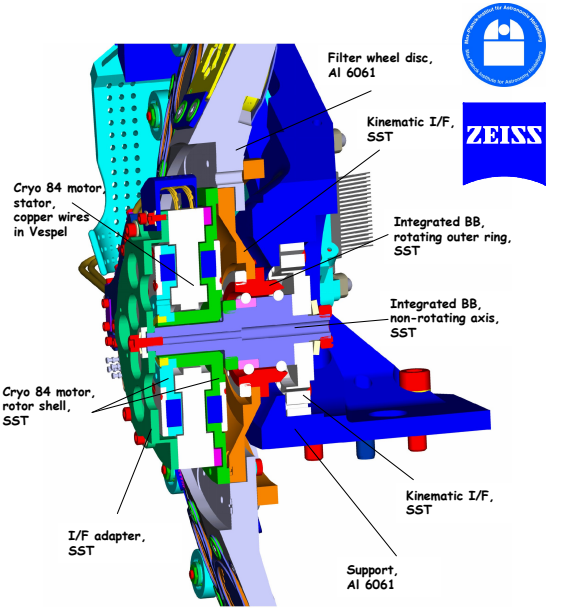

HERSCHEL-PACS Chopper (MPIA/ZEISS)

HERSCHEL-PACS Guaranteed Time Observations

Title	led by	Time	Field	Mode
The earliest phases of star formation	Henning et al.	125h (115MPIA, 10F)	Gal.	Key
Gould Belt survey: Probing the origin of the IMF	Andre, Saraceno et al.	170h (70F, 70I, 20B, 10MPIA)	Gal.	Key
The Circumstellar Environment in Post-Main-Sequence Objects	Groenewegen, Kerschbaum et al.	187h (137B,50A)	Gal.	Key
Triggered massive star formation	Zavagno et al.	20h (20F)	Gal.	Normal
Star formation and activity in infrared bright galaxies at 0<z<1	Sturm et al.	180h (150 MPE, 30MPIA)	Extragal.	Key
The ISM in low metallicity environments	Madden et al.	30 of 150h (30F, 120 SPIRE)	Extragal.	Key
The Dusty Young Universe	Stickel et al.	170h (100MPIA, 20B, 50MPE)	Extragal.	Key
PACS Evolutionary Probe	Lutz et al.	570h (360MPE, 80F, 80E, 50I)	Extragal.	Key

Filter Wheel Mechanisms JWST-MIRI

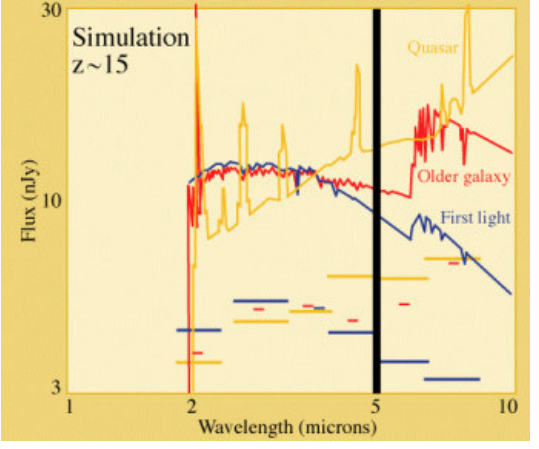




MIRI – Probing Nature of First Light Candidates

SLOAN z > 6.3 prior to reinonization

WMAP z > 12 initial stars



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