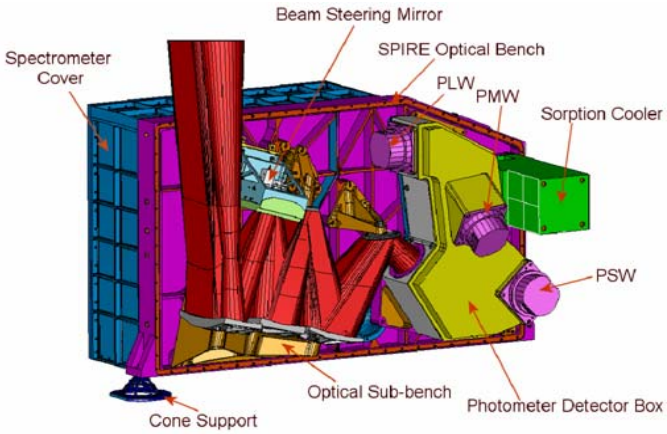
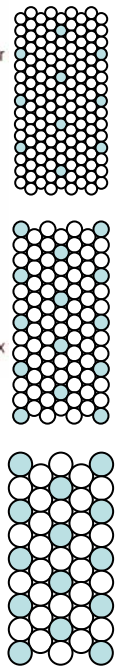
SPIRE – Spectral and Photometric Imaging Receiver

One of the three science instruments on the ESA Herschel Space Observatory

Instrument



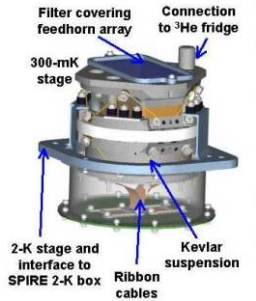


Imaging Photometer

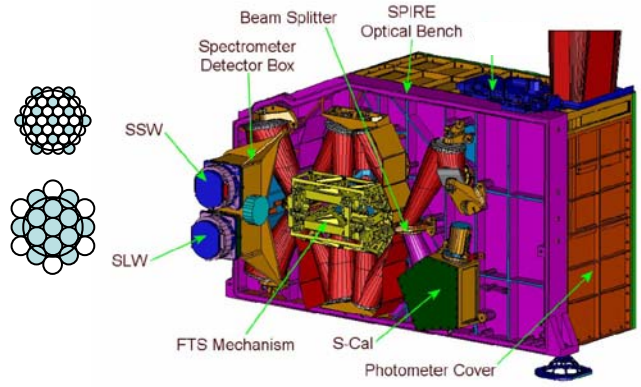
Simultaneous observation in 3 bands
139, 88, and 43 pixels
Wavelengths: 250, 350, 500 μm
$\lambda/\Delta\lambda \sim 3$
FOV 4' x 8', beams 18", 25", 36"

General

Beam Steering Mirror
T= 0.3 K by ^{3}He sorption cooler
Hexagonal Spider-web bolometer arrays



Detector Assembly



Imaging Fourier Transform Spectrometer

Simultaneous imaging observation of the whole spectral band
37 and 19 pixels
Wavelength range: 194-672 μm
$\lambda/\Delta\lambda$ = 40, 160, or 1000 at 250 μm
FOV 2.6' circular, beams 16", 34"

Estimated Photometer Sensitivities

Wavelengths (μm)	250	350	500
Point Source (mJy, 7-point mode)	1.8	2.2	1.7
Small map (mJy, 5σ, 1hr)	6.2	8.4	7.1
Large map (mJy, 5σ, 1hr)	3.7	5.3	4.6

Estimated Spectrometer Sensitivities

Wavelengths (μm)	200-315	315-500	500-670
Point Source (10^{-17} Wm^{-2}, 5σ, 1hr, res 0.04 cm^{-1})	2.5-4	2-3	3-4
2.6' map (10^{-17} Wm^{-2}, 5σ, 1hr, res 0.04 cm^{-1})	~15	~10	~15
Point Source (mJy, 5σ, 1hr, res 1 cm^{-1})	85-125	70-110	110-130
2.6' map (mJy, 5σ, 1hr, res 1 cm^{-1})	~500	~400	~500

The SPIRE Consortium: SPIRE is being designed and built by a consortium of institutes and university departments from across Europe, Canada and the USA, under the leadership of a Priciple Investigator (Professor M.J. Griffin) located at the University of Wales, Cardiff. The member institutes are: Astronomy Technology Centre (ATC), Edinburgh; Observatoire de Meudon (DESPA), Paris; CEA, Service des Basses Temperatures (SBT), Grenoble; Goddard Space Flight Center (GSFC), Maryland; Instituto de Astrofisica de Canarias (IAC), Tenerife; Insitut d'Astrophysique Spatiale (IAS), Orsay; Imperial College London; Instituto di Fisica dello Spazio Interplanetario (IFSI), Rome; Jet Propulsion Laboratory (JPL), Pasadena; Laboratoire de Marseille (LAM), Marseille; Mullard Space Science Laboratory (MSSL), Holmbury St. Mary; Padova Observatory, Padova; University of Wales, Cardiff; Rutherford Appleton Laboratory (RAL), Chilton; CEA, Service d'Astrophysique (Sap), Saclay; University of Lethbridge, Canada; Stockholm Observatory, Sweden

For more information HSC website: http://herschel.esac.esa.int/ and additional links provided therein

(version July 2007)

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Science

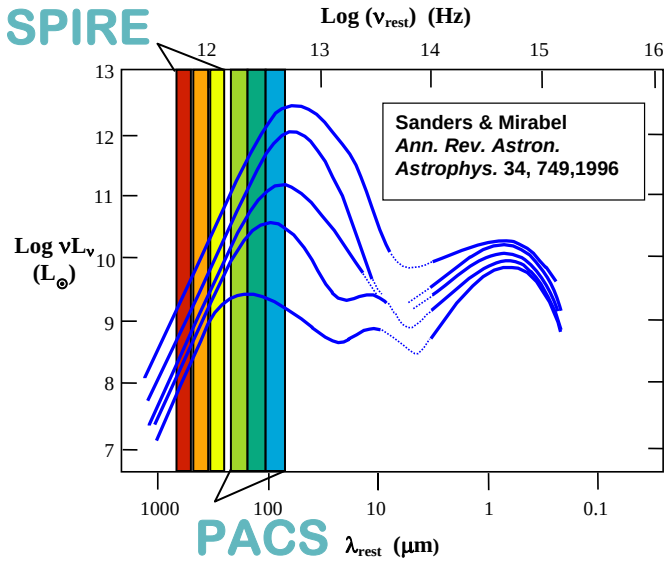
SPIRE is designed primarily to exploit **Herschel**'s capabilities in addressing two of the most prominent questions of modern astrophysics:

- **How and when did galaxies form?** - the investigation of the statistics and physics of galaxy and structure formation at high redshift;
- **How do stars form?** - the study of the earliest phases of star formation, when the protostar is still coupled to the interstellar medium.

These investigations require the ability to carry out large area deep photometric imaging surveys at far-infrared and submillimetre wavelengths, and to follow up these observations with spectroscopy of selected sources.

SPIRE will exploit the unique advantages of **Herschel**: its large-aperture, cold, low-emissivity telescope; the complete lack of atmospheric emission giving access to the poorly explored 194-672 μm range, and the large amount of high quality observing time. Because of these advantages, **SPIRE** will have unmatched sensitivity for deep photometry and moderate-resolution spectroscopy.

Although **SPIRE** has been optimized for the two main scientific programs, it will offer the astronomical community unique observing capabilities to tackle many other astrophysical topics: giant planets, comets, the galactic interstellar medium, nearby galaxies, ultraluminous infrared galaxies, and active galactic nuclei. Its capabilities will remain unchallenged by the ground based and the airborne observatories which are planned to come into operation over the next decade.



SPIRE's photometric bands, together with those of PACS, will cover emission of very cold dust, an interval where many ultraluminous infrared galaxies radiate most of their energy.