



Photodetector Array Camera & Spectrometer (PACS) for the ESA Herschel Space Observatory



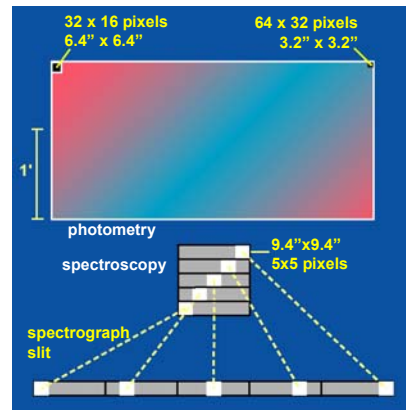
The Herschel Space Observatory, an ESA cornerstone mission to be launched in spring 2007, will explore the formation and evolution of galaxies and stars through photometric and spectroscopic observations in the far-infrared and submillimeter wavelength range. With a 3.5 m telescope, passively cooled to ~ 75 K, and a liquid Helium cryostat for the focal plane instruments, it will step into a new regime of angular resolution and sensitivity at these wavelengths and, for the first time, allow observations of luminous objects in the distant universe at the expected peak of their emission.

MPE as the PI-institute in a European consortium of 14 institutes from 6 countries is leading the construction and operation of one of the three focal plane instruments, the Photodetector Array Camera & Spectrometer (PACS). PACS will be a combined imaging photo/spectrometer for the wavelength range 57–210 μm .

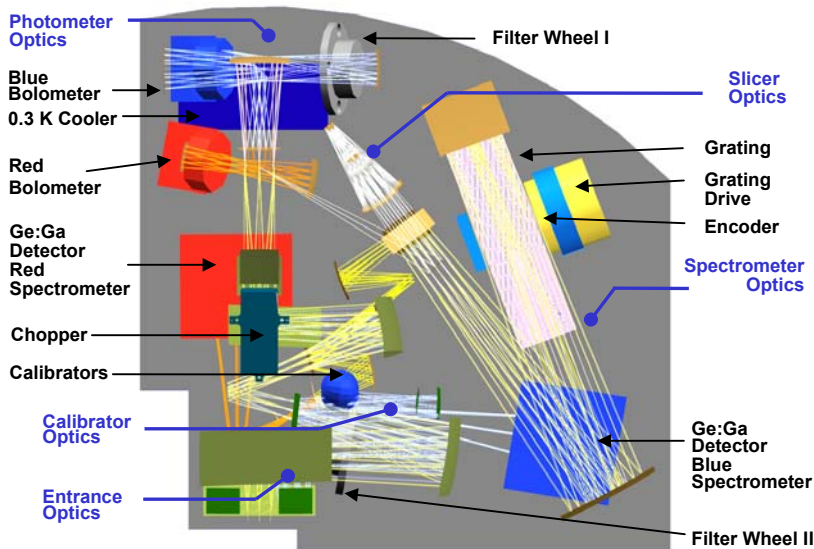
Instrument Concept

- **Imaging photometry**
 - two bands simultaneously (60-90 or 90-130 μm and 130-210 μm) with dichroic beam splitter
 - two bolometer arrays (32x16 and 64x32 pixels)
 - point source detection limit ~ 3 mJy (5σ , 1h)
- **Integral field line spectroscopy**
 - wavelength range 57 - 210 μm with 5x5 pixels, image slicer, and long-slit grating spectrograph ($R \sim 1500$)
 - two 16x25 Ge:Ga photoconductor arrays (stressed/unstressed)
 - point source detection limit $2 \dots 8 \times 10^{-18}$ W/m² (5σ , 1h)

Focal Plane Footprint



Focal Plane Unit Layout



The PACS Focal Plane Unit involves complex optics (image slicer, anamorphic collimation and imaging), precision cryomechanisms (chopper and grating drive), and advanced far-infrared detectors (stressed Ge:Ga photoconductor arrays and large format filled Si bolometer arrays). The entire unit is kept at ~ 5 K; the photoconductor arrays are operated at 1.8 K while the bolometers are cooled to 0.3 K through a dedicated ³He sorption refridgerator.