

HERSCHEL

Space Observatory

Herschel, ESA's future infrared observatory, has the largest mirror ever built for a space telescope. At 3.5-metres in diameter the mirror will collect long-wavelength radiation from some of the coldest and most distant objects in the Universe. In addition, Herschel will be the only space observatory to cover a spectral range from the far infrared to sub-millimetre.

Infrared radiation is undetectable to the human eye and represents the heat emitted by an object - even objects that we might think of as being cold, such as an ice cube. An infrared telescope can, therefore, look into cool regions of space and study objects invisible to optical telescopes. Infrared radiation can penetrate the gas and dust clouds that hide objects from optical telescopes allowing astronomers to see deep into star forming regions, galactic centres and planetary systems. Cooler objects, such as molecular clouds and forming stellar systems, even dust enshrouded galaxies, which barely emit optical light are visible in the infrared.

Alongside the mirror, the other main element of the Herschel spacecraft is its giant cryogenic cooling system. To observe the faintest signals the instruments onboard must be at a temperature close to absolute zero (-273.15°C) to remove any contribution from the spacecraft's own heat. To reduce the solar heating of the spacecraft the solar panels also serve as a heat shield and keep the telescope and cryostat permanently in the shade.

But why go into space? The simple reason is that the Earth's atmosphere acts as a shade at most infrared wavelengths. In addition, the atmosphere itself produces its own infrared radiation. To observe in the infrared from the ground is like trying to view the stars during a cloudy day!

