

The birth of galaxies and stars

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Experts at Cardiff University, UK, are designing and building highly sophisticated equipment, which will travel deep into [space](#) to enable scientists to look back in time to observe the formation of galaxies and stars. A team in the School of Physics and Astronomy is heading an international consortium, led by Cardiff's Professor Matt Griffin, to produce SPIRE. This is a three-colour camera and spectrometer, which will be launched aboard the European Space Agency's Herschel Space Observatory in 2007.

It will detect radiation at very long wavelengths, revealing distant galaxies - up to 10 billion light years away - which are invisible to other telescopes. This is equivalent to looking up to 10 billion years into the past, and hence SPIRE will be able to view distant galaxies in their early stages of formation. SPIRE will also be able to look at closer clouds of dust and gas in our own galaxy, and view the formation of stars in "stellar nurseries".

The Cardiff team, led by Dr Peter Hargrave, has worked with engineering experts in the University's Manufacturing Engineering Centre (MEC) to produce highly specialised lenses and sophisticated Kevlar supports for SPIRE's sensors. These sensors have to be kept at -273°C (0.3 degrees above absolute zero — the lowest possible temperature) in order to detect this long-wavelength radiation.

The production of the lenses was itself a complex operation, involving a technique called "hot embossing," which ensures the material maintains its original characteristics even at -273C .

In order to keep the detectors so cold, the detectors and cooling system have to be thermally isolated from all the other equipment. So the MEC's experts have manufactured components for a sophisticated Kevlar "cat's cradle" to suspend the detector housings.

"This is a very important and exciting project," said Dr Hargrave.

"Cardiff is playing a central role — not just through the science, but in the technical challenges of engineering the sophisticated equipment to make it possible. It has been a great help to have the engineering experts right alongside us in Cardiff University."

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