

Astronomers get their hands dirty as they lift the veil on galactic dust

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The stage was set for dramatic advances in the study of galactic dust in a recent workshop funded by the European Science Foundation (ESF) 's Exploratory Workshop. The big breakthrough is the ability to detect the dust at much higher resolution from its infrared radiation, according to Simone Bianchi, co-convenor of the ESF workshop. "It has been possible to do this since the eighties, but the new instruments have a higher sensitivity," said Bianchi.

At the same time new computer models are making it possible to work out the structure of the galaxy lying behind the dust, even though it cannot be observed directly at any wavelength. The key here is that the dust is acting as a relay for radiation emitted by the stars behind it. The dust absorbs high energy radiation from the stars and then heats up as a result. It then re-emits in the infra red waveband, which can now be detected with sensitive new instruments.

Plans were made at the workshop to use the European Space Agency's new infrared space telescope called Herschel, which will be launched in 2008 and be capable of detecting infrared radiation emitted by distant galactic dust. "The new instruments will allow us to detect dust associated with less dense regions of the interstellar medium," said Bianchi.

Astronomers also hope to learn more about the role played by dust in star formation. As Bianchi pointed out, there is a well established connection between the dust and the gas from which stars are formed. But the detailed relationship is unknown, and will require knowledge about the dust itself, in particular its molecular structure and lifecycle.

The ESF workshop focused mainly on spiral galaxies, because these are heavily obscured by dust. Galaxies are split into three categories by their structure, spiral, elliptical, and irregular. There is less dust in elliptical galaxies, while irregular galaxies are more difficult to model because they lack any orderly structure. "Spiral galaxies can be modelled in a more direct way because of their relatively simple geometry," said Bianchi. "However, recent comparison with observations of dust emission has shown that models may need a higher degree of complexity. This can be achieved now with the advances in computational facilities."

The ESF workshop was well timed to help Europe exploit the full

potential of the data that will be obtained from the new instruments. It has already brought together the relevant European groups specialising in spiral galaxies and modelling dust, providing the platform for major advances in the field.

The workshop, held in Ghent, Belgium in May 2007, brought together 29 researchers from 10 different countries. Each year, ESF supports approximately 50 Exploratory Workshops across all scientific domains. These small, interactive group sessions are aimed at opening up new directions in research to explore new fields with a potential impact on developments in science.

Source: European Science Foundation

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