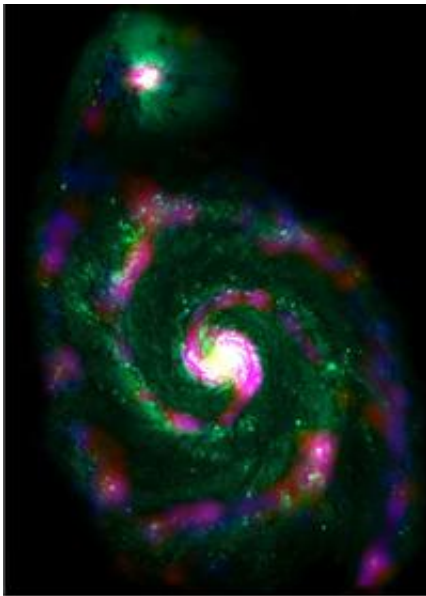


Revolutionary new camera reveals the dark side of the Universe

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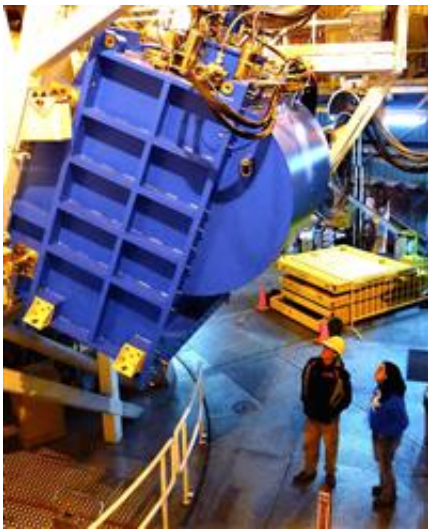
A composite image of the Whirlpool Galaxy (also known as M51). The green image is from the Hubble Space Telescope and shows the optical wavelength. The submillimetre light detected by SCUBA-2 is shown in red (850 microns) and blue (450 microns). The Whirlpool Galaxy lies at an estimated distance of 31 million light years from Earth in the constellation Canes Venatici. Credit: JAC / UBC / Nasa

(PhysOrg.com) -- A new camera that will revolutionise the field of submillimetre astronomy has been unveiled on the James Clerk Maxwell Telescope (JCMT) in Hawaii SCUBA-2 is far more sensitive and powerful than previous instruments and can map areas of the sky

hundreds of times faster.

SCUBA-2 will provide unprecedented information on the early life of stars - normally obscured by the remains of the very dust and [gas cloud](#) that collapsed under its own [gravity](#) to form the star.

"When you look up at the stars, you only see the light they are emitting in the visible part of the [spectrum](#). Many galaxies, including our own [Milky Way](#), contain huge amounts of cold dust that absorbs [visible light](#) and these dusty regions just look black when seen through an [optical telescope](#). The absorbed energy is then re-radiated by the dust at longer, submillimetre, wavelengths", explains Professor Gary Davis, Director of the JCMT. "SCUBA-2 has been designed to detect extremely low [energy radiation](#) in the submillimetre region of the spectrum. To do this, the instrument itself needs to be even colder. The detectors inside SCUBA-2 have to be cooled to only 0.1 degree above absolute zero [-273.05°C], making the interior of SCUBA-2 colder than anything in the Universe that we know of!"



SCUBA-2 mounted on the James Clerk Maxwell Telescope. Credit: JAC

The project was led by STFC's UK Astronomy Technology Centre (UKATC) in Edinburgh in collaboration with a world-wide consortium of laboratories including four universities (British Columbia, Cardiff, Edinburgh and Waterloo), the US National Institute of Standards and Technology, and the Joint [Astronomy](#) Centre, which operates the James Clerk Maxwell Telescope.

Professor Ian Robson, Director of UKATC, said: "The heart of SCUBA-2, the detector arrays, are a huge achievement; a world-first and the technological challenges in making them have been absolutely immense. It is equivalent to going from a primitive wind-on film camera that people over 50 might remember using straight to a modern digital camera all in one step. It is thanks to the ingenuity and abilities of our scientists and engineers that this immense leap in progress has been achieved."

UK, Canadian and Dutch researchers have pioneered observations of the sky in the submillimetre wavelength range (0.4 to 1 millimetre) through their partnership on the James Clerk Maxwell Telescope. SCUBA-2's predecessor, SCUBA (Submillimetre Common User Bolometer Array) produced many new and unexpected discoveries, from a previously unknown population of distant, dusty galaxies (known ever since as 'SCUBA galaxies'), to the first images of cold debris discs around nearby stars, which may indicate the presence of planetary systems.

Commenting on the performance of the new instrument, Professor Wayne Holland of UKATC, and the SCUBA-2 Project Scientist, said: "With SCUBA, it typically took 20 nights to image an area about the size of the full Moon. SCUBA-2 will be able to cover the same area in a couple of hours and go much deeper, allowing us to detect faint objects that have never been seen before."

The increased mapping speed and sensitivity of SCUBA-2 make it ideal

for large-scale surveys; no other instrument will be able to survey the submillimetre sky in such exquisite detail. Dr. Antonio Chrysostomou, Associate Director of the JCMT said: "SCUBA-2's first task will be to carry out a series of surveys right across the heavens, mapping sites of star formation within our Galaxy, as well as planet formation around nearby stars. It will also survey our galactic neighbours and crucially, will look deep into space and sample the youngest galaxies in the Universe, which will be critical to understanding how [galaxies](#) have evolved since the Big Bang."

The data obtained by these surveys will allow a new and precise understanding of star formation throughout the history of the universe, and complements research being carried out on other telescopes such as the Atacama Large Millimetre Array (ALMA), currently undergoing commissioning in Chile.

Provided by Science and Technology Facilities Council

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