

Astronomers gaze back in time and map the history of the Universe

December 23 2008

(PhysOrg.com) -- UK astronomers are set to expand our knowledge of the history of our Universe with a new project to map the inception and formation of galaxies.

Making use of an Infrared Array Camera on NASA's Spitzer Space Telescope, the Spitzer Extragalactic Representative Volume Survey (SERVS) will make a very large map of the sky, capable of detecting extremely faint galaxies. The primary aim is to chart the distribution of stars and black holes from when the Universe was less than a billion years old to the present day.

The survey is one of the largest ever awards of observing time on a space-based observatory - a total of 1400 hours.

The project leader, Dr Mark Lacy, currently at the Spitzer Science Center at Caltech, but soon to move to the University of Southampton, says "This mid-infrared survey fills a crucial gap in wavelength between the large near-infrared surveys being conducted by UK-based teams, and the far-infrared surveys to be conducted by Herschel and SCUBA-2. It will allow us to study the formation and evolution of massive galaxies like our own Milky Way in a truly representative volume of the Universe for the first time."

Dr Duncan Farrah at the University of Sussex, whose work is funded by the Science and Technology Facilities Council, says "This is likely to be the benchmark near-infrared survey for the next decade. The great depth

of the SERVS data means we can detect moderately massive galaxies when the Universe was less than 8% of its current age. The combination of the SERVS data with data from the Herschel spacecraft (launch April 2009) also means we can see both relatively old, evolved stars, and young, dust-shrouded bursts of star formation. We will thus obtain a complete picture of how galaxies are assembled in the early Universe."

The combination of sensitivity and area mapped by SERVS is unprecedented; the sensitivity means that galaxy formation can be studied from when the Universe was very young, while the wide area means that these formation processes can be studied in the context of the underlying distribution of 'dark' matter. This power will be enhanced by a careful planned synergy with new observations from other facilities.

The sky regions were carefully chosen to coincide with those that will also have deep imaging from the Herschel Space Observatory, the SCUBA-2 camera on the James Clark Maxwell Telescope (JCMT) and from the VISTA Deep Extragalactic Origins VIDEO survey (see notes). Each of these facilities provides a different perspective on the processes of galaxy formation and each project has a strong level of UK leadership. The combination of data over a wide range in wavelength means we will obtain a complete picture of how these galaxies evolve; no part of the formation process will be 'hidden' due to the effects of dust obscuration.

Dr Seb Oliver at the University of Sussex says "it is fantastic to see major international astronomical facilities both on the ground and in space working in harmony to tackle the fundamental questions of galaxy formation and evolution".

Dr Matt Jarvis at the University of Hertfordshire adds "The combination of SERVS and VIDEO will allow us to make the definitive study of how galaxies grow over the history of the Universe. However, the major

improvement over past surveys is the combination of depth and area, allowing us to carry out these studies over both the densest and sparsest regions of the Universe. This will enable us to build up a picture of how galaxy formation and evolution is affected by the environment in which the galaxies reside."

Work on the survey is due to start in early 2009 which also sees the start of the International Year of Astronomy (IYA2009). With the participation of 140 countries worldwide, and with events taking place nationally, regionally and globally throughout the year, IYA2009 will not only allow people to observe first hand some of the amazing celestial bodies that make up our Universe, but will provide a wide variety of events and projects, from touring astronomy exhibitions to virtual blog interactions with practicing astronomers.

Provided by Science and Technology Facilities Council

Citation: Astronomers gaze back in time and map the history of the Universe (2008, December 23) retrieved 7 February 2023 from <https://phys.org/news/2008-12-astronomers-history-universe.html>

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