Astronomer's new guide to the galaxy: Largest map of cold dust revealed

July 1 2009

Colour-composite image of part of the Galactic Plane seen by the ATLASGAL survey. In this image, the ATLASGAL submillimeter-wavelength data (at 870 μm) are shown in red, overlaid on a view of the region in infrared light, from the Midcourse Space Experiment (MSX) in blue (8.28 μm) and in green (14.65/21.3 μm). The total size of the image is approximately 42 degrees by 1.75 degrees. Image: ESO.

This new guide for astronomers, known as the APEX Telescope Large Area Survey of the Galaxy (ATLASGAL) shows the Milky Way in submillimetre-wavelength light (between infrared light and radio waves). Images of the cosmos at these wavelengths are vital for studying the birthplaces of new stars and the structure of the crowded galactic core.

"ATLASGAL gives us a new look at the Milky Way. Not only will it help us investigate how massive stars form, but it will also give us an overview of the larger-scale structure of our galaxy", said Frederic Schuller from the Max Planck Institute for Radio Astronomy, leader of the ATLASGAL team.

The area of the new submillimetre map is approximately 95 square degrees, covering a very long and narrow strip along the galactic plane two degrees wide (four times the width of the full Moon) and over 40 degrees long. The 16 000 pixel-long map was made with the LABOCA submillimetre-wave camera on the ESO-operated APEX telescope. APEX is located at an altitude of 5100 m on the arid plateau of Chajnantor in the Chilean Andes — a site that allows optimal viewing in the submillimetre range. The Universe is relatively unexplored at submillimetre wavelengths, as extremely dry atmospheric conditions and advanced detector technology are required for such observations.

The interstellar medium — the material between the stars — is composed of gas and grains of cosmic dust, rather like fine sand or soot. However, the gas is mostly hydrogen and relatively difficult to detect, so astronomers often search for these dense regions by looking for the faint heat glow of the cosmic dust grains.

Submillimetre light allows astronomers to see these dust clouds shining, even though they obscure our view of the Universe at visible light wavelengths. Accordingly, the ATLASGAL map includes the denser central regions of our galaxy, in the direction of the constellation of Sagittarius — home to a supermassive black hole — that are otherwise hidden behind a dark shroud of dust clouds.

The newly released map also reveals thousands of dense dust clumps, many never seen before, which mark the future birthplaces of massive stars. The clumps are typically a couple of light-years in size, and have

masses of between ten and a few thousand times the mass of our Sun. In addition, ATLASGAL has captured images of beautiful filamentary structures and bubbles in the interstellar medium, blown by supernovae and the winds of bright stars.

Some striking highlights of the map include the centre of the Milky Way, the nearby massive and dense cloud of molecular gas called Sagittarius B2, and a bubble of expanding gas called RCW120, where the interstellar medium around the bubble is collapsing and forming new stars.

"It's exciting to get our first look at ATLASGAL, and we will be increasing the size of the map over the next year to cover all of the galactic plane visible from the APEX site on Chajnantor, as well as combining it with infrared observations to be made by the ESA Herschel Space Observatory. We look forward to new discoveries made with these maps, which will also serve as a guide for future observations with ALMA", said Leonardo Testi from ESO, who is a member of the ATLASGAL team and the European Project Scientist for the ALMA project.

Source: ESO (news : web)