Spitzer Space Telescope

Galaxy M81

National Aeronautics and Space Administration
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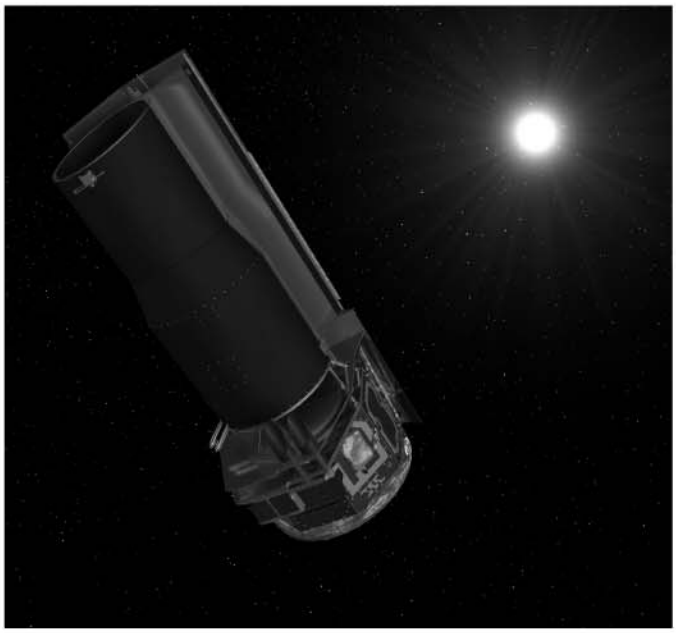
Galaxy M81

Our Beautiful Neighbor

The magnificent, dusty, star-studded arms of a nearby spiral galaxy, Messier 81, are illuminated in this image from NASA's Spitzer Space Telescope. Located in the northern constellation of Ursa Major (which also includes the Big Dipper), this galaxy is easily visible through binoculars or a small telescope. At 12 million light-years away, M81 is one of the closest spiral galaxies to our Milky Way galaxy.

Because it is so close compared to most other galaxies, M81 gives astronomers an opportunity to study the properties of a spiral galaxy in great detail. Using data from highly sensitive infrared instruments, this Spitzer image shows us old stars, interstellar dust heated by newly-formed stars, and embedded sites of star formation within this galaxy. Detailed study of infrared images of M81 have allowed astronomers also to measure the galaxy's overall dust content, as well as the rate at which new stars are being formed.



The Spitzer Space Telescope

Following the Gas and Dust

The bluish-white central bulge of the galaxy contains older stars and only a little dust. Winding outward from the bulge are the grand spiral arms, which are very rich in infrared-emitting dust. This dust is bathed in ultraviolet and visible light from the surrounding stars. When the dust absorbs this light, it heats up and then releases this heat as infrared light. By detecting these dust particles, composed of silicates (chemically similar to beach sand) and polycyclic aromatic hydrocarbons (which are organic molecules), astronomers can trace the distribution of gas and dust in the galaxy. This gas and dust provides the raw materials from which future stars will form.

Revealing Star Formation in Process

The infrared-bright clumpy knots within the spiral arms show the places where massive stars are being born in giant molecular clouds. The greenish areas are regions dominated by the infrared light radiated by hot dust that has been heated by nearby bright stars. Reddish regions in the spiral arms represent the places where dust is heated by the most luminous young stars. The image shows the power of Spitzer to explore regions unseen in visible light and to study star formation on a galactic scale. By studying the locations of these star-forming regions and comparing them to the distribution of gas and dust, astronomers can learn more about the conditions and processes needed for star formation. The white stars scattered throughout the image are foreground stars within our own Milky Way galaxy.

Multi-band Sensitivity

This Spitzer Space Telescope image was obtained using instruments that are sensitive to invisible infrared light at wavelengths about ten times longer than visible light. It is a composite made using both Spitzer's multi-band imaging photometer and its infrared array camera. Infrared emission at a wavelength of 24 microns (red) from the photometer is combined with infrared camera data at 5.8–8.0 microns (green), and 3.6–4.5 microns (blue). A micron is one millionth of a meter.

For more images from the Spitzer Space Telescope, see http://www.spitzer.caltech.edu.

The Jet Propulsion Laboratory, California Institute of Technology, manages the Spitzer Space Telescope for NASA.

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