Spitzer Space Telescope

Nebula NGC 7129

National Aeronautics and Space Administration
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A Rosebud of New Stars

A cluster of newborn stars herald their birth in this interstellar Valentine's Day commemorative picture obtained with NASA's Spitzer Space Telescope. Resembling a shimmering pink rosebud, this cluster of newborn stars was captured by state-of-the-art infrared detectors onboard Spitzer.

Located 3,330 light-years away in the constellation Cepheus and spanning 10 light-years, this reflection nebula called NGC 7129 is home to some 130 young stars surrounded by glowing clouds of gas and dust. The main stars in the NGC 7129 star-forming region are thought to be well under a million years old, which is very young by astronomical standards.

Infrared Escapes Dense Clouds

Reflection nebulas are clouds of gas and dust that shine by reflecting the light from nearby stars. The brightest reflection nebulas are the places where new stars are being formed. Stars form from dense clouds of gas and dust, which collapse under their own gravity. Very young stars are usually still embedded in thick cocoons of gas and dust making them very difficult to view directly with optical telescopes. Infrared light, however, can penetrate these dense clouds of gas and dust, giving us a view of these newly formed stars and the environment in which they live.

Previous images of NGC 7129 taken by optical telescopes show a smattering of hazy stars spotted against a luminescent cloud. Spitzer, by sensing the infrared radiation (or heat) of the cluster, produces a much more detailed snapshot. Highlighted in false colors are the hot dust particles and gases that form a nest around the stars. The rosy pink hue is produced by glowing dust grains heated by the intense light from the embedded young stars. These dust grains absorb the higher energy ultraviolet and visible light from these stars, which causes them to heat up. They then release this heat as infrared light. The reddish colors are thought to show the distribution of dust molecules, which are rich in hydrocarbons.

A Stem of Carbon Monoxide

Three very young stars near the center of the image are sending supersonic jets of gas into the cloud that impact and heat molecules of carbon monoxide. These heated molecules emit infrared light that is shown in green as the stem of the rosebud. Not all stars are formed in large clusters. Away from the main nebula and its young cluster are two smaller nebulas to the left and bottom of the central "rosebud," each containing a stellar nursery with only a few young stars. These stars beyond the nebula were previously hidden in the dark cloud and are seen for the first time in this image.

The findings by Spitzer go beyond what can be seen in the image. By analyzing the amount and type of infrared light emitted by nearly every star in the cluster, scientists can find out which stars support the swirling rings of debris, called circumstellar disks, in which planets may eventually form. Roughly half of the stars observed were found to have these disks.

A Clue to Our Own Beginnings

Infrared studies of star-forming regions give us important information about how stars are born, and thus, how our own Sun and solar system were formed. Astronomers believe that our own Sun may have formed billions of years ago in a cluster similar to NGC 7129. These observations will ultimately help astronomers determine how stellar nurseries shape the development of planetary systems similar to our own and help us understand how stars form in the crowded environments of stellar nurseries.

This Spitzer Space Telescope image was obtained with an infrared array camera that is sensitive to invisible infrared light at wavelengths about ten times longer than visible light. In this four-color composite, emission at 3.6 microns is depicted in blue, 4.5 microns in green, 5.8 microns in orange, and 8.0 microns in red (a micron is one millionth of a meter). The image covers a region that is about one quarter the size of the full moon.

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.

JPL 400-1239d 11/05 LS-2005-11-004d-JPL