National Aeronautics and Space Administration

RCW 49

Spitzer Space Telescope
Infrared Array Camera
credit: NASA/JPL-Caltech/E. Churchwell (University of Wisconsin)

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One of the most prolific birthing grounds in our Milky Way galaxy, a nebula called RCW 49 is exposed in superb detail for the first time in this new image from NASA's Spitzer Space Telescope. Located 13,700 light-years away in the southern constellation Centaurus, RCW 49 is a dark and dusty stellar nursery, inside of which an astonishing number of stars and possible planets appear to be under construction.

This false-color image, taken by Spitzer's infrared array camera, highlights the nebula's older stars (blue stars in the center pocket), its gas filaments (green) and dusty tendrils (red). Gas and dust near the center of the nebula have been cleared out by the stellar winds and radiation from the older, hot, central stars. Beyond this region, the gas and dust in RCW 49 is found in filaments, knots, bubbles, and pillars throughout the nebula, which have been sculpted by stellar winds and radiation. Within these dense areas of gas and dust lie numerous stellar nuseries where stars are being formed.

Because newly forming stars are usually deeply embedded in regions of thick dust, they cannot be seen at visible wavelengths. The visible light emitted by these stars is absorbed by the dense material surrounding them. However, in the infrared, astronomers can peer deep inside these regions and observe the visibly-hidden stars in great detail. When viewed with Spitzer's infrared eyes, RCW 49 becomes transparent, dramatically exposing the nebula's newly born and forming stars.

Spitzer has uncovered more than 300 never-before-seen newborn stars speckled throughout the murky dust clouds of RCW 49. This Spitzer data suggests that stars are being created at a more prolific rate in our galaxy than previously thought. The stars are at various stages of development, allowing astronomers to study different stages of early stellar evolution. Astronomers are interested in further studying these new-found stars because they offer a fresh look at star formation in our own galaxy.

The infrared data also suggests the presence of planet-forming disks of material around several of these newly forming stars, making these some of the farthest and faintest possible planet-forming disks ever observed. Spitzer observations add further support to the theory that planet-forming disks are a natural part of stellar evolution. Infrared studies of forming stars and planet-forming disks give us important information about how stars and planets are born, and thus, how our own Sun and solar system were formed.

The Spitzer Space Telescope has also allowed astronomers to study the spectra of newly forming stars at various stages of development. Spitzer specta of RCW 49 show the presence of organic compounds called polycyclic aromatic hydrocarbons in the dusty regions of the nebula (red). These organic molecules are produced, along with heavy elements, by the stellar nurseries found in RCW 49. Polycyclic aromatic hydrocarbons are commonly found on Earth and are usually created by combustion processes. They are in the black parts of burnt toast, in the grit on your grill, and are generated by running a car or burning a candle.

This image is a combination of four wavelengths of infrared light: 3.6 microns (blue), 4.5 microns (green), 5.8 microns (orange), and 8 microns (red). A micron is one millionth of a meter; a human hair is about 100 microns thick. The Jet Propulsion Laboratory, California Institute of Technology, manages the Spitzer Space Telescope for NASA.