National Aeronautics and
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Jet Propulsion Laboratory
California Institute of Technology
Pasadena, California

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SPITZER SPACE TELESCOPE

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NASA's Spitzer Space Telescope has captured in stunning detail the spidery filaments and newborn stars of the Tarantula Nebula, a rich star-forming region also known as 30 Doradus. This nebula is one of the largest and most dynamic regions of star formation known and is the only nebula outside our galaxy visible to the unaided eye.

The Tarantula nebula is located 170,000 light-years away in the southern constellation of Dorado, in our neighboring galaxy, the Large Magellanic Cloud. This glowing cloud of gas and dust surrounds a central star cluster called NGC 2070 (or R136), which contains some of the brightest and most massive stars in the universe. The brightest of these are blue supergiant stars which are up to 100 times more massive than the Sun, and are at least 100,000 times more luminous. These stars will live fast and die young, at least by astronomical standards, exhausting their nuclear fuel in a few million years.

It is primarily these hot, young stars that illuminate the Tarantula nebula with their intense radiation. Their radiation and strong stellar winds have sculpted the gas and dust clouds of the nebula into the elongated, spidery shapes seen in this image. Many of these newly formed stars, however, cannot be seen by optical telescopes because they are still hidden within regions of thick gas and dust. While other telescopes have highlighted the nebula's spidery filaments and its star-studded core, none was capable of fully penetrating its dust-enshrouded pockets of younger stars.

The Spitzer Space Telescope, using its sensitive infrared detectors, is able to see past this obscuring material and peer into the hidden central regions of the nebula, providing an unprecedented view of these massive newborn stars. This image shows, for the first time, a more complete picture of this huge stellar nursery, including previously hidden stars. The image also captures in stunning detail a hollow cavity around the stars, where the intense radiation from these young stars has blown away cosmic dust. The dense regions of gas and dust shown in this image will be the birthplace of even more stars in the future.

Stars form from collapsing clouds of gas and dust. Since newly formed stars are embedded in clouds of gas and dust, they are difficult to detect in visible light. Any visible light that the new star emits is absorbed by the material surrounding it. Only later, when the new star's radiation blows away most of the material surrounding it, can the star be seen in visible light. Until then, these new stars can usually be detected only in the infrared.

The Spitzer image of this star-forming region will help astronomers learn about the formation and early evolution of young stars. By studying this portrait of a family of stars, astronomers can piece together how stars in general, including those like our Sun, form.

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 a wavelength of 3.6 microns is shown in blue, 4.5 microns in green, 5.8 microns in orange, and 8.0 microns in red. The image covers a region that is three-quarters the size of the full moon.