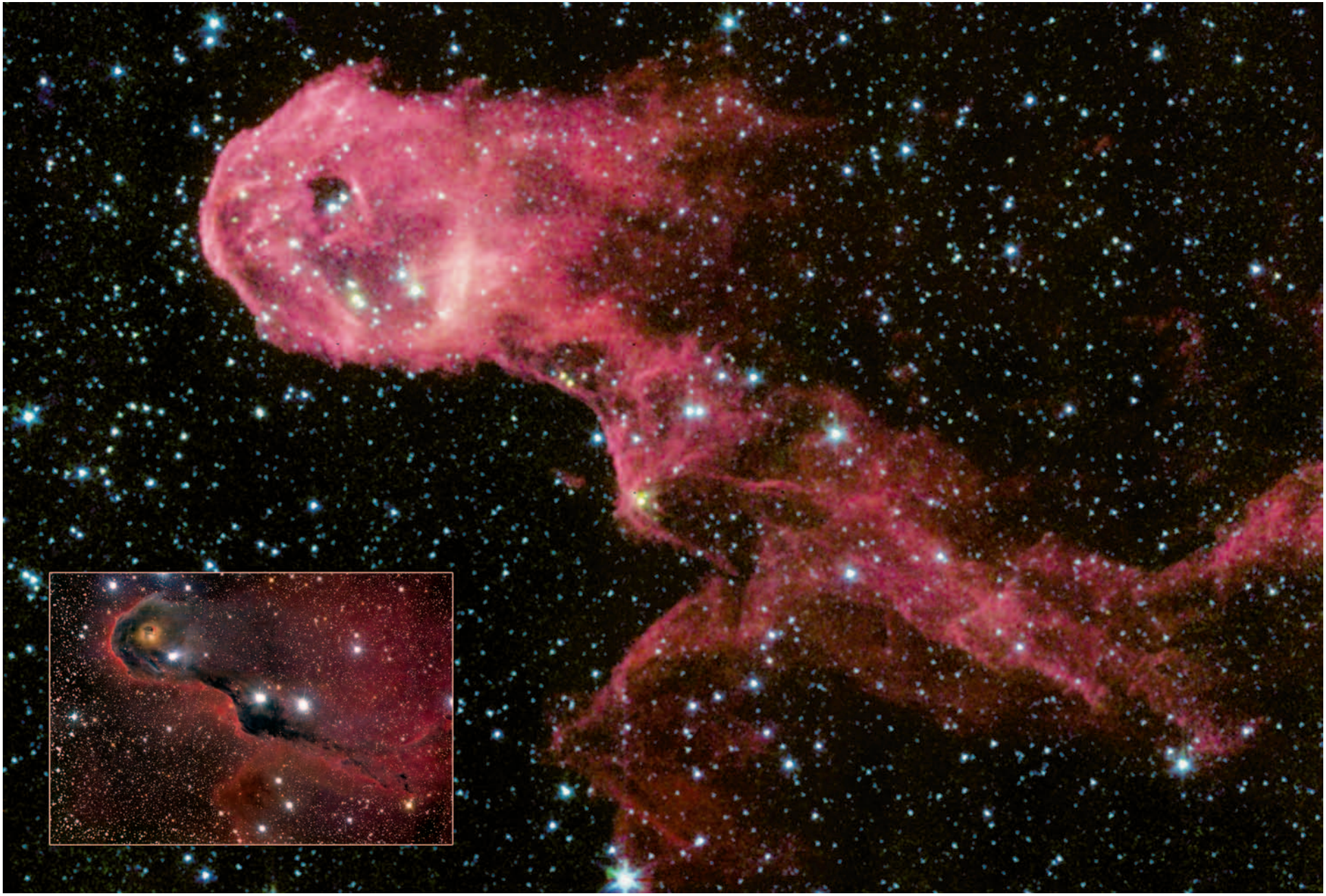

National Aeronautics and
Space Administration

Jet Propulsion Laboratory
California Institute of Technology
Pasadena, California

The Elephant's Trunk Nebula

SPITZER SPACE TELESCOPE

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Resembling a creature on the run with flames streaming behind it, this NASA Spitzer Space Telescope image of a dark globule in the emission nebula IC 1396 is in spectacular contrast to the view seen in visible light. Spitzer's sensitive infrared detectors have unveiled the brilliant hidden interior of this opaque cloud of gas and dust and have revealed, for the first time, a glowing stellar nursery with never-before-seen young stars and stars still in the process of formation.

Called the Elephant's Trunk Nebula, this elongated dark globule is part of a region of star formation that lies 2,450 light-years away in the constellation of Cepheus. It is a region of dense gas that is being compressed by the intense radiation and stellar winds from a nearby massive star, which lies to the left of the cloud. The compression of the gas in the globule is triggering the formation of stars within it. The stellar winds from the massive star are also responsible for sculpting the colorful filaments of the globule. These winds produce a dense circular rim making up the "head" of the globule and a swept-back tail of gas. The dark globule is seen in silhouette in visible-light pictures, backlit by the illumination of a bright star located to the left and outside of the image.

The Elephant's Trunk Nebula lies within a larger emission nebula called IC 1396. The glowing emission nebula IC 1396 is a hot, glowing cloud of gas and dust in space. Emission nebulas absorb the light of nearby stars and reach very high temperatures. The high temperature causes them to glow. Emission nebulas are often found in regions of space where new stars are forming.

Many previously hidden stars have been unveiled in this Spitzer image. These stars are embedded in thick regions of gas and dust, which absorb the visible light from these stars, preventing them from being seen with optical telescopes. Infrared light, however, can travel through the thick gas and dust that block visible light, allowing these stars to be detected. Spitzer also sees young stars which are barely starting to shine and are too cool to be seen by optical telescopes. These stars are all bright in the infrared because of their glowing disks of surrounding material.

One pair of young stars (LkHa 349 and LkHa 349c) that formed from the dense gas in the globule has cleared a spherical opening within the head of the globule and can be seen in both optical and Spitzer infrared images. While one of these stars is much fainter than the other in the optical images, they show a similar brightness in the infrared Spitzer image. This indicates the presence of a thick and dusty disk around LkHa 349c. These disks, called circumstellar disks, are the places where planets and moons will likely form in the future. These disks are much thicker in the early stages of star formation and glow brightly in the infrared.

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. It is a four-color composite of invisible light, showing emissions from wavelengths of 3.6 microns (blue), 4.5 microns (green), 5.8 microns (orange) and 8.0 microns (red). A micron is one millionth of a meter.