One Star's Life Ends With A Ring

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A new image from NASA's Spitzer Space Telescope shows the shimmering embers of a dying star, and in their midst a strange doughnut-shaped ring.
"Spitzer's infrared vision has revealed what could not be seen before - a massive ring of material that was expelled from the dying star," said Dr. Joseph Hora, a Spitzer scientist at the Harvard-Smithsonian Center for Astrophysics. "The composition of the ring and how it formed are mysteries we hope to address with further Spitzer studies."

The dying star is part of a planetary nebula called NGC 246. When a star like our own Sun begins to run out of fuel, its core shrinks and heats up, boiling off the star's outer layers. Leftover material shoots outward, expanding in shells around the star. This ejected material is then bombarded with ultraviolet light from the central star's fiery surface, producing huge, glowing clouds - planetary nebulae - that look like giant jellyfish in space.

These cosmic beauties last only a relatively brief time, about a few thousand years, in the approximately 10-billion-year lifetime of a star. About four-fifths of all stars will end their lives in this way, leaving behind glowing gaseous shapes that slowly fade to invisibility.

The name "planetary nebula" comes from early astronomers who thought the rounded clouds looked like planets.

NGC 246 is located 1,800 light-years away in the constellation Cetus. Observations of this object by visible-light telescopes showed a

glistening orb of gas and dust surrounding a central, compact star.

By cutting through the envelope of dust with its infrared eyes, Spitzer provided a more transparent view through and behind the nebula. This new view revealed that an apparently simple nebula contained hidden complexities. The cause of the lopsided, off-center ring featured in the new Spitzer image-whether the influence of an unseen binary star companion, a giant planet, magnetic fields, or stellar rotation-remains a mystery.

"What we have seen with Spitzer is totally unexpected," said Hora. "Although previous observations showed the nebula had a patchy appearance, Spitzer has revealed a ring component of this dying star, possibly consisting of hydrogen molecules, which was unknown."

In the new false-color picture, the ring appears clumpy and red and off-center from the central star, while fluorescent, or ionized, gases are green. The central star is the left white spot in the middle of the cloud.

Ultimately, these data will help astronomers better understand how planetary nebulae take shape, and how they nourish new generations of stars. A scientific paper on this and other planetary nebulae observed by Spitzer will be published on Sept. 1st in The Astrophysical Journal Supplement, along with 75 other papers reporting Spitzer early mission results.

Headquartered in Cambridge, Mass., the Harvard-Smithsonian Center for Astrophysics (CfA) is a joint collaboration between the Smithsonian Astrophysical Observatory and the Harvard College Observatory. CfA scientists, organized into six research divisions, study the origin, evolution and ultimate fate of the universe.

Launched August 25, 2003, the Spitzer Space Telescope is the fourth of

NASA's Great Observatories, a program that also includes the Hubble Space Telescope, the Chandra X-ray Observatory and the Compton Gamma Ray Observatory.

JPL manages the Spitzer Space Telescope mission for NASA's Office of Space Science, Washington, D.C. Science operations are conducted at the Spitzer Science Center at the California Institute of Technology in Pasadena. JPL is a division of Caltech. Spitzer's infrared camera, which captured the new picture of NGC 246, was built by the Goddard Space Flight center, directed by the Smithsonian Astrophysical Observatory. This instrument's development was led by Dr. Giovanni Fazio of the CfA.