

## A Very Bright Star

In the competition for the title of "Brightest Star in the Galaxy," a new contender has just been announced. Hello, I'm Daniel Brennan.

*This Spitzer Space Telescope podcast is part of a series highlighting recent discoveries in infrared astronomy. It's produced by NASA's Spitzer Science Center at the California Institute of Technology in Pasadena. The Spitzer mission is managed by NASA's Jet Propulsion Laboratory.*

Currently, the brightest known star in the Milky Way galaxy is the supergiant Eta Carina, which puts out a whopping solar wattage of 4.7 million Suns. But the exact luminosity of these enormous stars is notoriously difficult to pin down precisely, so when an infrared survey by NASA's Spitzer Space Telescope peered through the dust at the center of the galaxy, a new prospect shone through.

The star was previously known, but because it is deeply embedded in a cloud of dust now nicknamed the Peony Nebula, after the flower it resembles, astronomers hadn't realized just how big it actually is. The Spitzer study, led by Dr. Lidia Oskinova of Potsdam University in Germany, took advantage of the nebula's transparency at infrared wavelengths to determine that the Peony Nebula Star probably puts out about 3.2 million Suns' worth of light. But because of the uncertainty in the measurements and the variability of supergiant stars, it may, in fact, shine brighter than Eta Carina.

The brightest stars in the universe are also the biggest. Astronomers estimate the Peony Nebula Star kicked off its life with a hefty mass of roughly 150 to 200 times that of our Sun. Stars this massive are rare, and puzzle astronomers because they push the limits required for stars to form. Theory predicts that if a star starts out too massive, it can't hold itself together and must break into a double or multiple star system instead.

The Peony Nebula Star has a large girth too. It's a type of giant blue star called a Wolf-Rayet star, with a diameter of roughly 200 times that of our Sun. That means this star, if placed where our Sun is, would extend out to Mercury.

With so much mass, the star can barely keep itself together. It sheds an enormous amount of stellar matter in the form of strong stellar winds over its relatively short lifetime of a few million years. This matter is pushed so hard by strong radiation from the star that the wind is accelerated to a speed of about 1.6 million kilometers per hour in only a few hours. That's a rate of acceleration comparable to a Space Shuttle launch, but sustained rather than only a couple minutes. As the material is blown away from the star, it forms the bulbous nebula that kept the Peony Nebula Star hidden for so long.

Ultimately, the Peony Nebula Star will blow up in a fantastic supernova. In fact, Oskinova and her colleagues say that the star is ripe to explode soon, which in astronomical terms means anytime from now to millions of years from now. For the Spitzer Science Center, I'm Daniel Brennan.

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