Spitzer Telescope spots a ghoulish gourd

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This infrared image from NASA's Spitzer Space telescope shows a cloud of gas and dust carved out by a massive star. A drawing overlaid on the image reveals why researchers nicknamed this region the "Jack-o'-lantern Nebula." Credit: NASA/JPL-Caltech

A carved-out cloud of gas and dust looks like a celestial jack-o'-lantern in this image from NASA's Spitzer Space Telescope.

A massive star—known as an O-type star and about 15 to 20 times

heavier than the sun—is likely responsible for sculpting this cosmic pumpkin. A recent study of the region suggests that the powerful outflow of radiation and particles from the star likely swept the surrounding dust and gas outward, creating deep gouges in this cloud, which is known as a nebula.

Spitzer, which detects infrared light, saw the star glowing like a candle at the center of a hollowed-out pumpkin. The study's authors have fittingly nicknamed the structure the "Jack-o'-lantern Nebula."

A plethora of objects in the universe emit infrared light, often as heat, so objects tend to radiate more infrared light the warmer they are.

Invisible to the human eye, three wavelengths of infrared light compose the multicolor image of the nebula seen here. Green and red represent light emitted primarily by dust radiating at different temperatures, though some stars radiate prominently in these wavelengths as well. The combination of green and red in the image creates yellow hues. Blue represents a wavelength mostly emitted, in this image, by stars and some very hot regions of the nebula, while white regions indicate where the objects are bright in all three colors. The O-type star appears as a white spot in the center of a red dust shell near the center of the scooped-out region.

A high-contrast version of the same image makes the red wavelength more pronounced. Together, the red and green wavelengths create an orange hue. The picture highlights contours in the dust as well as the densest regions of the nebula, which appear brightest.

The study that produced these observations appears in the Astrophysical Journal and examined a region in the outer region of the Milky Way galaxy. (Our sun is halfway to the edge of the disk-shaped galaxy.) Researchers used infrared light to count the very young stars in different

stages of early development in this region. They also counted protostars—infant stars still swaddled in the dense dust clouds in which they were born. When combined with tallies of adult stars in these regions, these data will help scientists determine whether the rates of star and planet formation in the galaxy's outer regions differ from the rates in middle and inner regions.

Scientists already know that conditions differ slightly in those outer areas. For example, interstellar clouds of gas and dust are colder and more sparsely distributed there than they are near the center of the galaxy (which may reduce the rate of star formation). Star-forming clouds in those outer areas also contain lower amounts of heavy chemical elements, including carbon, oxygen and other ingredients for life as we know it. Eventually, more studies like this one might also determine whether planets similar in composition to Earth are more or less common in the outer galaxy than in our local galactic neighborhood.

The data used to create this image was collected during Spitzer's "cold mission," which ran between 2004 and 2009.

Provided by Jet Propulsion Laboratory

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