



AG Carinae

Giant Star Teeters on the Edge of Destruction

The mighty blue supergiant AG Carinae is not your normal star. One of the brightest stars in our Milky Way galaxy, AG Carinae is sizzling hot, shining with the brilliance of 1 million suns, and living life in the fast lane.

The stellar behemoth is using up its nuclear fuel at a ferocious rate, waging a tug-of-war battle between gravity and radiation, causing the star to change in size and brightness. This battle causes the star to shed its outer layers of material into space. One or more giant eruptions 10,000 years ago created the expanding shell of dust and gas in this image taken in visible and ultraviolet light (front).

These outbursts are typical for stars like AG Carinae, a rare breed of star called a luminous blue variable (LBV). These stars are among the most massive and brightest stars known — living for only a few million years compared to the roughly 10-billion-year lifetime of our Sun.

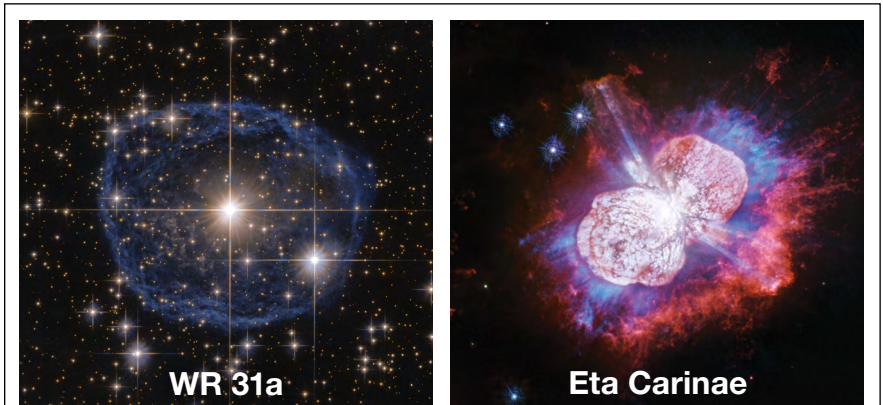
Although AG Carinae is inactive now, its searing radiation and powerful stellar wind (streams of charged particles) have been shaping the surrounding nebula. Over time, the stellar wind catches up with cooler expelled material, plows into it, and pushes it farther away from the star. This “snowplow” effect has cleared a cavity around the star and sculpted bluish-white filamentary structures in the dust.

The glowing red material is hydrogen gas laced with nitrogen gas. The diffuse red material at upper left pinpoints where the stellar wind has broken through a thin region of material and swept it into space.

Less than 50 of these rare luminous blue variable stars are known among our neighboring galaxies. These stars are expected to end their lives in titanic supernova blasts, which enrich the universe with heavy elements, such as aluminum, sodium, and magnesium.

The Hubble Space Telescope snapped an image of this monster star to commemorate the 31st anniversary of the Earth-orbiting observatory’s launch into space.

Image Credit: NASA, ESA, and STScI



Not all luminous blue variables look alike. These massive, unstable stars have distinct appearances, as shown in the two images above of WR 31a (left) and Eta Carinae (right). These unpredictable stars undergo outbursts that expel their outer layers of gas and dust. The eruptions can create a bubble of gas and dust that encircles the doomed star, as seen in the snapshot of WR 31a. But, for Eta Carinae, the ejected material takes on a vastly different shape. The twin lobes of material were expelled in the 1840s in a giant outburst, dubbed the “Great Eruption.” Researchers suggest the lobes may have been created by the interplay of up to three stars bound together in the system. An outer shell of material was shed in another outburst before the Great Eruption.

*Credit for WR 31a: ESA/Hubble & NASA; Acknowledgement: Judy Schmidt
Credit for Eta Carinae: NASA, ESA, N. Smith (University of Arizona), and J. Morse (BoldlyGo Institute)*

VOCABULARY

Luminous blue variable (LBV): a type of blue supergiant star that is massive, bright, and unstable. Sporadic and unpredictable outbursts cause the star to change in size and brightness over time.

Nebula: a cloud of gas and dust located between stars and/or surrounding stars. Nebulas are often places where stars form.

National Aeronautics and Space Administration

Goddard Space Flight Center

8800 Greenbelt Road
Greenbelt, Maryland 20771

www.nasa.gov

LG-2021-5-663-GSFC

For images and information on the Hubble mission, go to hubblesite.org and www.nasa.gov/hubble. Follow the Hubble mission on social media: @NASAHubble.

