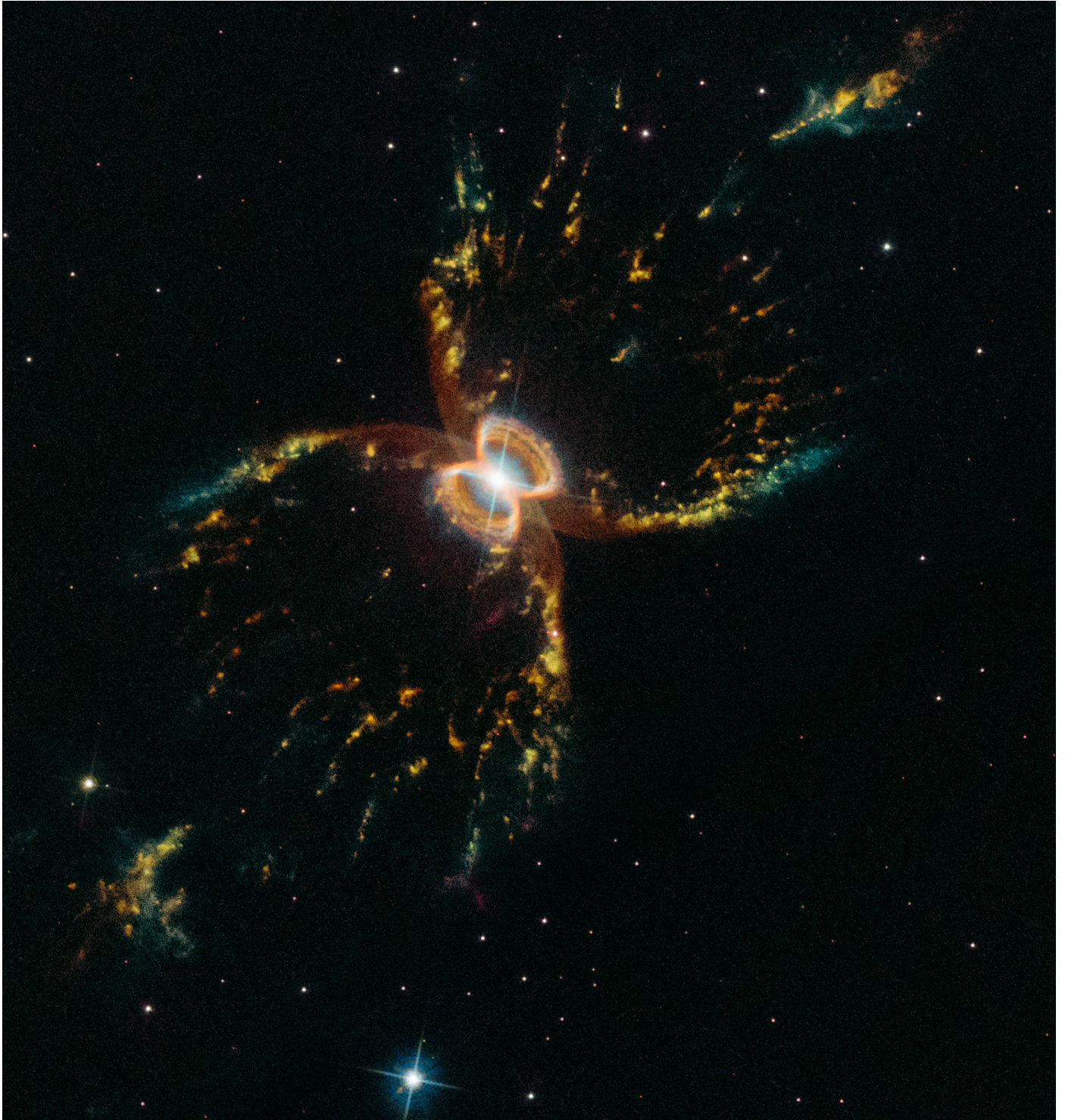
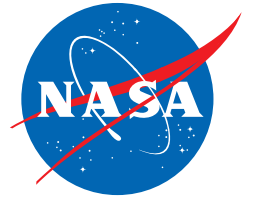


# Southern Crab Nebula

National Aeronautics and  
Space Administration



# Hubble Cracks Open a Cosmic Crab

This colorful image from the Hubble Space Telescope highlights the unique shapes around an aging star system. Called the Southern Crab Nebula, it has two nested hourglass-shaped structures. The outer hourglass is brightest at the edges, giving the illusion of crab legs.

This huge symmetrical structure was sculpted by the interaction between a whirling pair of stars, seen as the bright glow in the center of the nebula. The duo is made up of an aging red giant star and a white dwarf—a burned-out star. The red giant star is shedding some of its outer layers, which spill onto the white dwarf, creating a gaseous disk. The white dwarf's orbit constricts the gaseous outflow so that it only speeds away above and below the disk, forming the two sets of hourglass shapes. The red giant is apparently expelling its gas in episodes because the inner and outer structures were created at different times.

Astronomers used Hubble to divide the light from the Southern Crab Nebula into its various colors, or wavelengths—a process called spectroscopy. This technique shows which chemical elements are present and how they are distributed in the nebula. Energized by radiation from the stellar companions, each element glows in specific colors (or wavelengths) of light.

Spectroscopy is a fundamental astronomical method for revealing not only composition but also the temperature and motion of luminous bodies. Combined with imaging, it is an important diagnostic tool that helps astronomers develop a comprehensive picture of astronomical objects.

Most of the elements in the universe are produced inside of stars through nuclear fusion. When a star dies, it recycles some of its material back into the galaxy. This same process is happening in the Southern Crab Nebula. The recycled material from the stellar death provides the building blocks for new stars, planets, and possibly life.

This image was released to celebrate Hubble's 29th anniversary in space.

*Credit: NASA, ESA, and STScI*

You can get images and news about the Hubble Space Telescope on our website, [hubblesite.org](http://hubblesite.org). For images and information on the Hubble mission, go to [www.nasa.gov/hubble](http://www.nasa.gov/hubble). Follow the Hubble mission on social media: [@NASAHubble](https://twitter.com/NASAHubble).

For education activities, go to the Amazing Space website at [amazingspace.org](http://amazingspace.org).

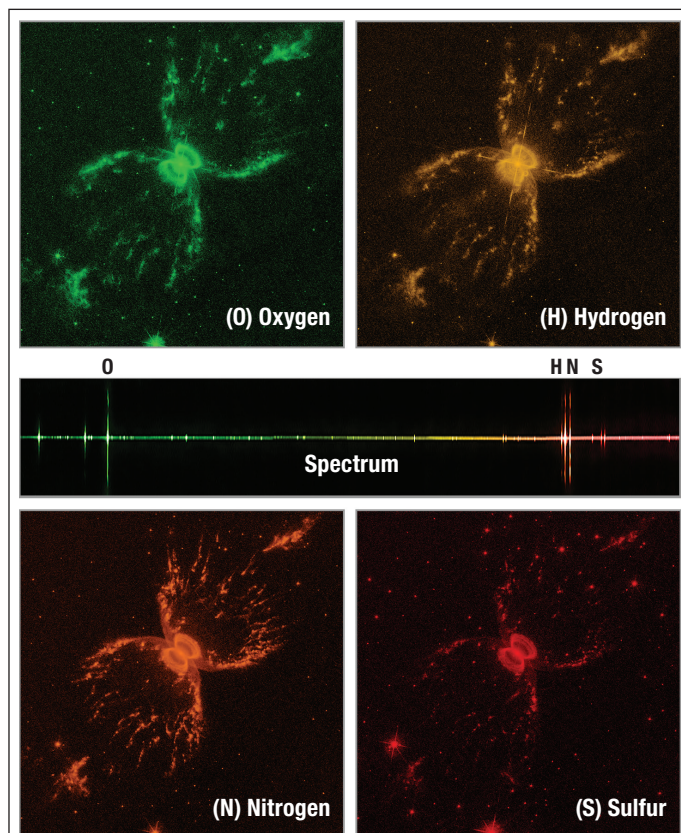
National Aeronautics and Space Administration

[Goddard Space Flight Center](http://GoddardSpaceFlightCenter.gov)

8800 Greenbelt Road  
Greenbelt, Maryland 20771

[www.nasa.gov](http://www.nasa.gov)

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This diagram illustrates the spectral observations from Hubble that astronomers used to study the chemical makeup of the Southern Crab Nebula. The nebula contains elements forged within an aging star system. Hubble divided the light from the nebula's filaments to record the emission from oxygen (green), hydrogen (yellow), nitrogen (orange), and sulfur (red). Those elements are shown in the images above. In the middle is the resulting spectrum showing the location of the specific colors emitted from these elements.

## VOCABULARY

**Red Giant:** A Sun-like star nearing the end of its life. Its outer layers expand and become cooler, forming a bright star much larger and cooler than the Sun.

**White Dwarf:** The hot, compact remains of a star that has exhausted its sources of fuel for nuclear fusion in its core.

**Nuclear Fusion:** The process by which multiple atomic nuclei join together to form a heavier nucleus. When light nuclei combine to form heavier nuclei, energy is released. This energy is what powers stars like our Sun.



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