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Tour: A Cosmic Amethyst in a Dying Star

(Credit: NASA/CXC/A. Hobart)
[Runtime: 03:01]

[With closed-captions](#) (at YouTube)

On Earth, amethysts can form when gas bubbles in lava cool under the right conditions. In space, a dying star with a mass similar to the Sun is capable of producing a structure on par with the appeal of these beautiful gems.

As stars like the Sun run through their fuel, they cast off their outer layers and the core of the star shrinks. This is what astronomers call a planetary nebula. Using NASA's Chandra X-ray Observatory, astronomers have found a bubble of ultra-hot gas at the center of one of these expiring stars in our Galaxy called IC 4593. At a distance of about 7,800 light years from Earth, IC 4593 is the most distant planetary nebula yet detected with Chandra.

This new image of IC 4593 has X-rays from Chandra in purple, invoking similarities to amethysts found in geodes around the globe. The plum-colored bubble detected by Chandra is from gas that has been heated to over a million degrees. These high temperatures were likely generated by material that blew away from the shrunken core of the star and crashed into gas that had previously been ejected by the star.

Astronomers also found evidence for a point-like X-ray source at the center of IC 4593. This X-ray emission has higher energies than the bubble of hot gas. The point source could be from the star that discarded its outer layers to form the planetary nebula or it could be from a possible companion star in this system.

The name planetary nebula is misleading because this class of objects has actually nothing to do with planets. Astronomers created this term about two centuries ago because they thought these objects looked like the disk of a planet through their small telescopes. Today we know that a planetary nebula is formed after the interior of a star with about the mass of the Sun contracts and its outer layers expand and cool. When our Sun nears its planetary nebula phase several billions of years from now, its outer layers could extend as far as the orbit of Venus.



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Quick Look: A Cosmic Amethyst in a Dying Star

(Credit: NASA/CXC/A. Hobart)
[Runtime: 1:12]

When stars like the Sun run out of fuel, the core shrinks and they shed their outer layers.

This phase of stellar evolution is called a 'planetary nebula'.

NASA's Chandra X-ray Observatory has detected a bubble of superheated gas at the center of one.

IC 4593 is a planetary nebula located about 7,800 light years from Earth

[Return to: A Cosmic Amethyst in a Dying Star](#) (November 12, 2020)

[News by email: [Chandra Digest](mailto:Chandra.Digest)]
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