

NASA's flagship mission for X-ray astronomy.

- [Home](#)
- [About Chandra](#)
- [Education](#)
- [Field Guide](#)
- [Photo Album](#)
- [Press Room](#)
- [Resources](#)
- [Multimedia](#)
- [Podcasts](#)
- [Blog](#)
- [Research](#)



Images by Date

[2018](#) [2017](#) [2016](#) [2015](#)
[2014](#) [2013](#) [2012](#) [2011](#)
[2010](#) [2009](#) [2008](#) [2007](#)
[2006](#) [2005](#) [2004](#) [2003](#)
[2002](#) [2001](#) [2000](#) [1999](#)

Images by Category

[Solar System](#)
[Stars](#)
[White Dwarfs](#)
[Supernovas](#)
[Neutron Stars](#)
[Black Holes](#)
[Milky Way Galaxy](#)
[Normal Galaxies](#)
[Quasars](#)
[Galaxy Clusters](#)
[Cosmology/Deep Field](#)
[Miscellaneous](#)

Images by Interest

- [Space Scoop for Kids](#)
- [4K JPG](#)
- [Multiwavelength](#)
- [Sky Map](#)
- [Constellations](#)
- [3D Wall](#)
- [Photo Blog](#)
- [Top Rated Images](#)
- [Image Handouts](#)
- [Desktops](#)
- [High Res Prints](#)
- [Fits Files](#)

Image Tutorials



- [Photo Album Tutorial](#)
- [False Color](#)
- [Cosmic Distance](#)
- [Look-Back Time](#)
- [Scale & Distance](#)
- [Angular Measurement](#)
- [Images & Processing](#)
- [AVM/Metadata](#)
- [Getting Hard Copies](#)

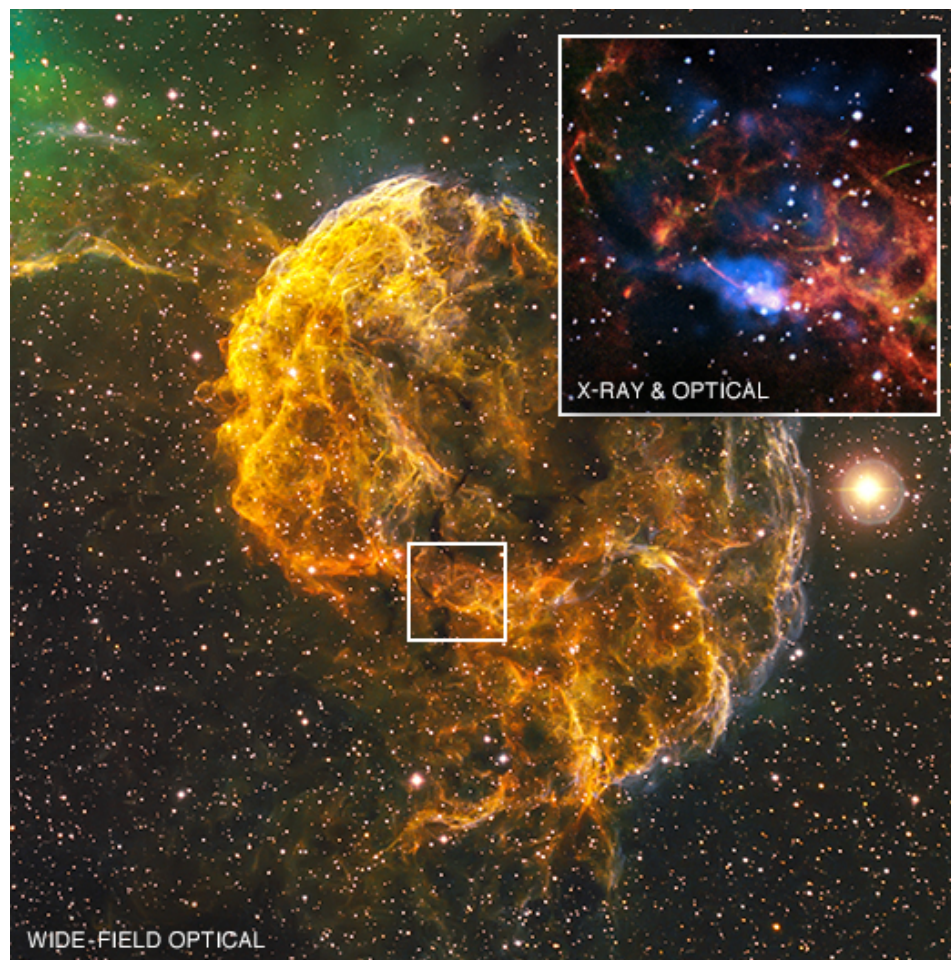
[Image Use Policy](#)

Web Shortcuts



- [Chandra Blog](#)
- [RSS Feed](#)
- [Chronicle](#)
- [Email Newsletter](#)
- [News & Noteworthy](#)
- [Image Use Policy](#)
- [Questions & Answers](#)
- [Glossary of Terms](#)
- [Download Guide](#)
- [Get Adobe Reader](#)

IC 443: What Spawned the Jellyfish Nebula?



- The Jellyfish Nebula (officially known as IC 443) is a supernova remnant about 5,000 light years from Earth.
- Astronomers have been looking for the spinning neutron star, or pulsar, from the explosion that created the remnant.
- New Chandra observations have likely spotted a pulsar on the southern edge the Jellyfish Nebula.
- The X-ray data also provide new details about the structure and properties of this pulsar.

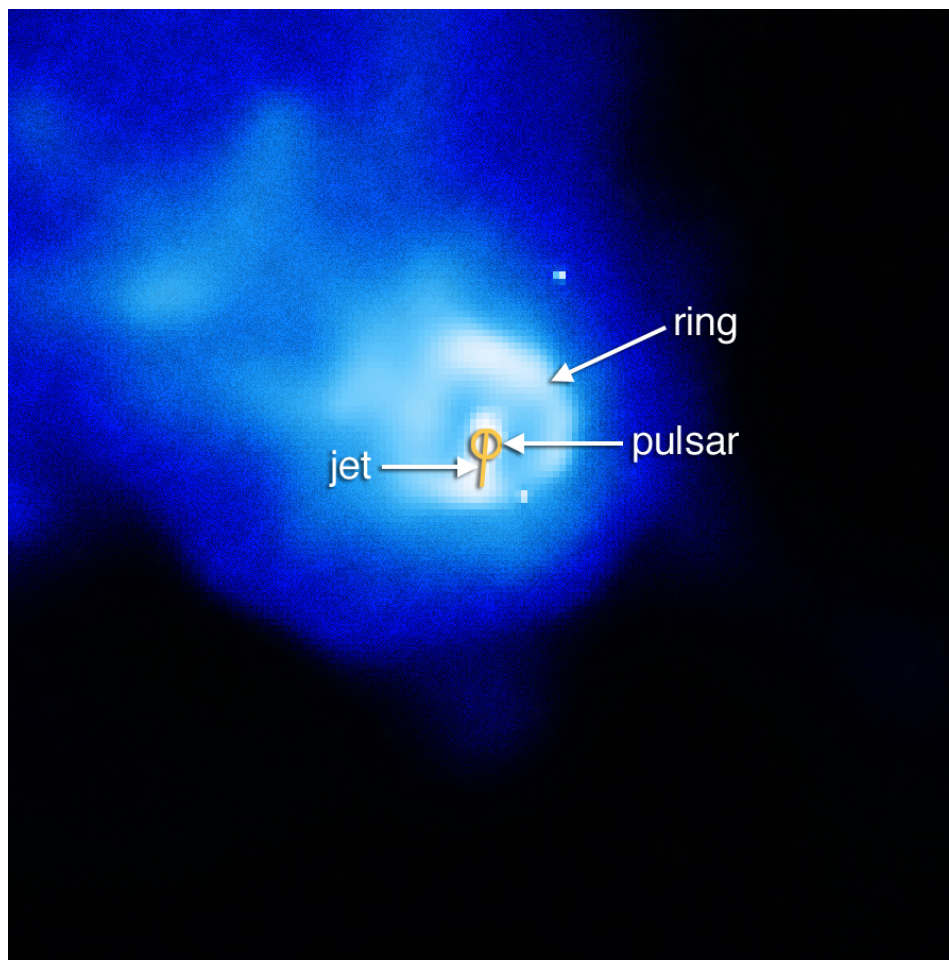
The Jellyfish Nebula, also known by its official name IC 443, is the remnant of a [supernova](#) lying 5,000 [light years](#) from Earth. New Chandra observations show that the explosion that created the Jellyfish Nebula may have also formed a peculiar object located on the southern edge of the remnant, called CXOU J061705.3+222127, or J0617 for short. The object is likely a rapidly spinning neutron star, or [pulsar](#).

When a massive star runs out of thermonuclear fuel, it implodes, forming a dense stellar core called a [neutron star](#). The outer layers of the star collapse toward the neutron star then bounce outward in a supernova explosion. A spinning neutron star that produces a beam of radiation is called a pulsar. The radiation sweeps by like a beacon of light from a lighthouse and can be detected as pulses of radio waves and other types of radiation.

This new composite image includes a wide-field view from an astrophotographer that shows the spectacular filamentary structure of IC 443. Within the inset box, another optical image from the Digitized Sky Survey (red, green, orange, and cyan) has been combined with [X-ray data](#) from Chandra (blue). The inset shows a close-up view of the region around J0617.

The Chandra image reveals a small, circular structure (or ring) surrounding the pulsar and a jet-like feature pointing roughly in an up-down direction that passes through the pulsar. It is unclear if the long, pink wisp of optical emission is related to the pulsar, as similar wisps found in IC 443 are unrelated to X-ray features from the pulsar. The ring may show a region where a high speed wind of particles flowing away from the pulsar, is slowing down abruptly. Alternately, the ring may represent a shock wave, similar to a sonic boom, ahead of the pulsar wind. The jet could be particles that are being fired away from the pulsar in a narrow beam at high speed.

The X-ray brightness of J0617 and its X-ray spectrum, or the amount of X-rays at different wavelengths, are consistent with the profiles from known pulsars. The spectrum and shape of the diffuse, or spread out, X-ray emission surrounding J0617 and extending well beyond the ring also match with expectations for a wind flowing from a pulsar.



X-ray close-up



The comet-like shape of the diffuse X-ray emission suggests motion towards the lower right of the image. As pointed out in previous studies, this orientation is about 50 degrees away from the direction expected if the pulsar was moving away from the center of the supernova remnant in a straight line. This misalignment has cast some doubt on the association of the pulsar with the supernova remnant. However, this misalignment could also be explained by movement towards the left of material in the supernova remnant pushing J0617's cometary tail aside.

This latest research points to an estimate for the age of the supernova remnant to be tens of thousands of years. This agrees with previous work that pegged IC 443's age to be about 30,000 years. However, other scientists have inferred much younger ages of about 3,000 years for this supernova remnant, so its true age remains in question.

These findings are available in a paper published in The Astrophysical Journal and is available [online](#). The authors are Douglas Swartz (Marshall Space Flight Center), George Pavlov (Penn State University), Tracy Clarke (Naval Research Laboratory), Gabriela Castelletti (IAEF, Argentina), Vyacheslav Zavlin (MSFC), Niccolo Bucciantini (INAF, Italy), Margarita Karovska (Smithsonian Astrophysical Observatory), Alexander van der Horst (George Washington University), Mihoko Yukita (Goddard Space Flight Center), and Martin Weisskopf (MSFC).

NASA's Marshall Space Flight Center in Huntsville, Alabama, manages the Chandra program for NASA's Science Mission Directorate in Washington. The Smithsonian Astrophysical Observatory in Cambridge, Massachusetts, controls Chandra's science and flight operations.

Fast Facts for IC 443:

Credit	Wide Field Optical: Focal Pointe Observatory/B.Franke, Inset: X-ray: NASA/CXC/MSFC/D.Swartz et al, Inset: Optical: DSS, SARA
Release Date	December 10, 2015
Scale	Wide Field: 1.2 deg (about 100 light years); Inset: 7 arcmin (about 10 light years)
Category	Neutron Stars/X-ray Binaries , Supernovas & Supernova Remnants
Coordinates (J2000)	RA 06h 17m 05.00s Dec +22° 21' 30.00"
Constellation	Gemini
Observation Date	06 and 08 Feb 2012
Observation Time	42 hours 13 min (1 day 18 hours 13 min).
Obs. ID	13736, 14385
Instrument	ACIS
References	Swartz, D. et al, 2015, ApJ, 808, 84; arXiv:1506.05507
Color Code	Wide Field Optical (Red, Green, Blue); Inset: Optical (Red, Green, Orange, Cyan), Inset: X-ray (Blue)
	
Distance Estimate	About 5,000 light years
	

Visitor Comments (2)



I love NASA.

Posted by Jade on Friday, 03.3.17 @ 14:46pm

This is so pretty.

Posted by Paige on Tuesday, 02.14.17 @ 09:28am

Leave Your Comment

Name:

Email:

Comments:

I'm not a robot reCAPTCHA
[Privacy](#) - [Terms](#)

[Rules](#)

The Basics

[What is it?](#)

In the constellation Gemini.


where is it located:

Rate This Image

Rating: **3.8**/5
(639 votes cast)


Download & Share

- [JPEG \(1 MB\)](#)
- [Large JPEG \(7.7 MB\)](#)
- [Tiff \(37.1 MB\)](#)
- [Handout \(pdf\)](#)
- [Image Feed](#)


Share This   

Desktops

- [1024x768](#) - 946.1 kb
- [1280x1024](#) - 1.3 MB
- [1680x1050](#) - 1.6 MB

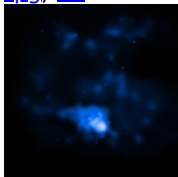
More Information 

Blog: [IC 443](#)


More Images 

X-ray Image of IC 443

[Jpg](#), [Tif](#)



[More Images](#)

Animation & Video 

Tour of IC 443



[More Animations](#)

More Releases



[IC 443](#)
(11 Dec 00)

Related Images



[PSR B1509-58](#)
(3 Apr 09)



[The Mouse](#)
(23 Sep 04)

Related Information



**Neutron Stars/X-ray
Binaries**

[X-ray Astronomy Field Guide
Questions and Answers](#)
[Chandra Images](#)

**Supernovas & Supernova
Remnants**

[X-ray Astronomy Field Guide
Questions and Answers](#)
[Chandra Images](#)

Related Podcast



[A Quick Look at the Crab
Nebula](#)



Top Rated Images



Crab Nebula



ULX in M51



Perseus Cluster

[Help](#) | [Site Map](#) | [Image Use Policy](#) | [Privacy & Accessibility](#) | [Downloads & Plugins](#) | [Glossary](#) | [Q & A](#) | [Guestbook](#) | [New & Noteworthy](#) | [CXC Science](#)

Chandra X-ray Center, Operated for NASA by the Smithsonian Astrophysical Observatory
This site was developed with funding from NASA under contract NAS8-03060.

Contact us: cxcpub@cfa.harvard.edu
Harvard-Smithsonian Center for Astrophysics
60 Garden Street, Cambridge, MA 02138 USA
Phone: 617.496.7941 Fax: 617.495.7356



Select Language ▼

Powered by [Google Translate](#)

Tweet

Like 284K

G+

