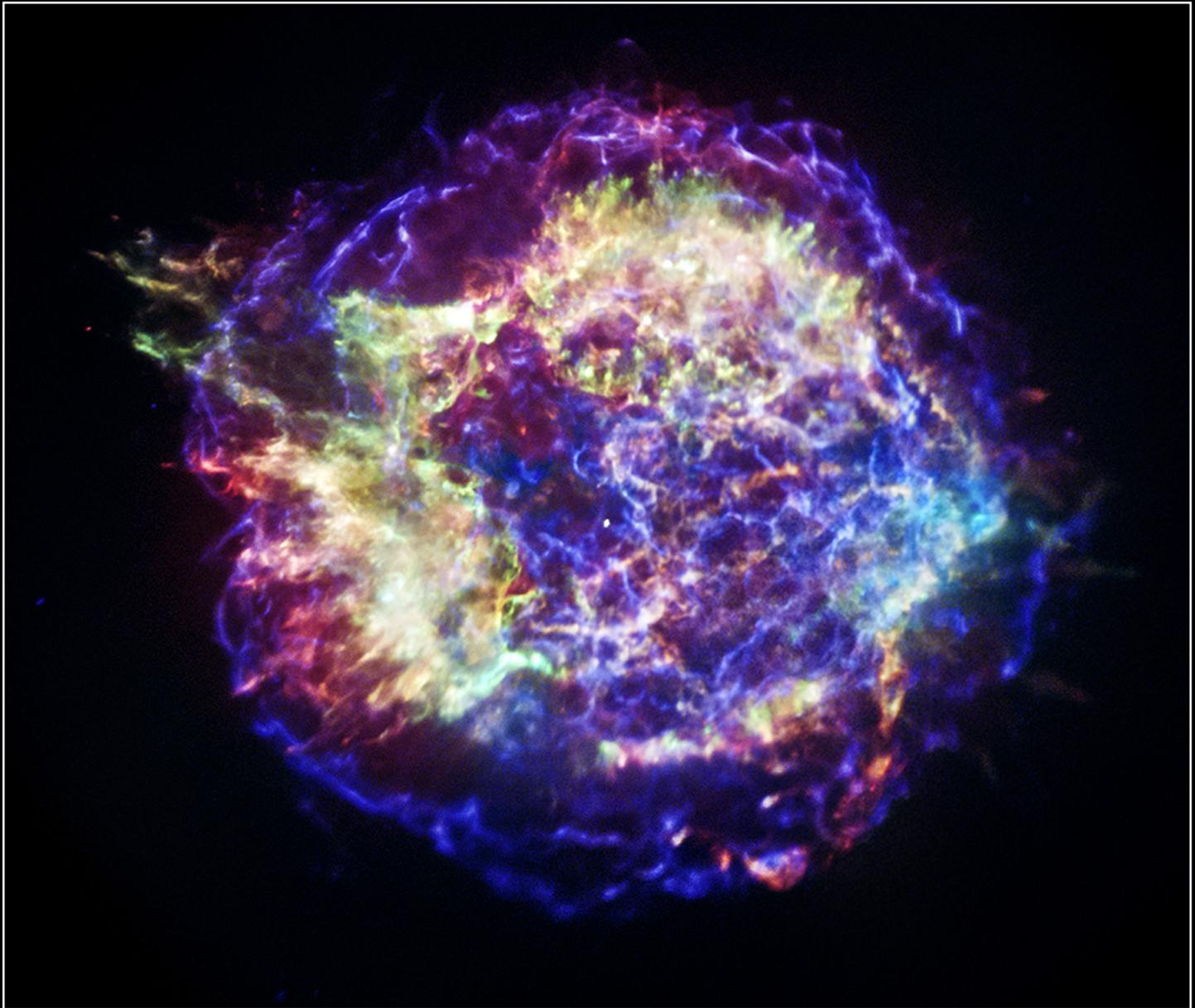




Cassiopeia A



Cassiopeia A: Exploring the Third Dimension of Cassiopeia A

The Chandra X-ray Observatory has observed the Cassiopeia A supernova remnant many times since its launch in 1999.

Cassiopeia A (Cas A) is the debris left behind after a massive star exploded.

Chandra images have been instrumental in unlocking the mysteries of this stellar explosion.

The Cassiopeia A supernova remnant is one of the most famous objects in the sky. Chandra's spectacular first image of Cas A in 1999 showed a hot point-like source close to the center of the remnant. This extremely compact object, thought to be a neutron star or black hole, had never been seen in any wavelength. In addition, the shell of material surrounding the central source was in clearer focus than ever before, displaying dense knots, complex filamentary structures, and a jet of material protruding out of the shell.

The next year, astronomers used Chandra to map the heavy elements that were ejected in the supernova blast. Separate iron, silicon, and calcium images gave important clues as to the nature of the explosion and the state of the star prior to explosion. The jet in the northeastern corner, which seems to give Cas A the shape of a fish, was seen to be made predominantly of silicon ions.

In 2004, Chandra observed Cas A for over a million seconds, yielding an extremely detailed image of the supernova remnant. In the years since then, astronomers have continued to observe Cas A with Chandra, making additional important discoveries.

For example, astronomers found evidence for a bizarre state of matter—known as a superfluid—in the neutron star at the center of Cas A. Other researchers analyzed Chandra data of Cas A to discover that the supernova remnant acts as a relativistic pinball machine by accelerating electrons to enormous energies. Scientists were also able to combine X-rays from Chandra with data from other telescopes to create a unique 3-dimensional model of Cas A—a major innovation in digital technologies with public, education, and research-based impacts.

In this image of Cas A, the lower-energy X-rays Chandra detects are red, the medium-energy X-rays are green, and the highest-energy X-rays are blue.

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.

CREDIT: NASA/CXC/SAO
RELEASED: November 15, 2013
SCALE: Image is about 8.91 arcmin across
(about 29 light years)
COORDINATES (J2000): RA 23h 23m 26.7s
Dec +58° 49' 03.00"

CONSTELLATION: Cassiopeia
OBSERVATION DATE: 16 pointings between
01/00 and 11/10
OBSERVATION TIME: 353 hours (14 days, 17 hours)
COLOR CODE: Red 0.5-1.5 keV; Green 1.5-2.5;
Blue 4.0-6.0
DISTANCE ESTIMATE: About 11,000 light years