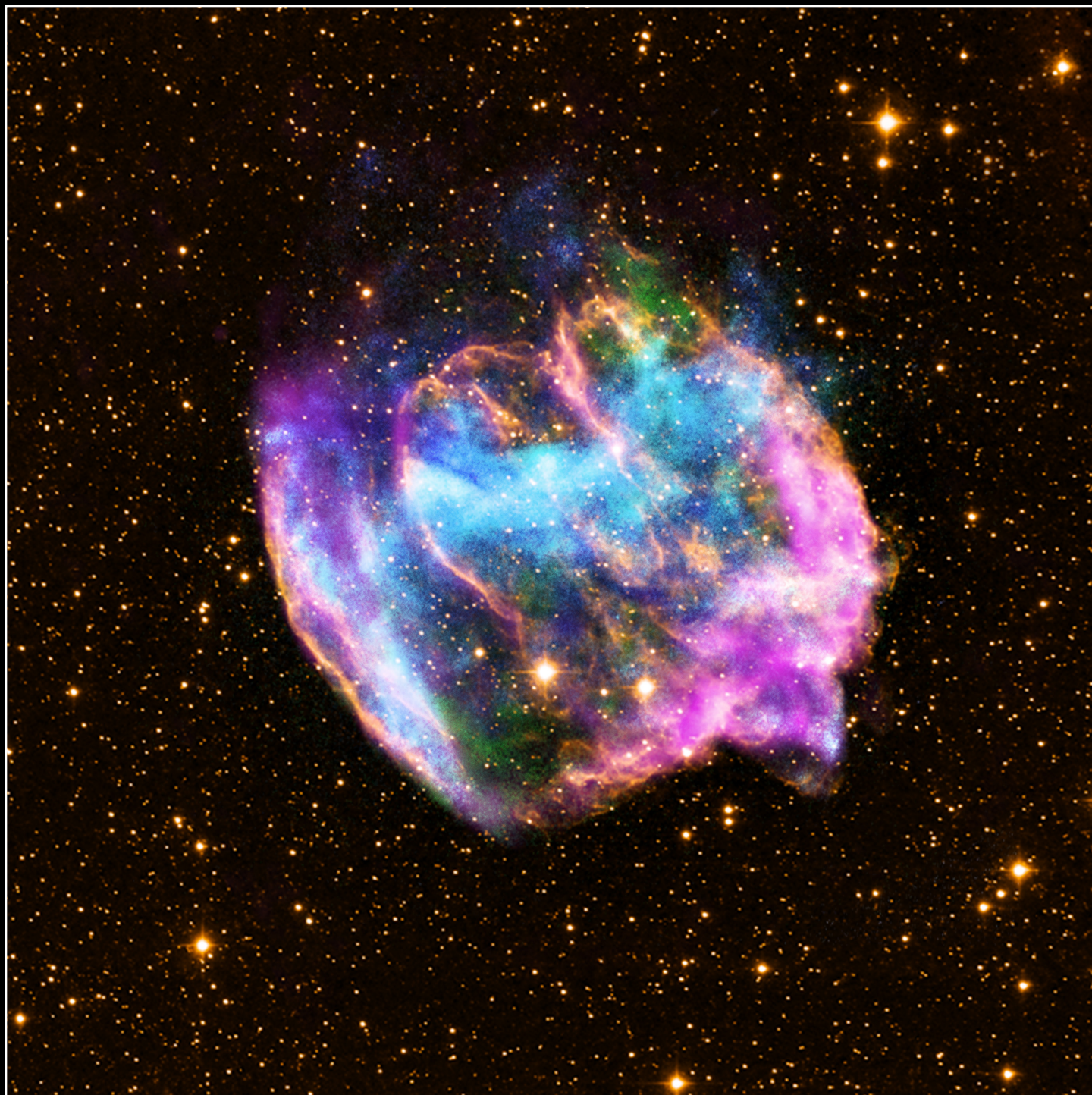


W49B



W49B: Rare Explosion May Have Created Our Galaxy's Youngest Black Hole

W49B is a highly distorted supernova remnant, produced by a rare type of explosion.

Instead of radiating out symmetrically, W49B's exploding star shot more material out from its poles versus from its equator.

There is evidence that W49B left behind a black hole —not a neutron star like most other supernovas.

If confirmed, W49B would be the most recent black hole formed in our Galaxy.

The highly distorted supernova remnant shown in this image may contain the most recent black hole formed in the Milky Way galaxy. The image combines X-rays from NASA's Chandra X-ray Observatory in blue and green, radio data from the NSF's Very Large Array in pink, and infrared data from Caltech's Palomar Observatory in yellow.

The remnant, called W49B, is about a thousand years old, as seen from Earth, and is at a distance of about 26,000 light years away.

The supernova explosions that destroy massive stars are generally symmetrical, with the stellar material blasting away more or less evenly in all directions. However, in the W49B supernova, material near the poles of the doomed rotating star was ejected at a much higher speed than material emanating from its equator. Jets shooting away from the star's poles mainly shaped the supernova explosion and its aftermath.

By tracing the distribution and amounts of different elements in the stellar debris field, researchers were able to compare the Chandra data to theoretical models of how a star explodes. For example, they found iron in only half of the remnant while other elements such as sulfur and

silicon were spread throughout. This matches predictions for an asymmetric explosion. Also, W49B is much more barrel-shaped than most other remnants in X-rays and several other wavelengths, pointing to an unusual demise for this star.

The authors also examined what sort of compact object the supernova explosion left behind. Most of the time, massive stars that collapse into supernovas leave a dense spinning core called a neutron star. Astronomers can often detect these neutron stars through their X-ray or radio pulses, although sometimes an X-ray source is seen without pulsations. A careful search of the Chandra data revealed no evidence for a neutron star, implying an even more exotic object might have formed in the explosion, that is, a black hole.

This may be the youngest black hole formed in the Milky Way galaxy, with an age of only about a thousand years, as viewed from Earth (i.e., not including the light travel time). A well-known example of a supernova remnant in our Galaxy that likely contains a black hole is SS433. This remnant is thought to have an age between 17,000 and 21,000 years, as seen from Earth, making it much older than W49B.

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: X-ray: NASA/CXC/MIT/L.Lopez et al.; Infrared: Palomar;
Radio: NSF/NRAO/VLA

RELEASED: February 13, 2013

SCALE: Image is about 8.5 arcmin across
(about 60 light years)

COORDINATES RA 19h 11m 07s
(J2000): Dec +09° 06' 00"

CONSTELLATION: Aquila

OBSERVATION DATE: 08/18/11 to 08/22/11

OBSERVATION TIME: 61 hours 7 min
(2 days 13 hours 7 min)

COLOR CODE: X-ray (Green, Blue); Infrared (Yellow);
Radio (Magenta)

DISTANCE ESTIMATE: About 26,000 light years