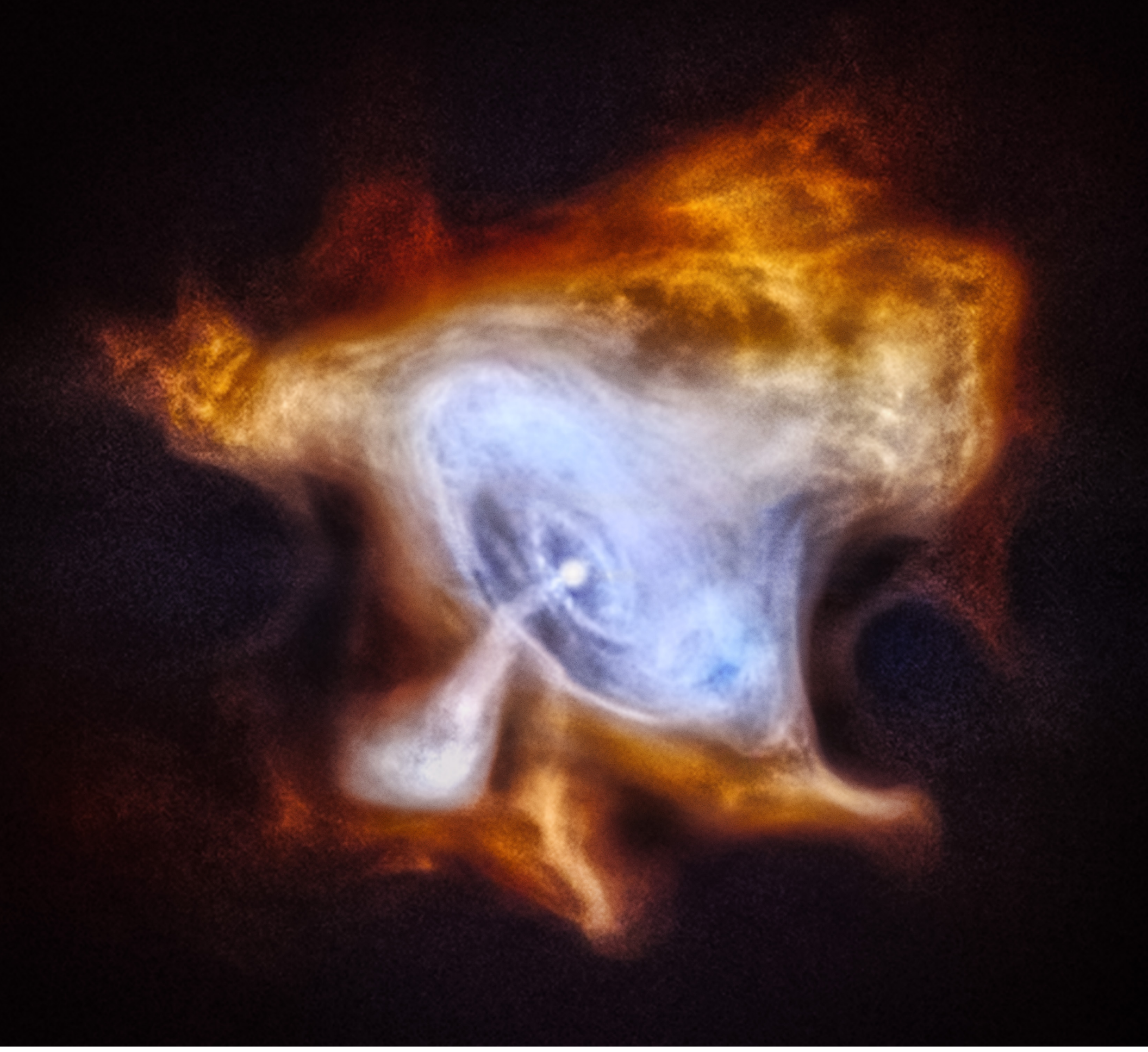

JANUARY 2015

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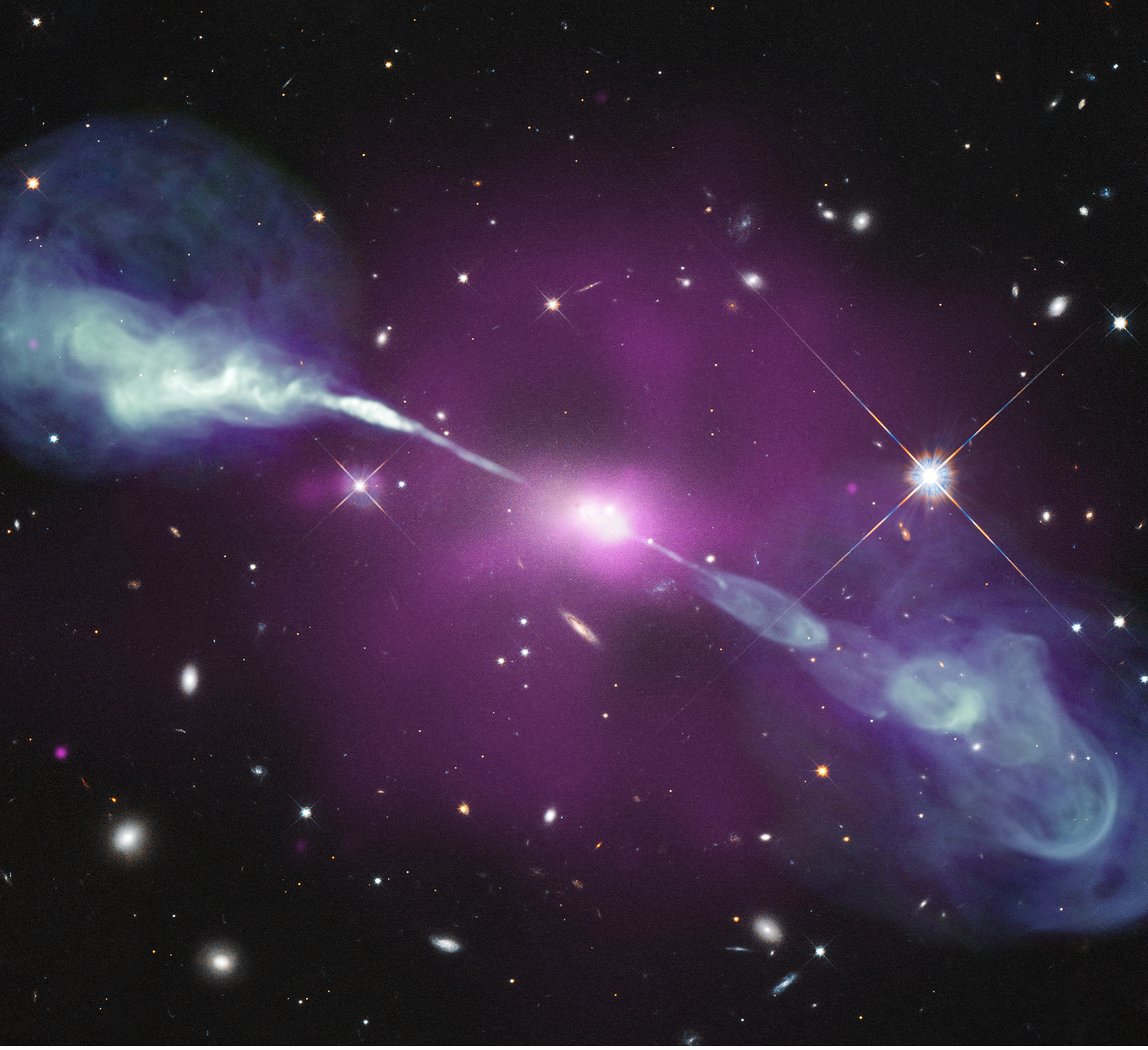
THE CRAB NEBULA

In 1054 AD, Chinese astronomers and others around the world noticed a new bright object in the sky. This “new star” was, in fact, the supernova explosion that created what is now called the Crab Nebula. At the center of the Crab Nebula is an extremely dense, rapidly rotating neutron star left behind by the explosion. The neutron star, also known as a pulsar, is spewing out a blizzard of high-energy particles, producing the expanding X-ray nebula seen by Chandra. In this new image, lower-energy X-rays from Chandra are red, medium energy X-rays are green, and the highest-energy X-rays are blue.

Credit: NASA/CXC/SAO



FEBRUARY 2015

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HERCULES A

Some galaxies have extremely bright cores, suggesting that they contain a supermassive black hole that is pulling in matter at a prodigious rate. Astronomers call these “active galaxies,” and Hercules A is one of them. In visible light (colored red, green and blue, with most objects appearing white), Hercules A looks like a typical elliptical galaxy. In X-ray light, however, Chandra detects a giant cloud of multimillion-degree gas (purple). This gas has been heated by energy generated by the infall of matter into a black hole at the center of Hercules A that is over 1,000 times as massive as the one in the middle of the Milky Way. Radio data (blue) show jets of particles streaming away from the black hole. The jets span a length of almost one million light years.

Credit: X-ray: NASA/CXC/SAO, Optical: NASA/STScI, Radio: NSF/NRAO/VLA)

MARCH 2015

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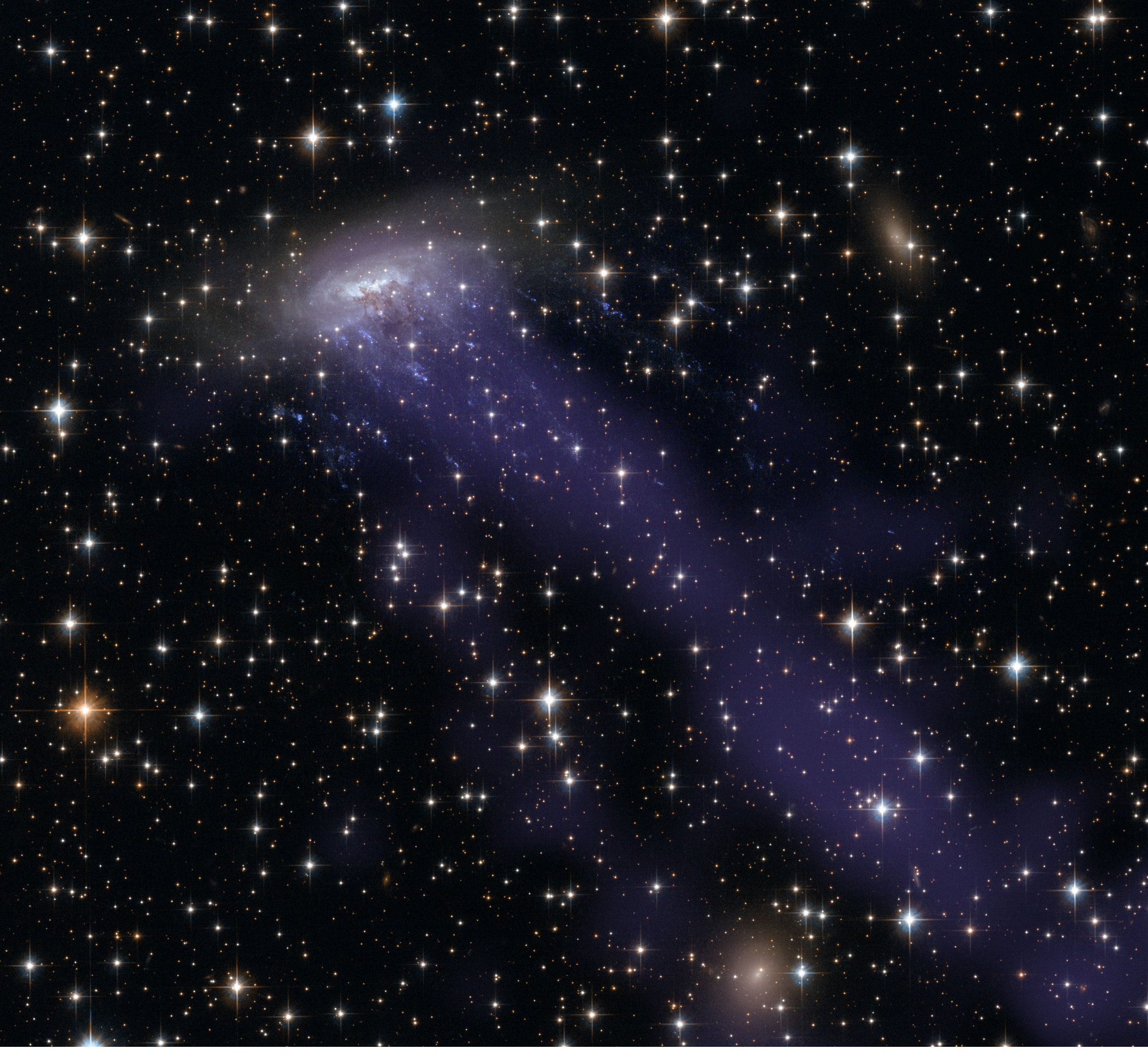
NGC 4736

NGC 4736 is a spiral galaxy that is unusual because it has two ring structures. This galaxy is classified as containing a “low ionization nuclear emission region,” or LINER, in its center, which produces radiation from specific elements such as oxygen and nitrogen. Chandra observations (gold) of NGC 4736, seen in this composite image with infrared data from Spitzer (red) and optical data from Hubble and the Sloan Digital Sky Survey (blue), suggest that the X-ray emission comes from a recent burst of star formation. Part of the evidence comes from the large number of point sources near the center of the galaxy, showing that strong star formation has occurred. In other galaxies, evidence points to supermassive black holes being responsible for LINER properties. Chandra’s result on NGC 4736 shows LINERs may represent more than one physical phenomenon.

Credit: X-ray: NASA/CXC/Universita di Bologna/S.Pellegrini et al, IR: NASA/JPL-Caltech; Optical: SDSS & NASA/STScI



APRIL 2015

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ESO 137-001

This composite image from the Chandra X-ray Observatory (blue) and the Hubble Space Telescope (red, green, and blue) captures this galaxy on its way as it zooms toward the upper left of this image. The intergalactic gas in the Norma cluster is sparse, but so hot at 180 million degrees Fahrenheit that it glows in X-rays detected by Chandra. The spiral moves through the seething intra-cluster gas so rapidly—at nearly 4.5 million miles per hour—much of its owngas is caught and torn away. The galaxy's stars remain intact due to the binding force of their gravity.

Credit: X-ray: NASA/CXC/UAH/M.Sun et al; Optical: NASA, ESA, & the Hubble Heritage Team (STScI/AURA)

MAY 2015

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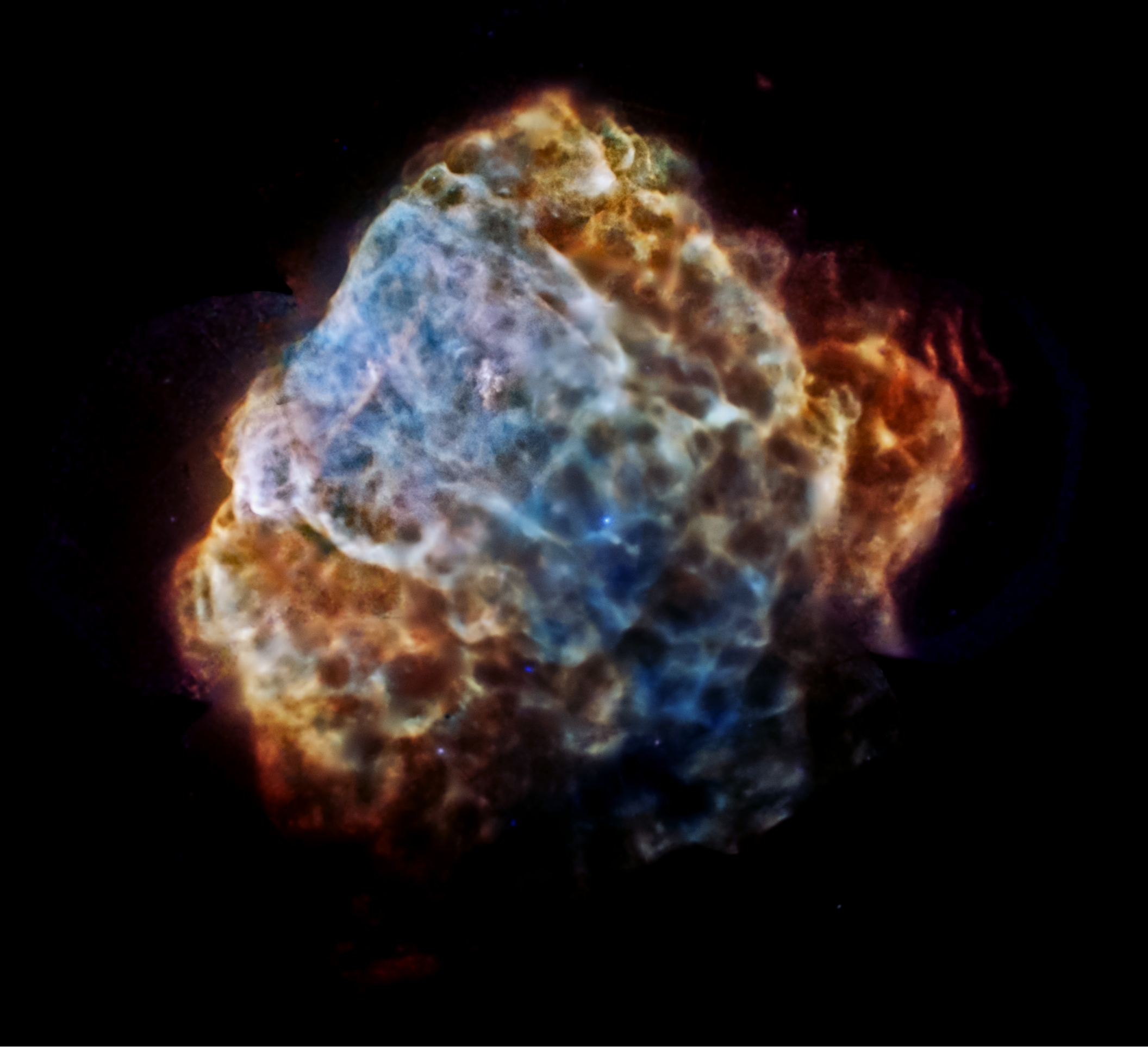
CENTAURUS A

Centaurus A is a galaxy well known for a gargantuan jet blasting away from a central supermassive black hole, which is seen in this new Chandra image. This image—where red, medium, and blue show low, medium, and high-energy X-rays respectively—has been processed with new techniques and contains data from observations equivalent to over nine and a half days worth of observing time taken between 1999 and 2012.

Credit: NASA/CXC/U.Birmingham/M.Burke et al.



JUNE 2015

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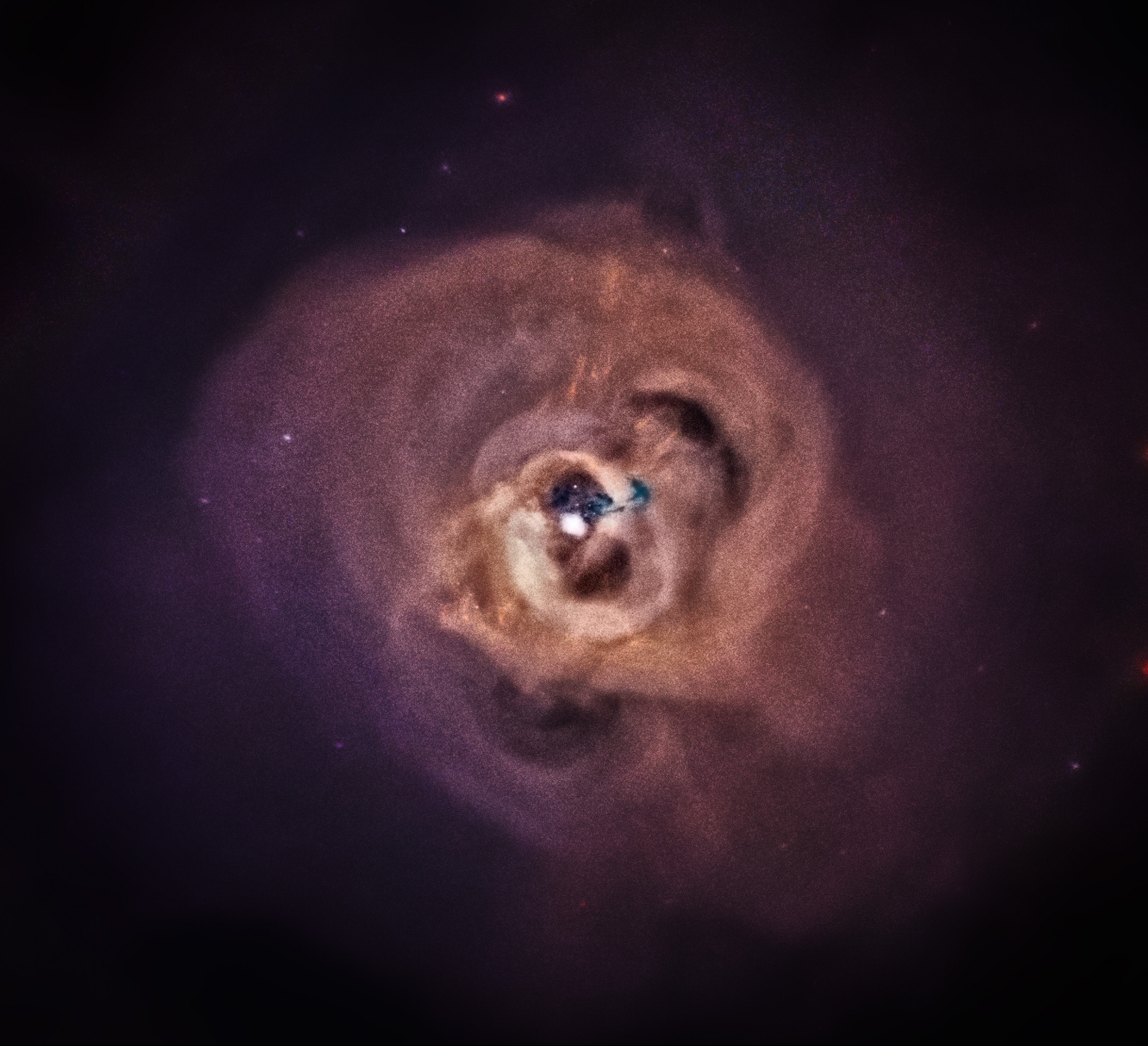
PUPPIS A

The destructive results of a powerful supernova explosion are seen in a delicate tapestry of X-ray light in this new image. The remnant is called Puppis A, which could have been witnessed on Earth about 3,700 years ago and is about 10 light years across. This image is the most complete and detailed X-ray view of Puppis A ever obtained, made by combining a mosaic of different Chandra and XMM-Newton observations. In this image, low-energy X-rays are shown in red, medium-energy X-rays are in green and high energy X-rays are colored blue.

Credit: Chandra: NASA/CXC/IAFE/G.Dubner et al.; XMM: ESA/XMM-Newton



JULY 2015

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PERSEUS CLUSTER

A new study of the Perseus galaxy cluster, shown in this image from Chandra has revealed a mysterious X-ray signal in the data. The signal is also seen in over 70 other galaxy clusters using XMM-Newton. This unidentified X-ray emission line—a spike of intensity centered on about 3.56 kiloelectron volts—requires further investigation to confirm both the signal's existence and nature. One possibility is this signal is from the decay of sterile neutrinos, one proposed candidate to explain dark matter.

Credit: Chandra: NASA/CXC/SAO/E.Bulbul, et al.

AUGUST 2015

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EL GORDO

When scientists first discovered this galaxy cluster in 2012 with Chandra and ground-based optical telescopes, they nicknamed it “El Gordo” (the “fat one” in Spanish) because of its gigantic mass. New data from Hubble suggest it may weigh 43 percent more—about 3 million billion Suns—than the original estimate based on the X-ray data and dynamical studies. This composite image of El Gordo contains X-rays from Chandra (pink), a map of where the dark matter is found determined by gravitational lensing (blue), and the individual galaxies in the cluster and stars in the field of view as observed by Hubble.

Credit: X-ray: NASA/ESA/Univ. of California, Davis/J. Jee et al.;Optical: NASA/STScI

SEPTEMBER 2015

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NGC 4258

NGC 4258 is a spiral galaxy well known to astronomers for having two so-called anomalous arms that glow in X-ray, optical, and radio light. Rather than being aligned with the plane of the galaxy, they intersect with it. This composite image of NGC 4258 shows the galaxy in X-rays from Chandra (blue), radio waves from the VLA (purple), optical data from Hubble (yellow and blue), and infrared with Spitzer (red). Researchers are using all of these telescopes to better understand how the supermassive black hole is affecting the galaxy and its anomalous arms.

Credit: X-ray: NASA/CXC/Caltech/P.Ogle et al; Optical: NASA/STScI; IR: NASA/JPL-Caltech; Radio: NSF/NRAO/VLA

OCTOBER 2015

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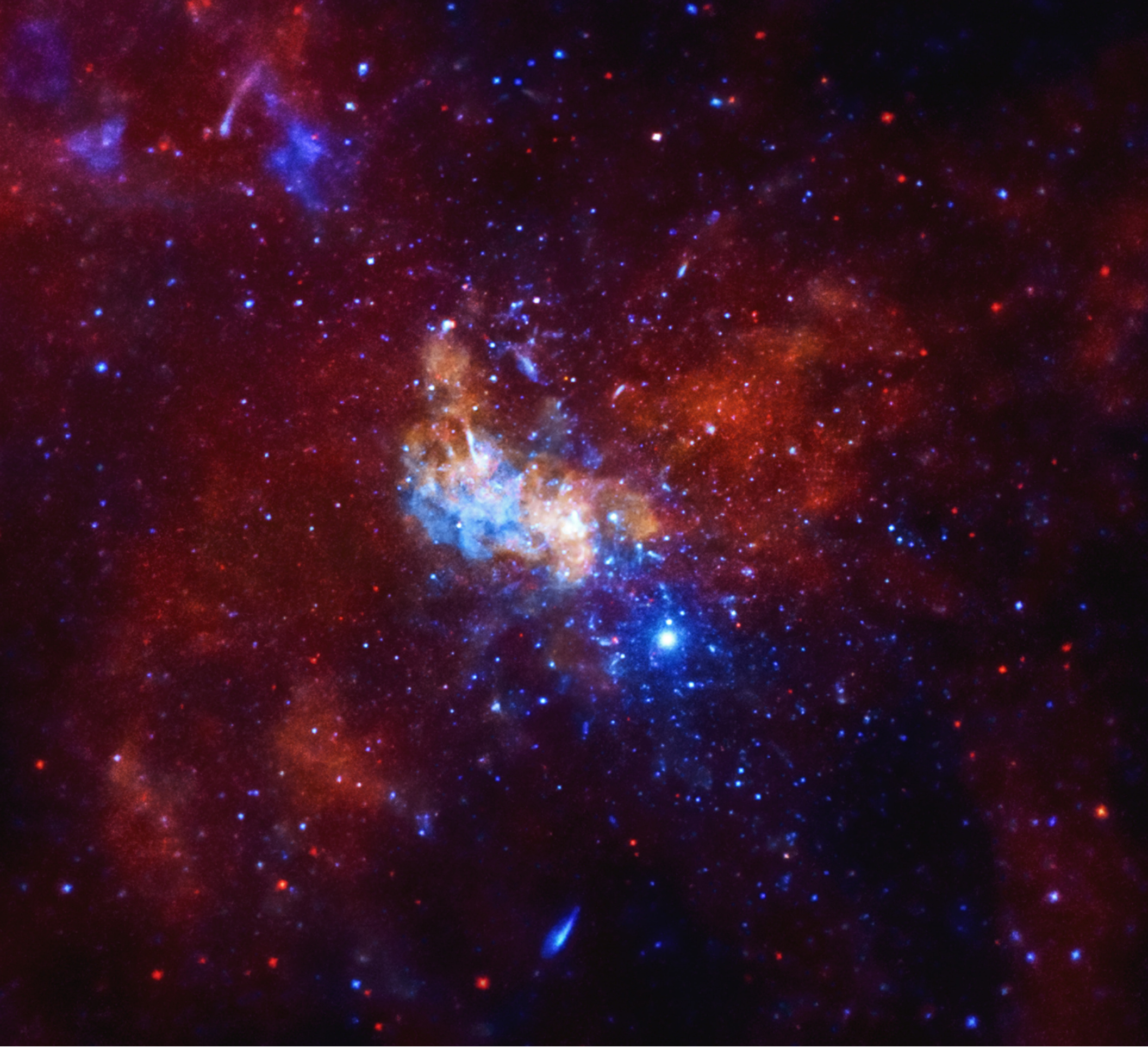
M82

New Chandra data gives insight into the explosion that produced SN 2014J, one of the closest super-novas discovered in decades. SN 2014J is a so-called Type Ia supernova, an important class that astronomers use to measure the expansion of the Universe. This image shows M82 in the low, medium, and high-energy X-rays that Chandra can detect in red, green, and blue respectively. The lack of X-rays detected by Chandra rules out one mechanism that scientists theorized could cause the star to explode.

Credit: NASA/CXC/SAO/R.Margutti et al.



NOVEMBER 2015

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SAGITTARIUS A*

The supermassive black hole at the center of the Milky Way may be producing tiny particles, called neutrinos, that have virtually no mass and carry no electric charge. This Chandra image shows the region around the black hole, known as Sagittarius A*, in low, medium, and high-energy X-rays (red, green, and blue respectively.) Scientists have found a connection to outbursts generated by the black hole and seen by Chandra and other X-ray telescopes with the detection of high-energy neutrinos in an observatory under the South Pole.

Credit: NASA/CXC/Univ. of Wisconsin/Y.Bai. et al.

DECEMBER 2015

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G292.0+1.8

At a distance of about 20,000 light years, G292.0+1.8 is one of only three supernova remnants in the Milky Way known to contain large amounts of oxygen. These oxygen-rich supernovas are of great interest to astronomers because they are one of the primary sources of the heavy elements (that is, everything other than hydrogen and helium) necessary to form planets and people. The X-ray image from Chandra shows a rapidly expanding, intricately structured, debris field that contains, along with oxygen (yellow and orange), other elements such as magnesium (green) and silicon and sulfur (blue) that were forged in the star before it exploded.

Credit: NASA/CXC/SAO