JANUARY 2016

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MESSIER 51 (M51)

Located about 30 million light years from Earth, this galaxy, nicknamed the “Whirlpool,” is a spiral galaxy like our Milky Way. This composite image combines data collected at X-ray wavelengths by NASA’s Chandra X-ray Observatory (purple), ultraviolet by the Galaxy Evolution Explorer (blue), visible light by the Hubble Space Telescope (green), and infrared by the Spitzer Space Telescope (red). The Chandra data reveal hundreds of point-like X-ray sources as well as diffuse X-ray emission found throughout the galaxy.

Credit: X-ray: NASA/CXC/SAO; UV: NASA/JPL-Caltech; Optical: NASA/STScI; IR: NASA/JPL-Caltech

FEBRUARY 2016

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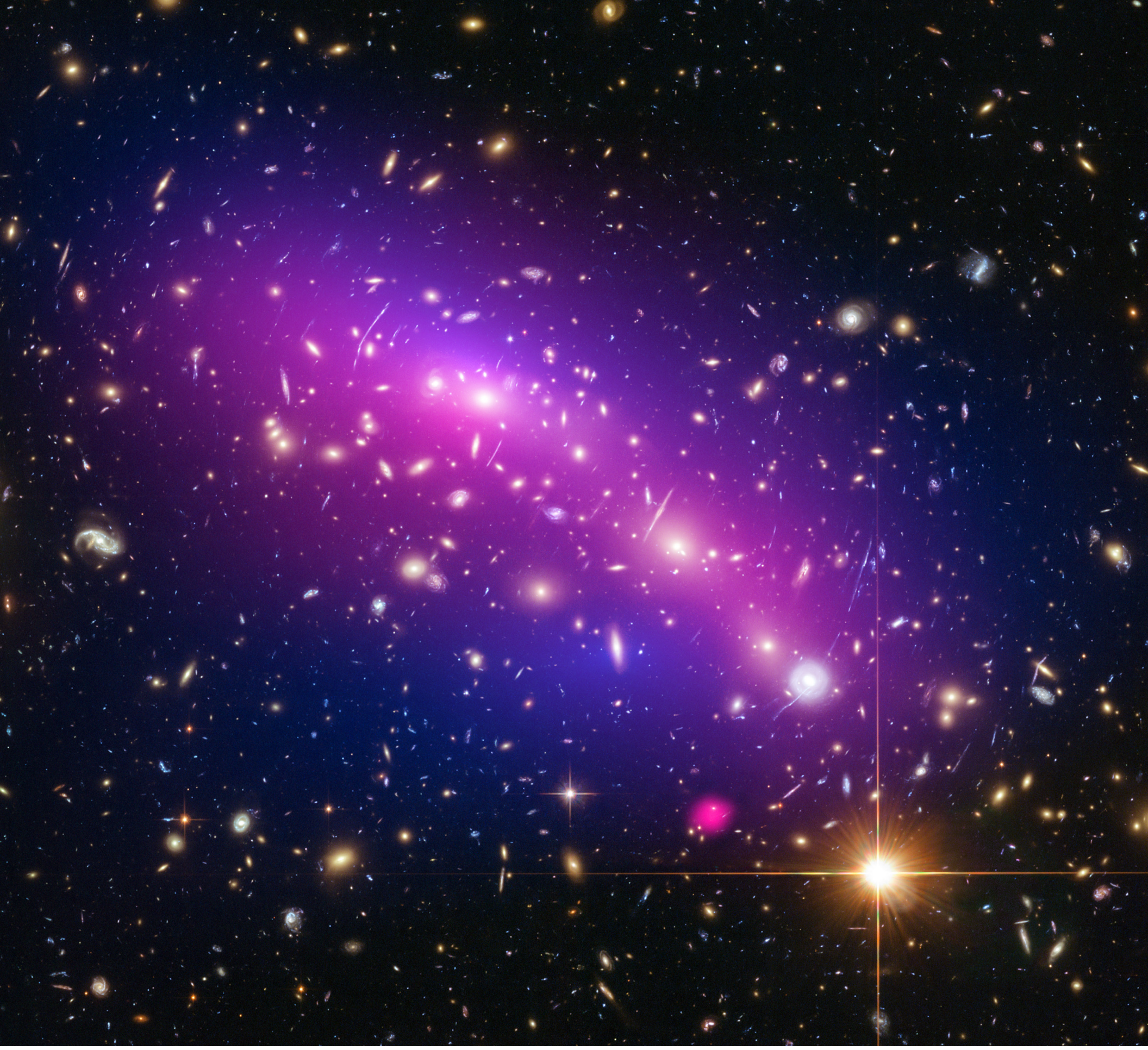
NGC 6388

Using Chandra and several other telescopes, researchers have found evidence that a white dwarf star—the dense core of a star like the Sun that has run out of nuclear fuel—may have ripped apart a planet as it came too close. This composite image provides one of the clues: Chandra shows that the X-rays (pink) are not coming from the cluster's center, as is evident when combined with visible light data from Hubble (red, green, and blue). Instead, the details of the combined datasets point to a possible "tidal disruption" where one astronomical object destroys another through powerful gravitational forces.

Credit: X-ray: NASA/CXC/IASF Palermo/M.Del Santo et al; Optical: NASA/STScI



MARCH 2016

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MACS J0416.1-2403

Astronomers can use galaxy clusters to help limits on how dark matter—the mysterious substance that makes up most of the matter in the Universe—interacts with itself. MACS J0416.1-2403 is one galaxy cluster that is part of a large observing campaign by Chandra and other telescopes to do just that. Chandra detects the hot gas that envelopes the cluster and glows brightly in X-rays (pink). When combined with Hubble's visible light data (blue), astronomers can map where the stars and hot gas are after the collision, as well as the inferred distribution of dark matter through the effect of gravitational lensing.

Credit: X-ray: NASA/CXC/Ecole Polytechnique Federale de Lausanne, Switzerland/D.Harvey & NASA/CXC/Durham Univ/R.Massey; Optical & Lensing Map: NASA/ESA/D. Harvey & R. Massey

APRIL 2016

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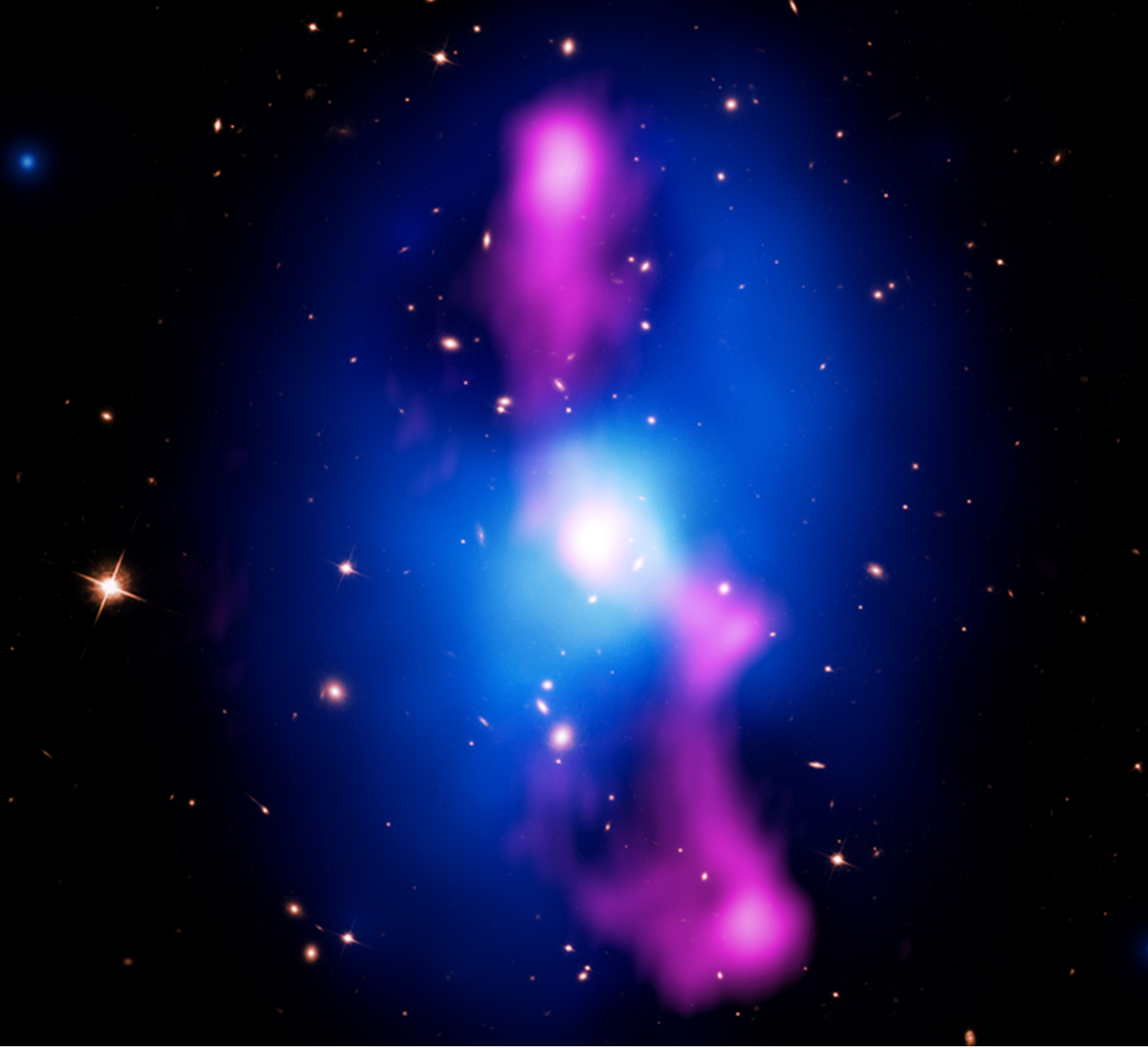
GUITAR NEBULA

The pulsar called B2224+65 is moving through space very rapidly. Because of its high speed, the pulsar is creating a bow shock in its wake. This structure is known as the Guitar Nebula and the likeness of the musical instrument can be seen in the optical data (blue) of this composite image. X-ray data from Chandra (pink) reveal an odd long jet that is coincident with the location of the pulsar, but is not aligned with the direction of its motion. Astronomers will continue to study this intriguing system as they try to determine the true nature of this X-ray jet.

Credit: X-ray: NASA/CXC/SAO, Optical: NASA/STScI & Palomar Observatory 5-m Hale Telescope



MAY 2016

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MS0735.6+7421

Located some 2.6 billion light years from Earth, MS 0735.6+7421 is a galaxy cluster that is home to one of the most powerful eruptions in the Universe ever seen. Chandra's X-ray data (blue) show the hot gas that comprises much of the mass of this enormous object. Within the Chandra data, holes, or cavities, can be seen. These cavities were created with an outburst from the supermassive black hole at the center of the cluster, which ejected the enormous jets of particles seen in radio data (pink). These data have been combined with optical data of stars in the field of view (orange).

Credit: X-ray: NASA/CXC/SAO; Optical: NASA/STScI; Radio: NRAO/VLA

JUNE 2016

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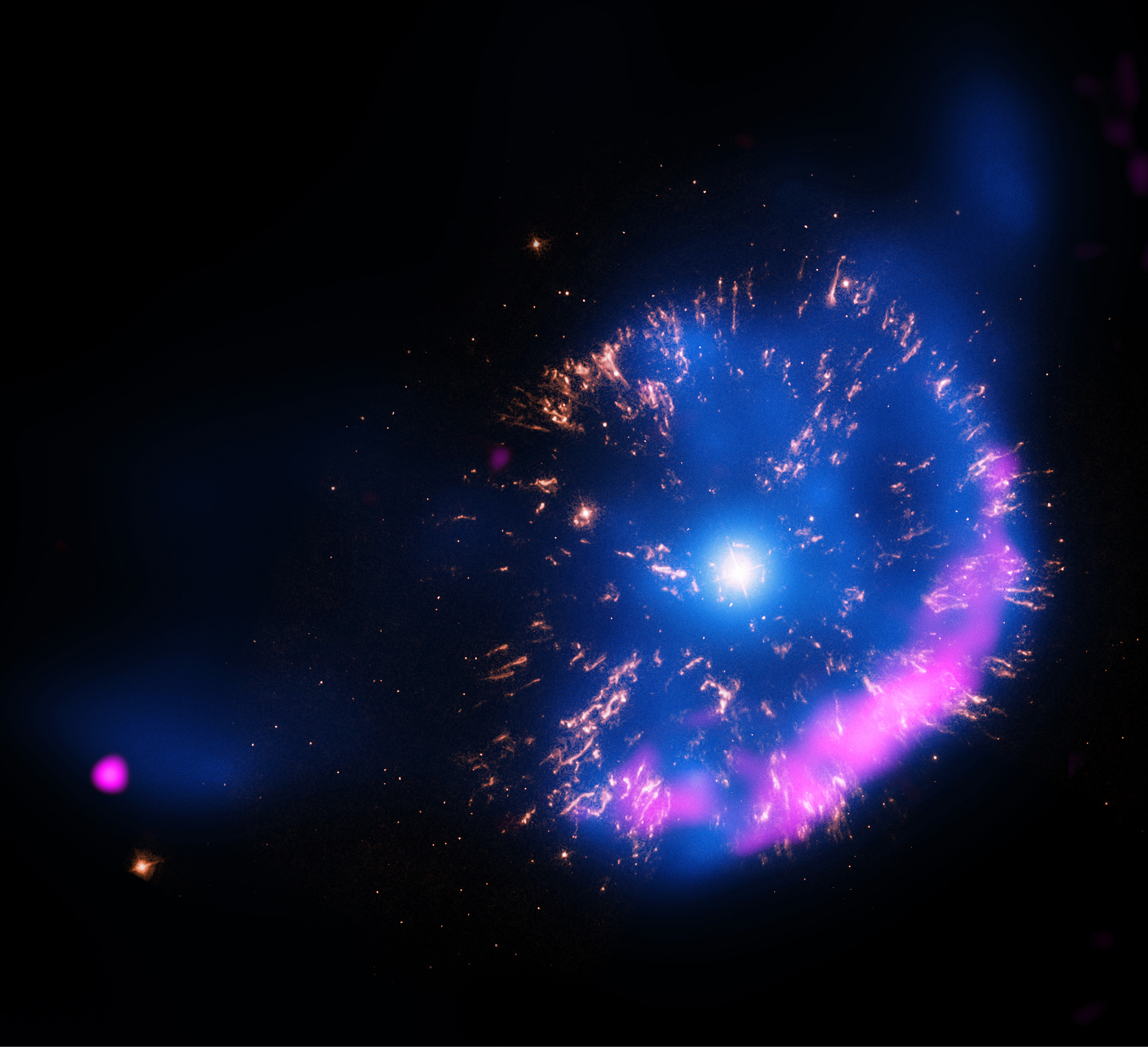
NGC 1333

NGC 1333 is a cluster that contains many stars that are less than two million years old, which is very young in astronomical terms. This composite image of NGC 1333 combines Chandra's X-rays (pink) with infrared data from Spitzer (red) and visible light data from ground-based telescopes (red, green, blue). The Chandra data reveal 95 young stars glowing in X-ray light, 41 of which had not been identified previously. In addition, X-ray observations can reveal information about the physical properties and behaviors of these very young stars.

Credit: X-ray: NASA/CXC/SAO/S.Wolk et al; Optical: DSS & NOAO/AURA/NSF; Infrared: NASA/JPL-Caltech



JULY 2016

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GK PERSEI

Using Chandra, astronomers have studied the “classical nova” called GK Persei. Classical novas are outbursts produced by a thermonuclear explosion on the surface of a white dwarf star, the dense remnant of a Sun-like star. This composite image of GK Persei contains X-rays from Chandra (blue), optical data from Hubble (yellow), and radio data from the Very Large Array (pink). The X-ray data show hot gas and the radio data show emission from electrons that have been accelerated to high energies by the nova shock wave. The optical data reveal clumps of material that were ejected in the explosion.

Credit: X-ray: NASA/CXC/RIKEN/D.Takei et al; Optical: NASA/STScI; Radio: NRAO/VLA

AUGUST 2016

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ABELL 1033

Astronomers have found evidence for a “radio phoenix” in the collision of two galaxy clusters, where vast clouds of high-energy particles have been re-energized. This composite image of Abell 1033 combines X-ray data from Chandra (pink) along with radio data (green) and optical data that reveals the density of the galaxies (blue). By tracing the history of mergers like the one found in Abell 1033, astronomers can better understand how galaxy clusters—the largest structures in the Universe held together by gravity—evolve over time.

Credit:X-ray: NASA/CXC/Univ of Hamburg/F. de Gasperin et al; Optical: SDSS; Radio: NRAO/VLA

SEPTEMBER 2016

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PHOENIX CLUSTER

The galaxy cluster SPT-CLJ2344-4243 owns bragging rights to a few important superlatives. It features the highest rate of star formation ever seen in the center of a galaxy cluster and is the most powerful producer of X-rays. The rate of hot gas cooling in the center of the cluster is also the largest ever observed. The view of this cluster, nicknamed the Phoenix Cluster for the constellation in which it is found, contains X-rays from Chandra (blue) as well as optical data from Hubble (red, green, and blue).

Credit: X-ray: NASA/CXC/MIT/M.McDonald et al; Optical: NASA/STScI

OCTOBER 2016

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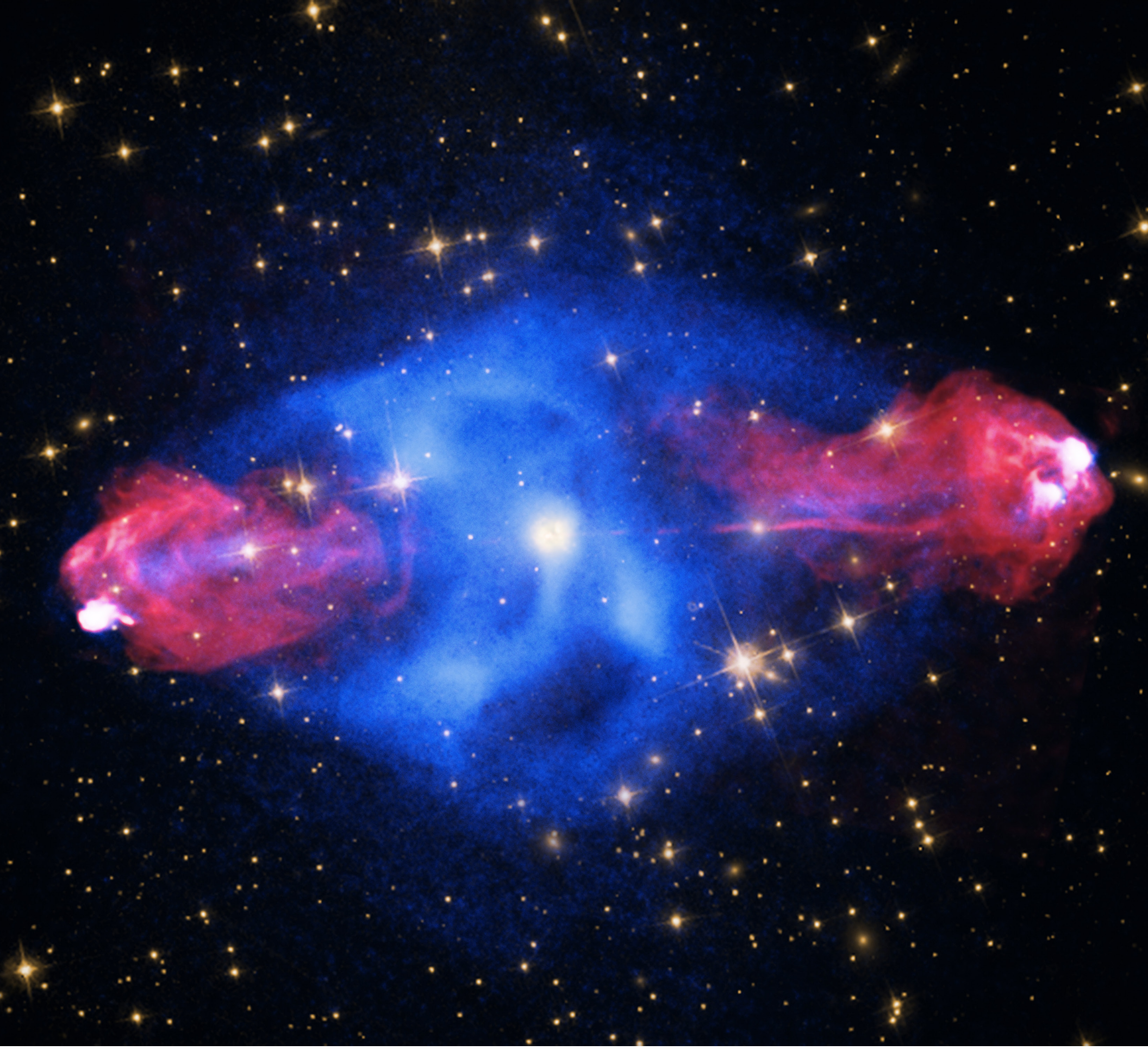
G299.2-2.9

G299.2-2.9 is a supernova remnant that was created when a star exploded about 4,500 years ago. This object, which glows brightly in X-rays, belongs to a particular class of supernovas called Type Ia. Astronomers think that a Type Ia supernova involves a thermonuclear explosion—involving the fusion of elements and release of vast amounts of energy—of a white dwarf star in a tight orbit with a companion star. In this image, red, green, and blue represent low, medium, and high-energy X-rays, respectively, detected by Chandra. The X-rays have been combined infrared data, which show the stars in the field of view.

Credit: X-ray: NASA/CXC/U.Texas/S.Post et al, Infrared: 2MASS/UMass/IPAC-Caltech/NASA/NSF



NOVEMBER 2016

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CYGNUS A

This galaxy, at a distance of some 700 million light years, contains a giant bubble filled with hot, X-ray emitting gas detected by Chandra (blue). Radio data from the Very Large Array (red) reveal “hot spots” about 300,000 light years out from the center of the galaxy where powerful jets emanating from the galaxy’s supermassive black hole end. Visible light data (yellow) from both Hubble and the Digitized Sky Survey complete this view of the galaxy known as Cygnus A.

Credit: X-ray: NASA/CXC/SAO; Optical: NASA/STScI; Radio: NSF/NRAO/AUI/VLA

DECEMBER 2016

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W44 (G34.7-0.4)

W44 is an expanding supernova remnant that is interacting with the dense interstellar material that surrounds it. X-rays from Chandra (blue) show that hot gas fills the shell of the supernova remnant as it moves outward. Infrared observations from Spitzer (red, orange, and pink) reveal the molecular cloud into which the supernova remnant is moving as well as stars in the field of view. The supernova remnant in W44 is about 100 light years across and is located about 10,000 light years from Earth.

Credit: X-ray: NASA/CXC/MIT/M.McDonald et al; Optical: NASA/STScI