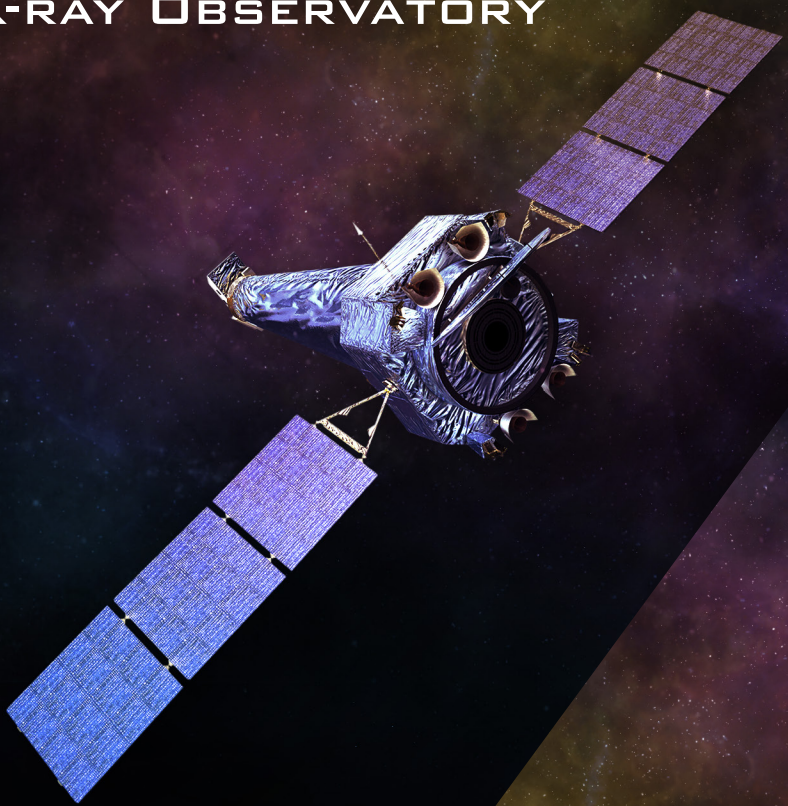
National Aeronautics and Space Administration

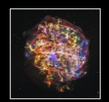
CHANDRA
X-RAY OBSERVATORY



www.nasa.gov

Since its launch on July 23, 1999, the Chandra X-ray Observatory has been NASA's flagship mission for X-ray astronomy, taking its place in the fleet of "Great Observatories."

NASA's Chandra X-ray Observatory is a telescope specially designed to detect X-ray emission from very hot regions of the Universe such as exploded stars, clusters of galaxies, and matter around black holes. Because X-rays are absorbed by Earth's atmosphere, Chandra must orbit above it, up to an altitude of 139,000 km (86,500 mi) in space. The Smithsonian's Astrophysical Observatory in Cambridge, MA, hosts the Chandra X-ray Center which operates the satellite, processes the data, and distributes it to scientists around the world for analysis. The Center maintains an extensive public web site about the science results and an education program.



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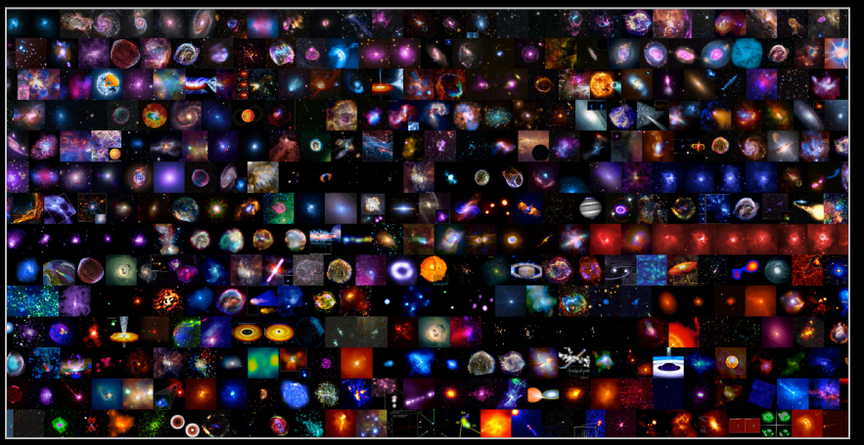
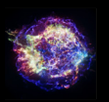
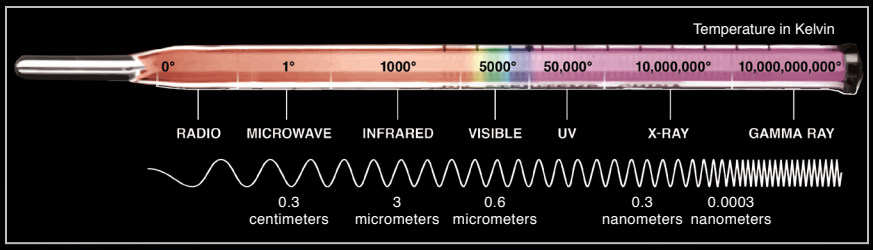
Chandra carries four very sensitive mirrors nested inside each other. The energetic X-rays strike the insides of the hollow shells and are focussed onto electronic detectors at the end of the 9.2- m (30-ft.) optical bench. Depending on which detector is used, very detailed images or spectra of the cosmic source can be made and analyzed.



Chandra has imaged the spectacular, glowing remains of exploded stars, and taken spectra showing the dispersal of elements. Chandra has observed the region around the supermassive black hole in the center of our Milky Way, and found black holes across the Universe. Chandra has traced the separation of dark matter from normal matter in the collision of galaxies in a cluster and is contributing to both dark matter and dark energy studies. As its mission continues, Chandra will continue to discover startling new science about our high-energy Universe.



Cassiopeia A



WHAT IS THE X-RAY UNIVERSE? The light produced by stars and clouds of gas in space comes in many forms, from low energy radio waves, through infrared and optical radiation, to high energy X-rays and gamma rays. The "X-ray Universe" refers to the Universe as observed with telescopes designed to detect X-rays. We could equally well speak of "the radio Universe" or "the optical Universe." These are not separate Universes. They are just different ways of observing the same Universe.

WHY OBSERVE THE UNIVERSE WITH DIFFERENT TYPES OF TELESCOPES? Because many things cannot be seen by even the most powerful optical telescopes. Radio and infrared telescopes observe cool clouds of gas and dust that are a hundred or more degrees below zero. X-ray telescopes observe extremely hot matter with temperatures of millions of degrees. Without different types of telescopes, we would miss many very important discoveries about the Universe.

DOES AN X-RAY TELESCOPE TAKE X-RAYS OF THE UNIVERSE? No. The X-ray machine in a doctor's or dentist's office is a source of X-rays. An X-ray telescope is not a source of X-rays. The telescope collects and focuses X-radiation from cosmic X-ray sources onto X-ray detectors. The data from these detectors are then used to make an image of the cosmic X-ray source.

chandra.si.edu

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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.