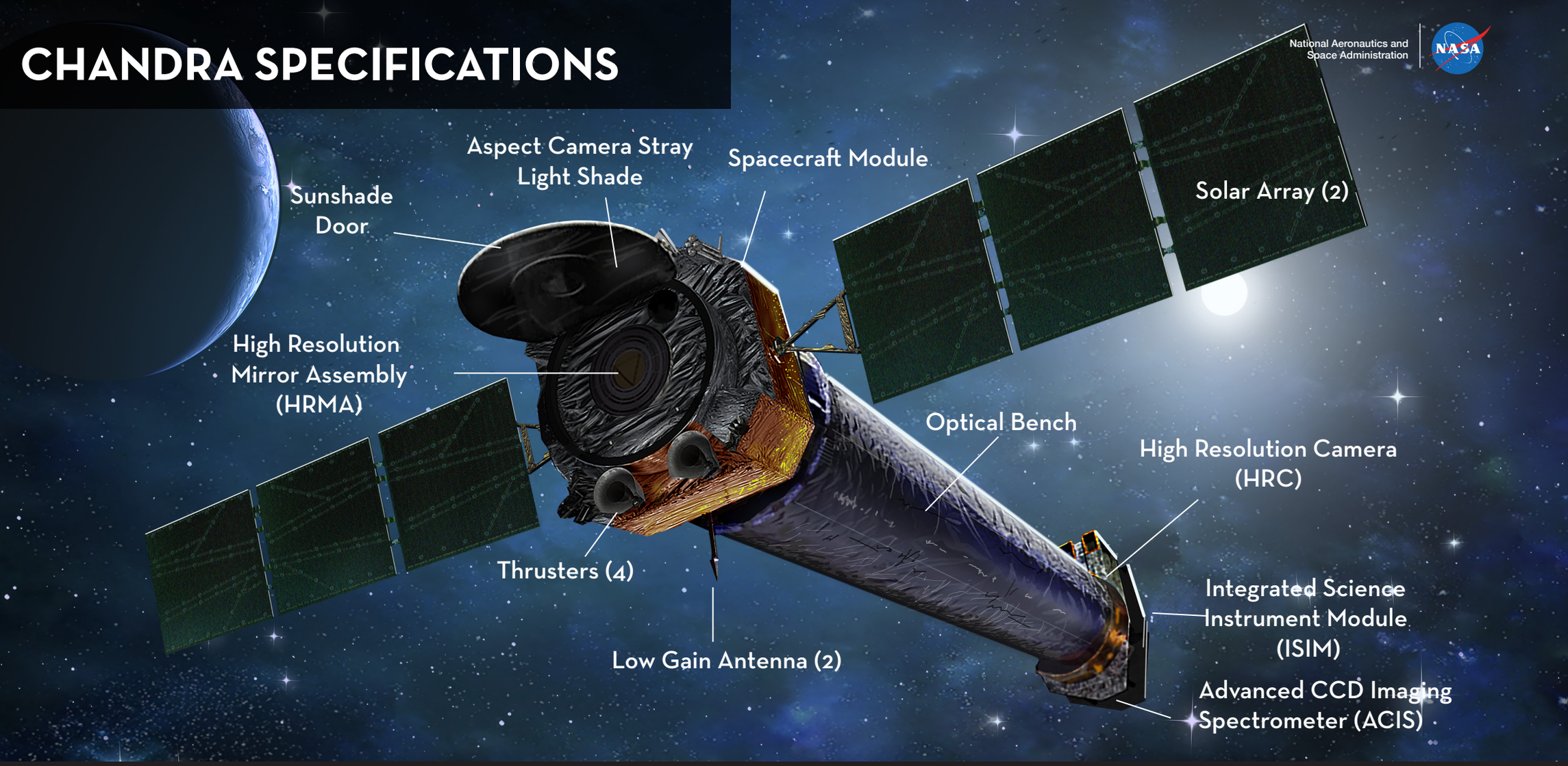
CHANDRA SPECIFICATIONS

National Aeronautics and Space Administration



Chandra's powerful and unique X-ray eyes have contributed to a revolution in our understanding of the cosmos. These images represent the breadth of Chandra's exploration, demonstrating the variety of objects it studies. From the colossal grandeur of a galaxy cluster to the light from infant stars, these images offer a sample of Chandra's spectacular X-ray vision.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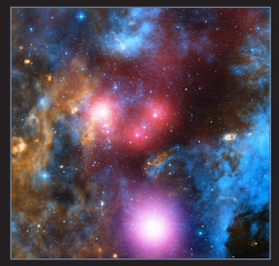
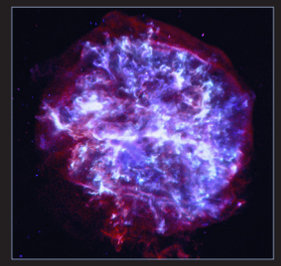

Cygnus OB2


G292


NGC 604


Abell 2146


Galactic Center

An X-ray telescope is the only way astronomers can observe the hot regions of the Universe. X-ray telescopes allow us to image matter swirling as close as 90 kilometers from the event horizon of a stellar black hole or to track the expansion of a hot gas bubble produced by an exploding star.

The Chandra X-ray Observatory has three major parts: (1) the X-ray telescope, whose mirrors focus X-rays from celestial objects; (2) the science instruments which record the X-rays so that X-ray images can be produced and analyzed; and (3) the spacecraft, which provides the environment necessary for the telescope and the instruments to work.

The mirrors on Chandra are the largest, most precisely shaped and aligned, and smoothest mirrors ever constructed. The images Chandra makes are twenty-five times sharper than the best previous X-ray telescope. Chandra, which was launched by the Space Shuttle on July 23, 1999, is helping scientists to better understand the hot, turbulent regions of space and answer fundamental questions about the origin, evolution, and destiny of the Universe.

OVERALL SPECIFICATIONS

Size (solar arrays deployed):	13.8 m x 19.5 m (45.3 ft x 64.0 ft)
Weight:	4,800 kg (10,560 lbs)
Orbit:	Highly elliptical orbit with a period of 63.5 hours
Ascending node:	28.5° inclination 200°
Argument of perigee:	270°
Life:	expected 25+ years

SPACECRAFT SPECIFICATIONS

Power:	two 3-panel silicon solar arrays (2350 W) three 40 amp-hour nickel hydrogen batteries
Antennas:	two low-gain, conical log spiral antennas
Frequencies:	transmit 2250 MHz, receive 2071.8 MHz
Command Link:	2 kilobits per second (kbps)
Data Recording:	solid state recorder; 3.6 gigabits (37.2 hours) recording capability
Downlink Operations:	downloaded typically every 8 hours
Contingency Mode:	32 kbps
Safing:	autonomous operation

SCIENCE INSTRUMENTS

Advanced Charged Couple Imaging Spectrometer (ACIS):	Ten CCD chips in 2 arrays provide imaging and spectroscopy; imaging resolution is 0.5 arc-sec over the energy range 0.2 – 10 keV; sensitivity: $4x10^{-15}$ ergs-cm^{-2} sec^{-1} in 10^5 s
High Resolution Camera (HRC):	Uses large field-of-view micro-channel plates to make X-ray images: ang. resolution < 0.5 arc-sec over field-of-view 31x31 arc-min; time resolution: 16 micro-sec. sensitivity: $4x10^{-15}$ ergs-cm^{-2} sec^{-1} in 10^5 s
High Energy Transmission Grating (HETG):	To be inserted into focused X-ray beam; provides spectral resolution of 60-1000 over the energy range 0.4 - 10 keV
Low Energy Transmission Grating (LETG):	To be inserted into focused X-ray beam; provides spectral resolution of 40-2000 over the energy range 0.09 - 3 keV

TELESCOPE SYSTEM

High Resolution Mirror Assembly:	4 nested pairs of grazing incidence paraboloid and hyperboloid mirrors
Length of Mirrors:	each 83.3 cm (32.8 in) long
Weight of Mirrors:	956.4 kg (2,104 pounds) total
Focal Length:	10 meters (32.8 ft)
Outer Diameter:	1.2 meters (3.9 ft)
Field of View:	1.0 degree diameter
Ang. Resolution:	0.5 arc-sec
Altitude Control:	6 reaction wheel control 2 inertial reference units
Aspect Camera:	1.40 deg x 1.40 deg field-of-view
Pointing Stability:	0.25 arc-sec (RMS) radius over 95% of all 10 second periods
Pointing Accuracy:	30 arc-sec 99% of viewing time
Remarks:	Mirrors have an effective area of 400 sq. cm. @1 keV; 600 A iridium coating

The Chandra program is managed by the Marshall Space Flight Center for NASA's Science Mission Directorate. Northrop Grumman (formerly TRW), the prime contractor, assembled and tested the observatory for NASA. The Chandra X-ray Center is operated for NASA by the Smithsonian Astrophysical Observatory. Illustration: NASA/CXC/Vaughan