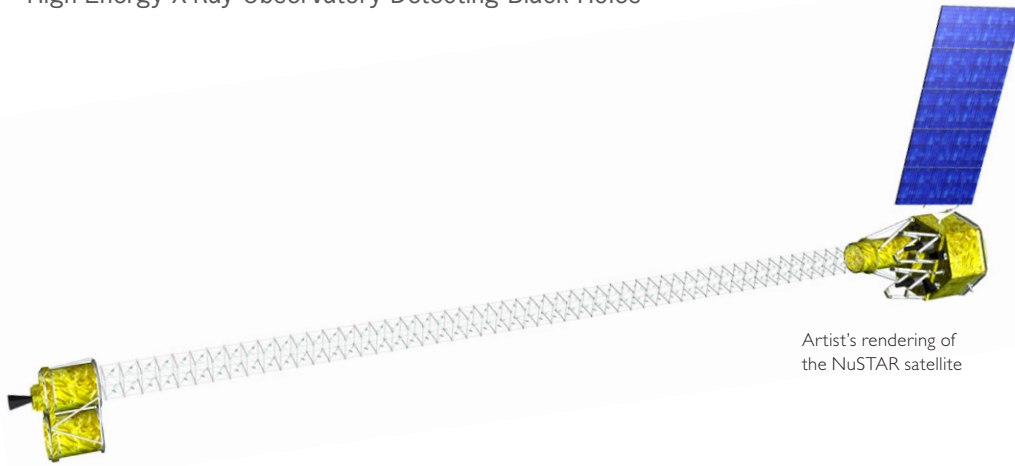




Nuclear Spectroscopic Telescope Array (NuSTAR)

High-Energy X-Ray Observatory Detecting Black Holes



Artist's rendering of the NuSTAR satellite

Mission Description

Orbital is designing, manufacturing, integrating and testing the Nuclear Spectroscopic Telescope Array (NuSTAR) scientific satellite under a contract from the California Institute of Technology and the Jet Propulsion Laboratory. The NuSTAR observatory will use high-energy X-rays to detect black holes and other energetic phenomena in the universe, scheduled for launch in 2012.

The NuSTAR program is being led by Principal Investigator Dr. Fiona Harrison of Caltech. Its mission is to help scientists answer fundamental questions about the universe, such as:

- How black holes are distributed throughout the cosmos
- How the elements of the universe were created
- What powers the most extreme active galaxies

With answers to these and other questions, NuSTAR will expand our understanding of the origins and destinies of stars and galaxies.

Spacecraft

The NuSTAR spacecraft is based on Orbital's proven LEOStar-2 design. NuSTAR will be the seventh satellite to be based on this platform, taking advantage of a growing heritage of excellent in-orbit performance from previous missions. Other LEOStar-based satellites that Orbital has designed and built for previous NASA scientific missions include SORCE, GALEX and AIM.

QUICK FACTS:

NuSTAR will have more than 500 times the sensitivity of previous instruments to detect black holes.

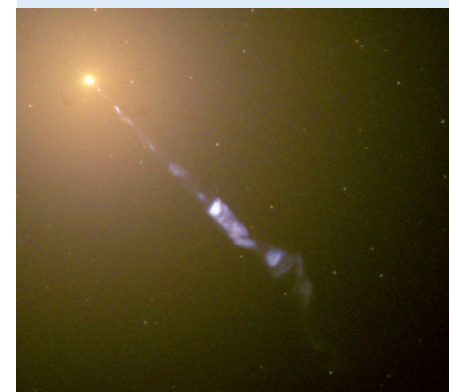
NuSTAR will be the first focusing hard X-ray telescope in space.

Mission:

Expanding our understanding of the origins and destinies of stars and galaxies

Customer:

California Institute of Technology/
Jet Propulsion Laboratory (JPL) -
Pasadena, CA



Black Hole-Powered Jet of Electrons and Sub-Atomic Particles Streams From Center of Galaxy M87 (Photo credit - NASA and STScI/AURA)

Specifications

Spacecraft

Launch Mass:	360 kg
Redundancy:	Single String
Solar Arrays:	750 W, Articulated
Stabilization:	3-axis stabilized
Orbit:	550 km, 6° inclination
Mission Life:	2 Years

Instrument

The NuSTAR instrument consists of an array of two co-aligned hard X-ray telescopes. The mirrors focus onto two shielded solid-state detectors, separated by a 10 meter mast that will be extended from the spacecraft after launch. A laser metrology system will monitor the mast alignment. The Cadmium Zinc Telluride (CdZnTe) detectors to be utilized provide excellent spectral resolution and high efficiency without requiring cryogenic operation.

Launch

Launch Vehicle:	Pegasus XL
Launch Site:	Kennedy Space Center, FL
Date:	1st Quarter 2012

Key Mission Partners

Jet Propulsion Laboratory

Program Management

California Institute of Technology

Principal Investigator: Dr. Fiona Harrison;
Mission Management

Orbital Sciences Corporation

Spacecraft Bus Development, Satellite Integration
and Testing



A growing black hole, called a quasar, can be seen at the center of a faraway galaxy in this artist's concept (Photo credit - NASA/JPL/Caltech)

Black Holes

Two types of black holes are known to exist. Stellar-mass black holes form when a very massive star (at least 25 times heavier than our Sun) runs out of nuclear fuel. The star explodes as a supernova and what remains is a black hole, usually only a few times heavier than our Sun since the explosion has blown much of the stellar material away.

We know less about the birth of supermassive black holes, which are much heavier than stellar-mass black holes and live in the centers of galaxies. Using high energy X-rays to see through the massive clouds that surround them, NuSTAR will provide a first ever census of supermassive black holes throughout space and time.