Science Payload
The Two SODART Flight Mirrors
and
The SXRP Polarimeter Flight Unit
from the
Spectrum X-Gamma Payload
A Replica of the Bragg Crystal Polarimeter in
SXRP
A Monitor Counter

Mission Overview

Science Objectives

Explore the Ultimate Limits of Gravity and Energy

Test General Relativity predictions of strong field gravity near black holes

Measure the spin of a black hole

Explore mechanisms for jet propagation in microquasars

Test if jets from black holes power the X-ray emission

Measure the accretion disk geometry around neutron stars

Determine whether accretion-powered pulsars have pencil or fan-beam geometries

Test the source geometry for rotation-powered pulsars

Measure the extreme field strengths of magnetars

Confirm that supernova remnants are sites for cosmic ray acceleration

Constrain models for extragalactic jet propagation

Test the standard unified model for AGN

Determine the origin of the X-ray emission from radio galaxies and quasars
**Key Mission Characteristics**

Two SODART mirror assemblies and SXRP polarimeter are built, calibrated and qualified for flight.

The Bragg crystal polarimeter for the second telescope is a streamlined replica of the one in SXRP.

A small, lightweight, selectively redundant spacecraft enables highly stable operation in low earth orbit.

Materials, processes, and handling are selected for a non-contaminating environment for X-ray optics.

Spacecraft components are flight proven, have low cost, and minimal schedule risk.

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**Launch Vehicle**

The Taurus 2210 launcher provides high reliability to orbit.

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**Mission Management**

The Smithsonian Astrophysical Observatory, supported by MIT and Ball Aerospace Systems Division, presents a unique combination of X-ray instrumentation and spacecraft skills with a history of success.

Realistic cost, low-risk mission implementation plan is based on existing skills, designs, and flight-proven hardware.

In addition, significant margins for schedule (10 weeks), cost (25%), and technology have been established.

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**Cost and Schedule**

*PRIZE Costs Are Within SMEX Guidelines*

| Mission Schedule | Cost Summary | | | | | | | |
|------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Year/Qty | FY03 | FY04 | FY05 | FY06 | FY07 | FY08 | FY09 | FY10 |
| A/B | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 |
| C/D | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 |
| C/E | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 |
| Reserves | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 |
| Launch | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 |
| Total | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 |

**PRIZE Schedule Achieves a Ready Date of 8/07**

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**The PRIZE Observatory**

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**The PRIZE Team**

**Principal Investigator:** Eric Silver, The Smithsonian Astrophysical Observatory

**Industrial Partner:** Ball Aerospace & Technologies Corp.

**Science Team:**
- Smithsonian Astrophysical Observatory
- Massachusetts Institute of Technology
- Danish Space Research Institute
- Russian Space Research Institute
- Ball Aerospace & Technologies Corp.
- Sonoma State University
- Lawrence Livermore National Laboratory
- Max-Planck-Institute for Astrophysics
- Cambridge University
- University of Illinois at Urbana-Champaign
- Instituto Nazionale di Astrofisica, Palermo
- Harvard College Observatory
- University of California at Berkeley
- Gettysburg College
- McGill University
- University of California at San Diego
- Florida Institute of Technology