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STROBE-X: X-ray Timing and Spectroscopy on Dynamical Timescales from Microseconds to Years

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ABSTRACT

The Spectroscopic Time-Resolving Observatory for Broadband Energy X-rays (STROBE-X) probes strong gravity for stellar mass to supermassive black holes and ultradense matter with unprecedented effective area, high time-resolution, and good spectral resolution, while providing a powerful time-domain X-ray observatory.

Keywords: Missions, X-ray timing, X-ray spectroscopy, compact objects

1. Introduction

The high-energy sky is extremely dynamic, requiring both wide-field monitoring, to catch a source at the right time, and highly flexible scheduling, to quickly repoint for detailed studies of critical events. Studies of strong gravity and ultradense matter require large collecting areas with low detector deadtime to access the shortest timescales. Broad energy coverage with good spectral resolution is needed to accurately determine continuum spectral shape, to characterize spectral features such as iron lines, to constrain absorption, and to accurately measure the relationship between thermal and non-thermal components. A flexible, high-throughput observatory, the Spectroscopic Time-Resolving Observatory for Broadband Energy X-rays (STROBE-X) has been selected as one of NASA's Astrophysics Probes Mission Concept Studies. These studies will provide input to the 2020 Astrophysics Decadal Survey. STROBE-X serves a large community in a decade of multi-wavelength time-domain astronomy with unique and complementary capabilities to the large high spectral and spatial resolution missions.

2. Science

STROBE-X's key science goals include:

- Probing stationary spacetimes near black holes (BHs) to explore the effects of strong-field general relativity and measure the masses and spins of BHs, using multiple techniques that allow for cross-calibration.
- X-ray reverberation mapping of the geometry of BH accretion flows across all mass scales, from stellar-mass BHs in

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