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

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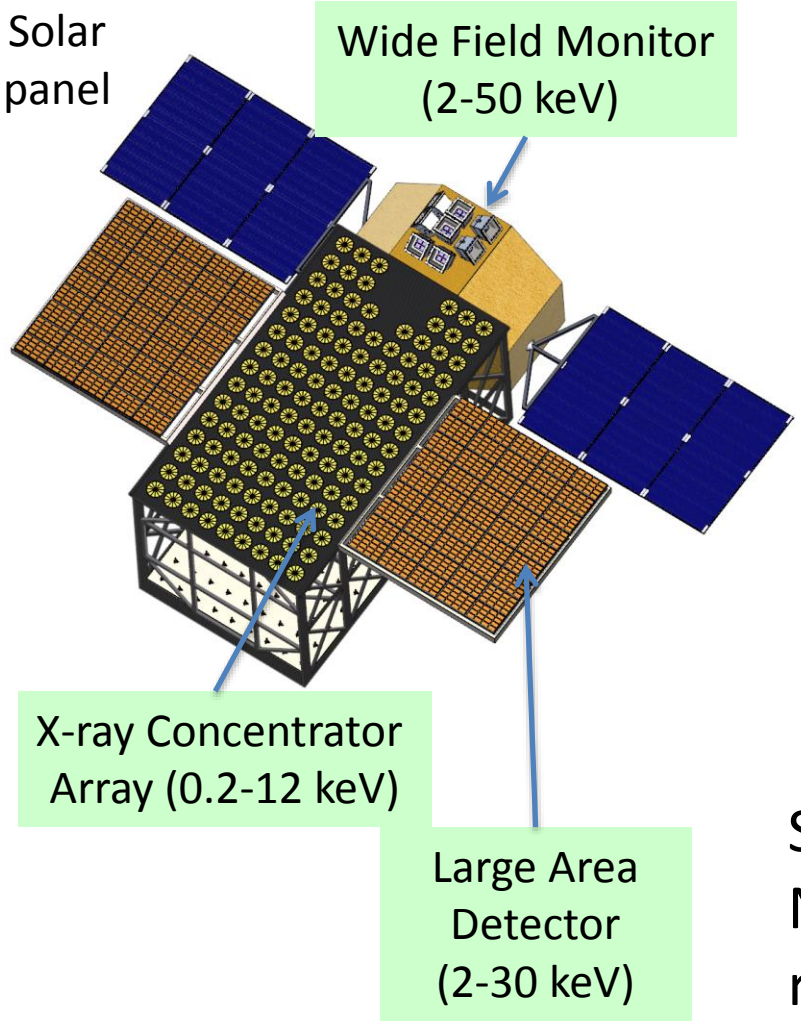
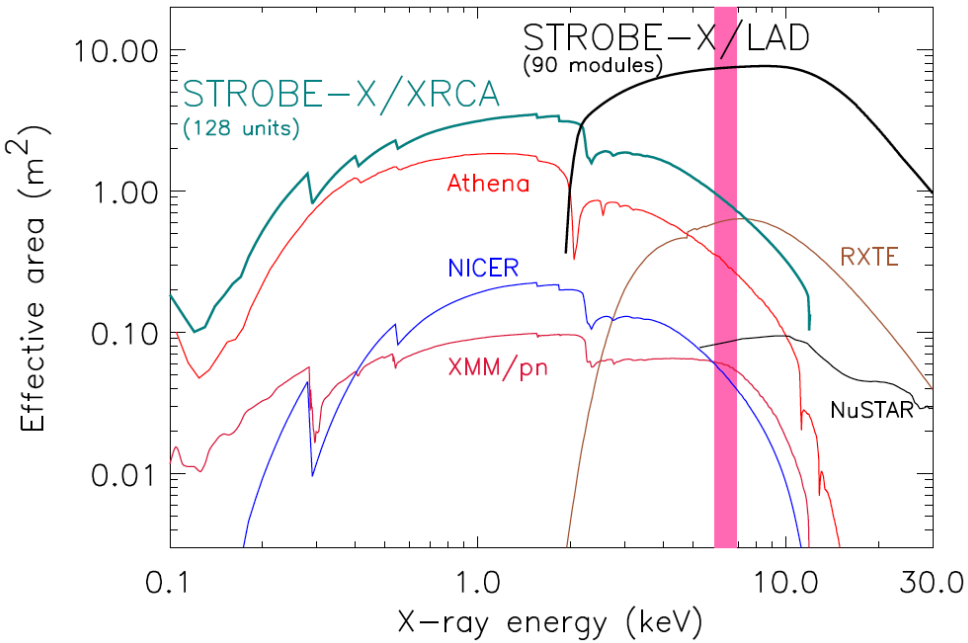
Spectroscopic Time-Resolving Observatory for Broadband Energy X-rays (STROBE-X)



Large effective area 10m^2 @ 6 keV



STROBE-X combines the strengths of NICER and LOFT: High throughput X-ray timing with good spectroscopy

Proposed to NASA's 2016 Call for Astrophysics Probe Mission Concept Studies (PI P. Ray (NRL))

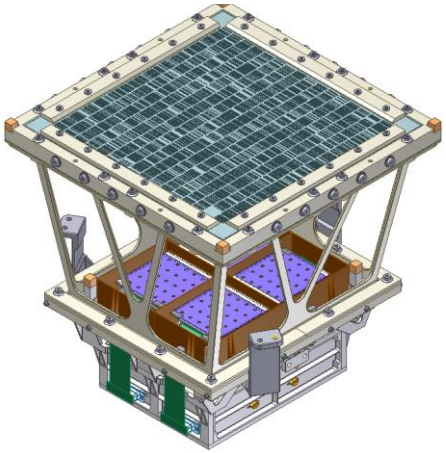
STROBE-X Instruments

X-ray Concentrator Array

- Concentrator optics and detectors, scaled up from NICER
- Energy resolution: 85-175 eV FWHM
- Effective area @ 1.5 keV: 3.4 m^2

Large Area Detector

- SDDs and micropore collimators from ESA's LOFT M3 & M4
- Energy resolution: 200-240 eV FWHM
- Effective Area @ 10 keV 7.6 m^2

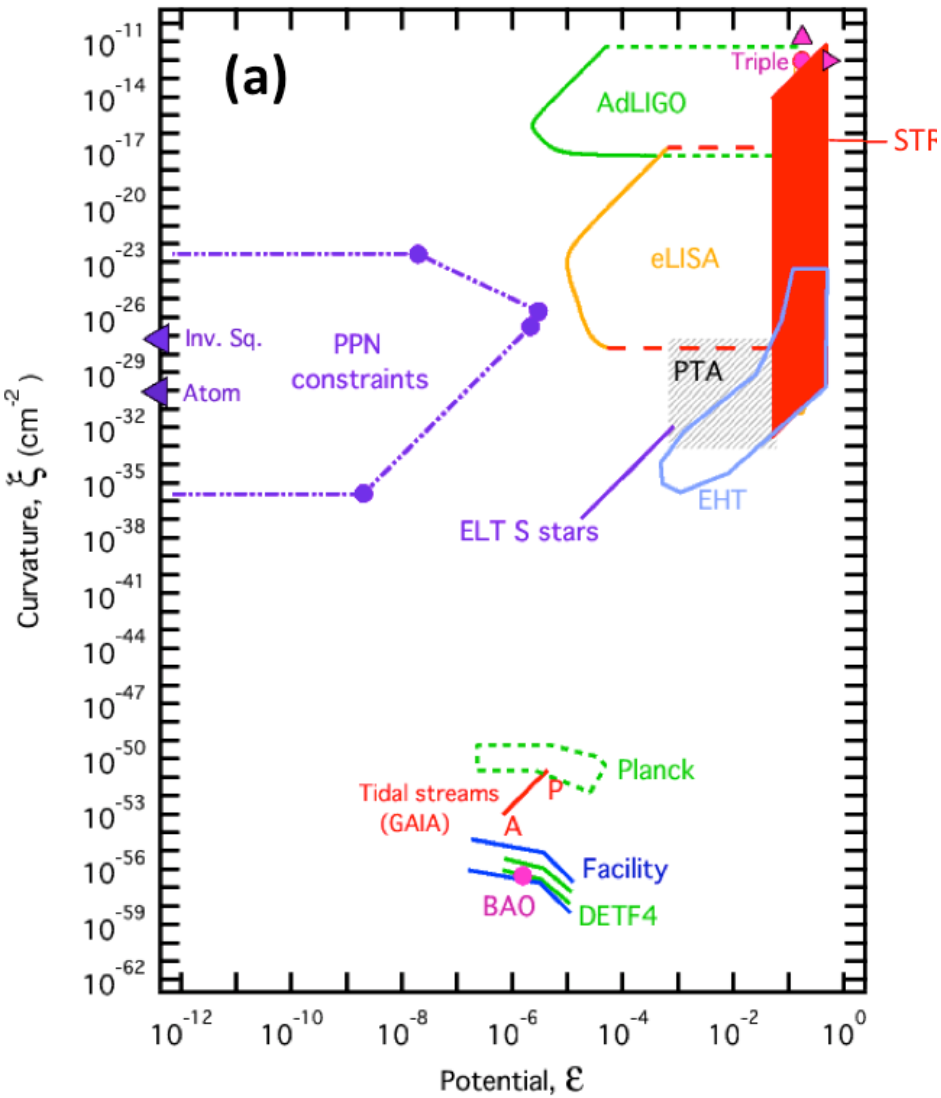


Wide Field Monitor

- LOFT SDDs and mask
- Energy resolution: 300 eV FWHM
- Instantaneous FoV: 1/3 of sky

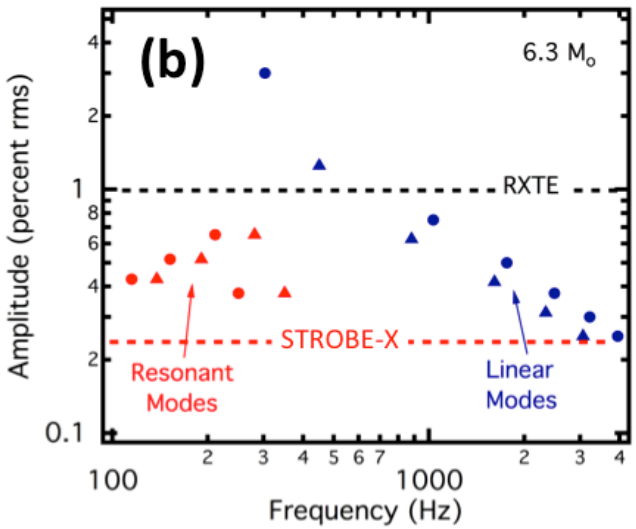
STROBE-X Black Hole Science

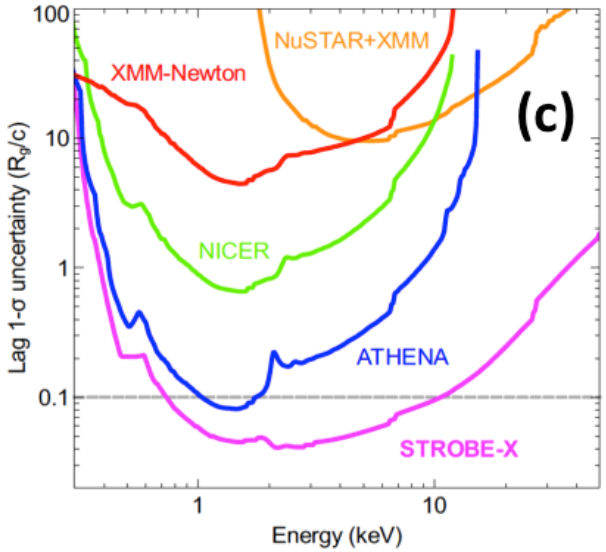
- Probes stationary spacetimes near black holes to explore effects of strong gravity
- Complementary to gravitational wave measurements that probe dynamic spacetimes



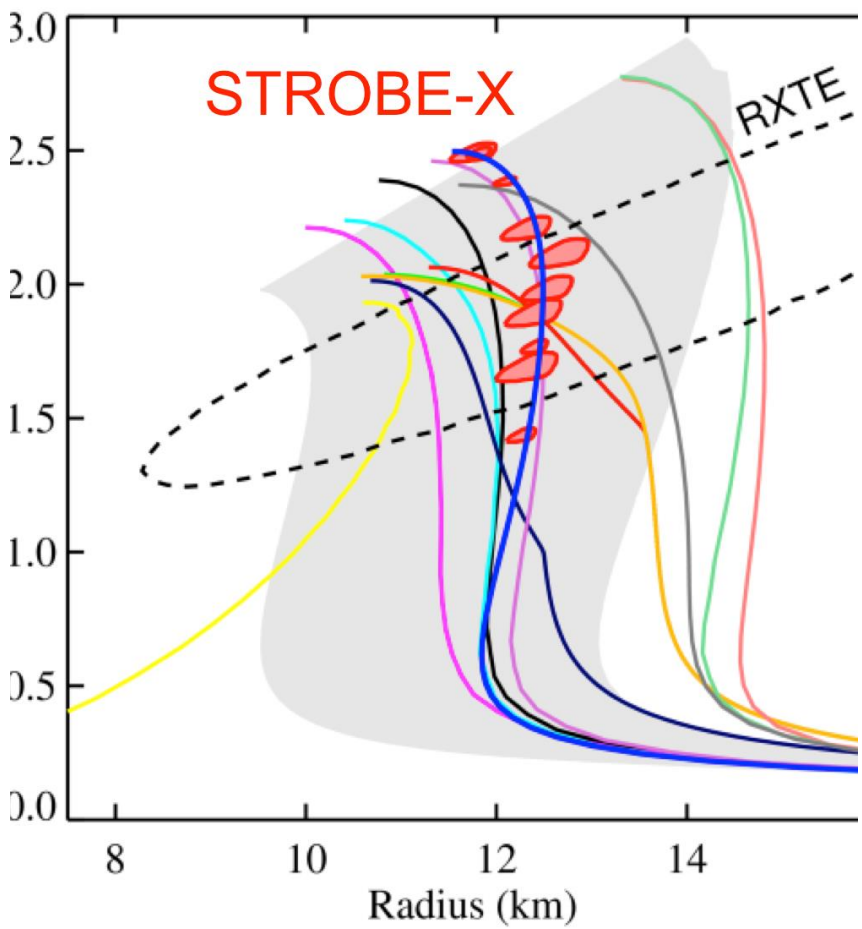
STROBE-X Black Hole Science

- Measures BH spin using QPOs
- Exploits X-ray reverberation mapping of BH accretion flows across all mass scales from stellar mass to supermassive

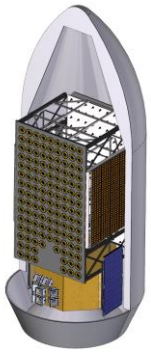




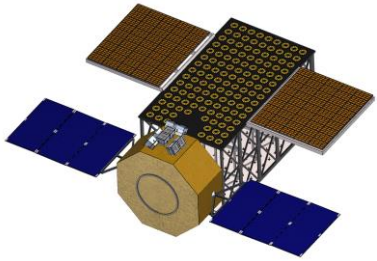
STROBE-X Science



- Fully determines the ultradense matter equation of state using > 20 pulsars
- Explores cosmic chemical evolution for ~100 high redshift clusters
- Continuously surveys the dynamic X-ray sky with large duty cycle and high spectral and time resolution



Summary



- STROBE-X is a probe class (<$1B) observatory designed for X-ray timing and spectroscopy in the 0.2-30 keV band
- STROBE-X has huge collecting area and good spectral resolution
- It is optimized for the study of matter in the most extreme conditions in the universe