Prospective USA contributions

Michael S. Briggs
University of Alabama in Huntsville

Huntsville, Alabama Gamma-ray group:
NASA/MSFC, University of Alabama, USRA.
Long history of GRB instruments & observations:
CGRO-BATSE & Fermi-GBM.
Entering an exciting era of multi-messenger observations!

The Huntsville team has many US contacts and collaborations, including with NASA/GSFC.

NASA provides a funding method for contributions to non-NASA missions: the “Partner Missions of Opportunity (PMO)” section of the Astrophysics Explorer program.

General approach: supplement the primary mission, to provide desirable but not essential new capability, or to enhance an existing capability.

Example: selected August 2017:

Conditionally-selected PMO: Contribution to ESA ARIEL Spectroscopy of Exoplanets (CASE).
Provide packaged detectors to ARIEL’s Fine Guidance Sensor Assembly.

Other possible contributions, besides hardware:

The NASA telemetry capability to support low-latency (~10 s) co-observations: TDRS Demand Access Service (DAS).

Testing facilities

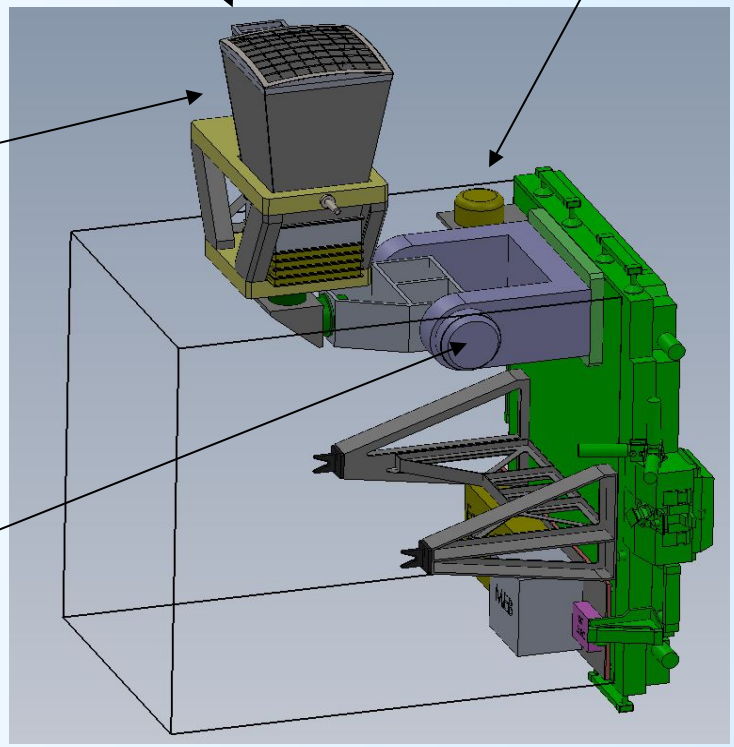
ISS-TAO Payload and its Instruments

Slides from Jordan Camp, ISS-TAO PI

Star Tracker

Gamma-Ray Transient Monitor (GTM)
50 keV to 1 MeV
Technion, Israel

Wide Field Imager (WFI)
FoV: 0.12 sr = 410 sq deg
Resolution = 1 arc min
Energy Range: 0.3 - 6 keV
Detectors: CCDs
Optics: Microchannel plates
10^{-11} erg cm^{-2} s^{-1} (2000 sec)

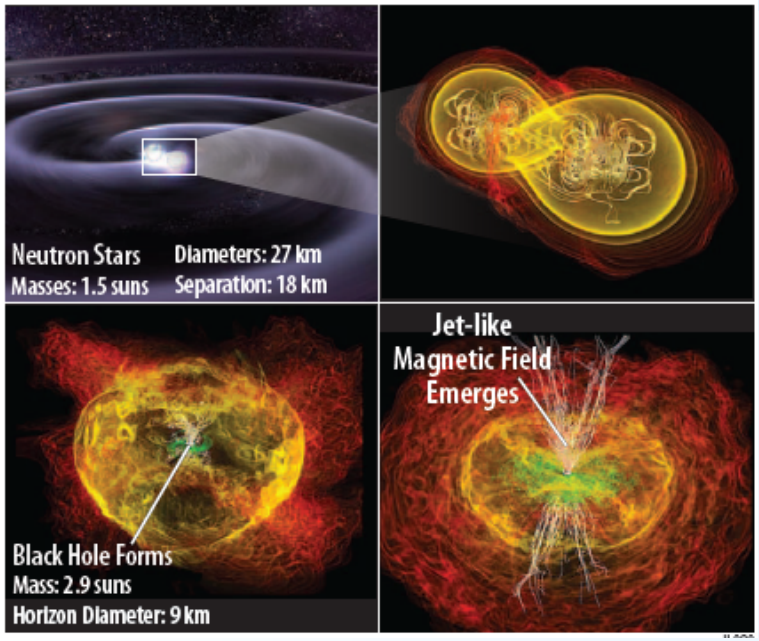


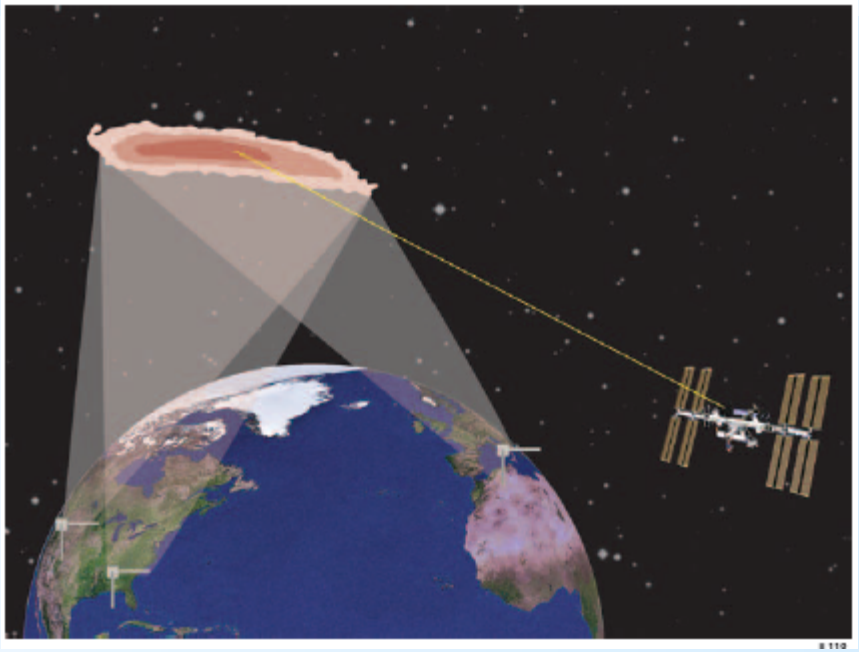
Pointing System
1 arc min

Proposed in 2016 NASA Explorer

Approved for Phase A Study

ISS-TAO: X-Ray Follow-up of Gravitational Wave Detection





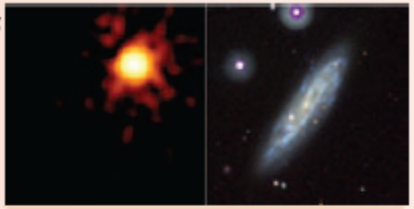
Several / yr (NS-NS and/or NS-BH)
Increase range, confidence of LIGO detections
Precise localization of source (redshift)
Energetics of source
Relative speed of graviton and photon (10^{-17})

Highest Sensitivity X-Ray Transient Science

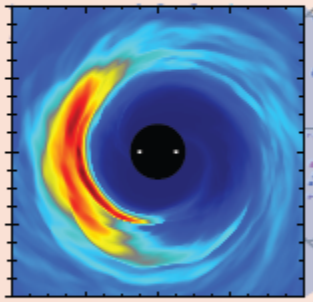
B Highest Sensitivity Time-Domain Survey of the Transient Soft X-ray Sky

With a 30-fold improvement in sensitivity beyond previous all-sky X-ray telescopes, ISS-Lobster will dramatically extend the discovery space for transient X-ray sources involving black holes and neutron stars. The near continuous ISS-to-ground communications link will allow transient alerts to be rapidly delivered to ground and space observatory networks.

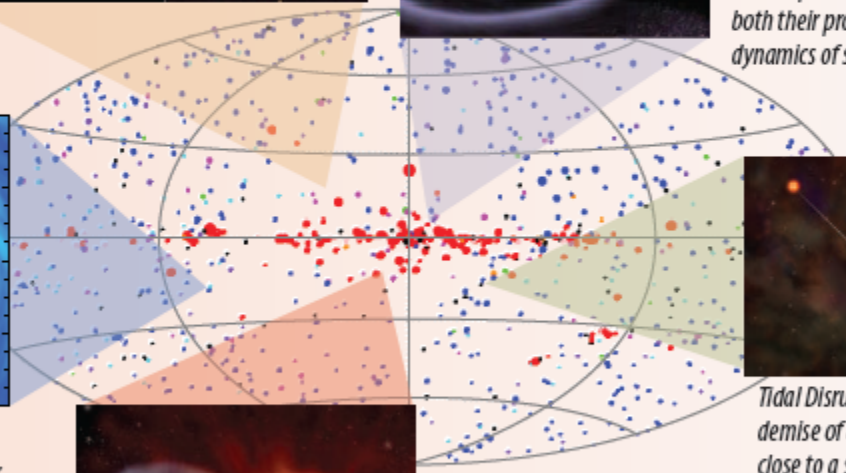
Supernova Shock Breakouts are the elusive short bright X-ray ashes signaling SNe explosions. ISS-Lobster will detect them at a rate of 1-2/yr.

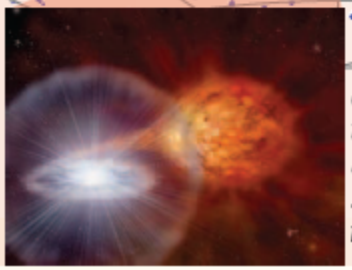


Binary neutron-star and neutron star – black hole mergers are thought to produce both short-lived strong gravity waves and electromagnetic signals. ISS-Lobster will detect these counterparts and provide insight into both their progenitor systems and the dynamics of strong gravity.



Active Galactic Nuclei will be densely monitored by ISS-Lobster, to detect modulated X-ray flux associated with the circumbinary disc inspiral of supermassive black hole binaries.





Classical and Recurrent Novae are the results of thermonuclear burning on the surface of a white . ISS-Lobster will detect X-rays from their runaway phases.

Tidal Disruption Flares signal the demise of a star when it wanders too close to a super massive black hole in the center of a galaxy. ISS-Lobster will detect ~14 such per year, elucidating stellar dynamics, and providing massive black hole demographics.