Physics of the Cosmos X-ray Science Interests Group (XRSIG) APS 2023

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USRA/NASA MSFC
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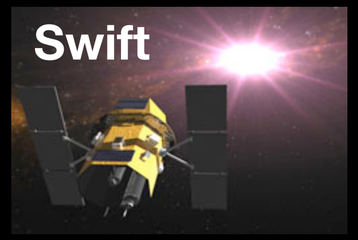
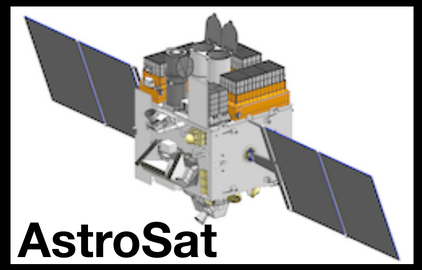
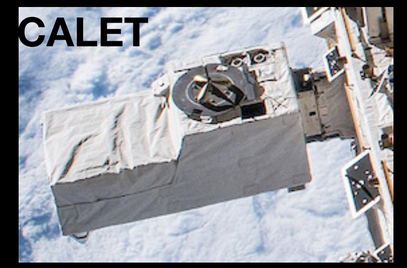
XRSIG Introduction

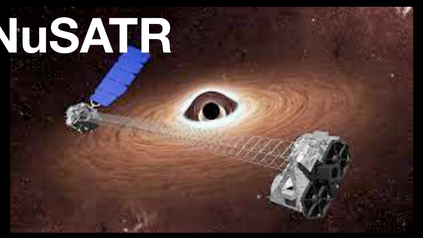
- Track and analyze evolving science goals and requirements in X-ray astronomy, especially as current "hot" topics evolve.
- Provide an active communication forum for X-ray astrophysics (e.g., via town hall meetings at venues such as AAS and APS meetings).
- Support mission studies and concept development for future X-ray observatories.
- Analyze technology development and prioritization plans with respect to redefined science goals and the evolution of mission concepts (i.e., the XR SIG will aid the PhysPAG in analyzing technology needs).

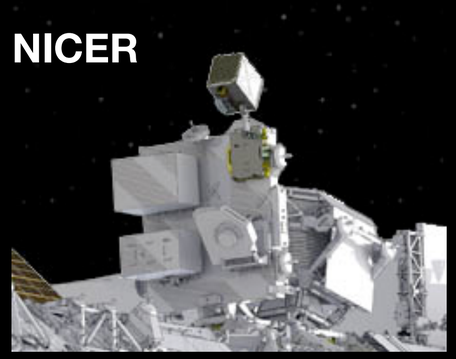
Current X-ray missions

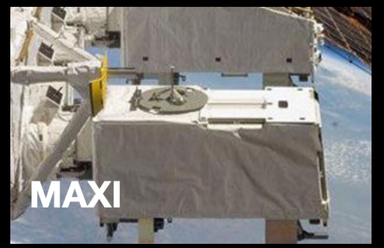






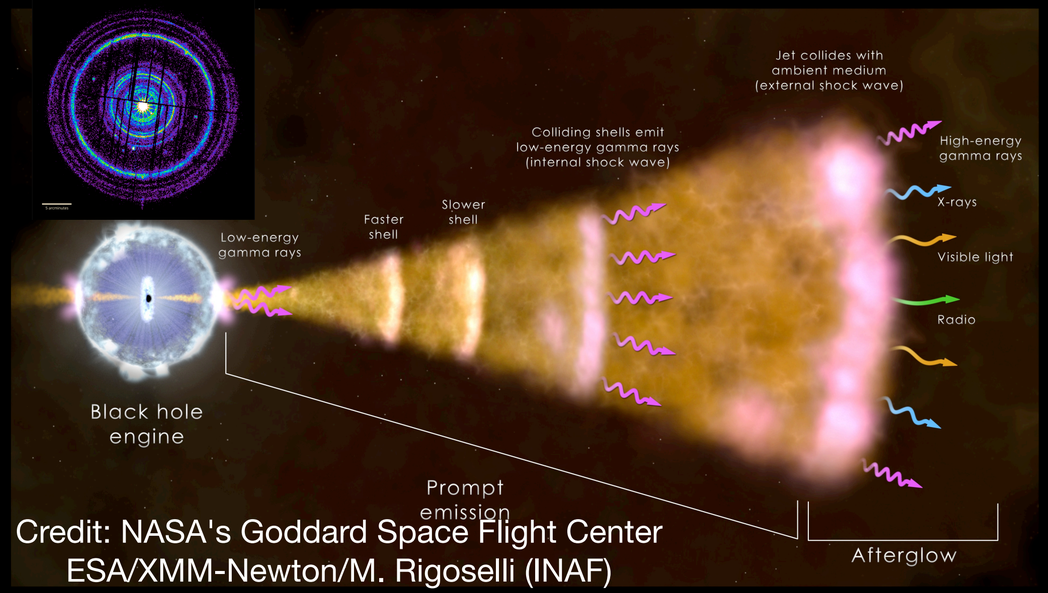




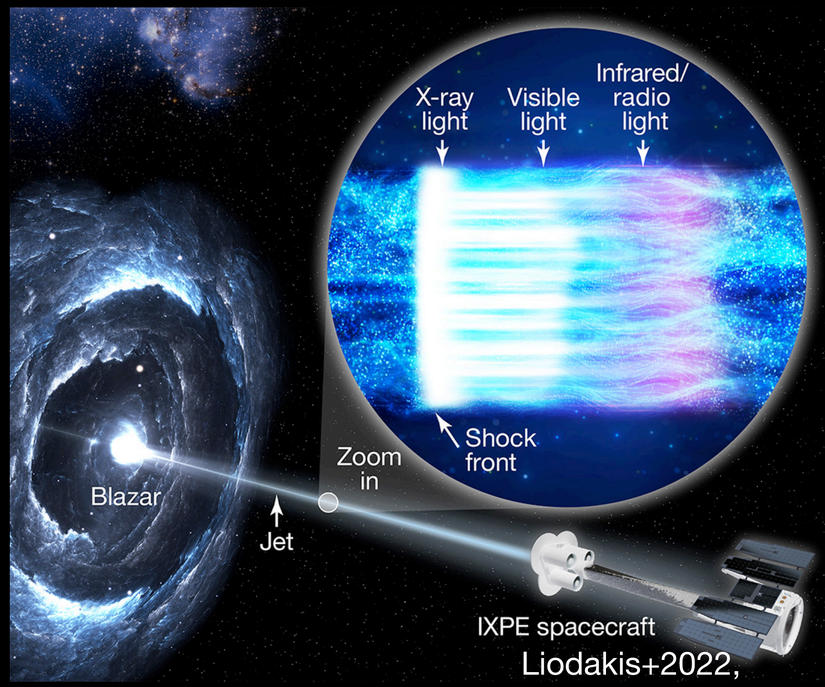


Credit:https://heasarc.gsfc.nasa.gov/

Recent X-ray science highlights

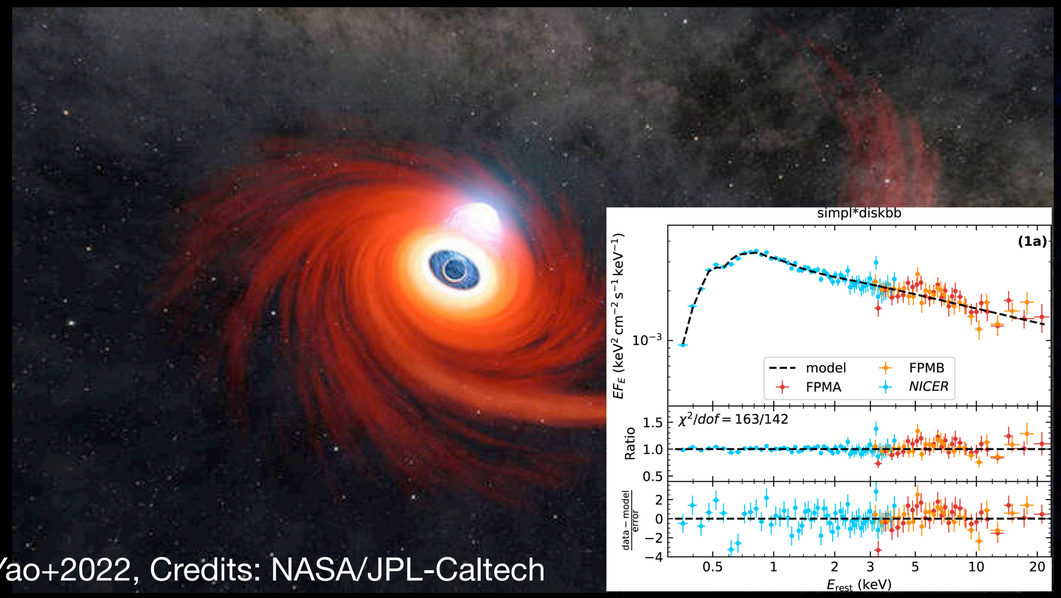


Credit: NASA's Goddard Space Flight Center
ESA/XMM-Newton/M. Rigoselli (INAF)



Liodakis+2022,
Credits: NASA/Pablo Garcia

Bucciantini+22,
Credits: Magnetic field lines: NASA/Bucciantini et al; X-ray: NASA/CXC/SAO; Optical: NASA/STScI; Infrared: NASA-JPL-Caltech



Yao+2022, Credits: NASA/JPL-Caltech

Missaglia+2023, Credit: X-ray: NASA/CXC/Univ. of Torino/V. Missaglia et al.; Optical: NASA/ESA/STScI & International Gemini Observatory/NOIRLab/NSF/AURA; Infrared: NASA/ESA/STScI; Radio: NRAO/AUI/NSF

Recent XR SIG activities

- Jan. 2023: 241th AAS meeting, Seattle, WA

  -Updates on STAR-X MIDEX Phase A

  -Updates on Probe concepts in response to Astro2020 Decadal survey

  -https://pcos.gsfc.nasa.gov/physpag/meetings/AAS_Jan2023/AAS2023-agenda.php#xrsig

- Mar. 2023: 20th HEAD meeting, Waikōloa, Hawai‘i

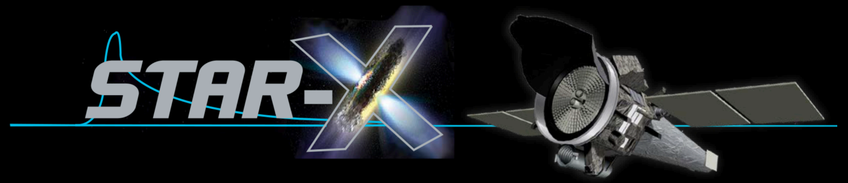
  -Athena updates

  -XRISM updates

  -https://pcos.gsfc.nasa.gov/physpag/meetings/HEAD2023/HEAD2023-Agenda.php

Near-term/Long-term XR SIG activities

- STAR-X selected for MIDEX Phase-A study



- X-ray probes and Astro2020 decadal
  - Recordings from the special probe sessions at the 20th HEAD meeting will be made public, check the PhysPAG website for updates!

ARCUS

Exploring the formation and evolution of clusters, galaxies, and stars

HEX-P
HIGH ENERGY X-RAY PROBE

STROBE-X

New Great Observatories Science Analysis Group (Cross-PAG)

- To what degree can the Key Science Questions from Astro2020 be advanced by contemporaneous flight of current, imminent, and future IR/O/UV, X-ray, and FIR Great Observatories? In particular, what discoveries in the Astro2020 Priority Areas might be uniquely made possible by coordinated use of X-ray through FIR space observatories using powerful and varied instruments? What gaps require contemporaneous flight of several or even all of these observatories, and to what degree is asynchronous panchromatic coverage sufficient? How might gaps be closed by the notional future multi-scale multiwavelength mission portfolio, including future explorers and probes?

- In the scenario that any or all of these missions not be launched, or should their missions see minimal overlap, what are the corresponding scientific impacts with regards to loss of discovery space or inability of the community to address the priority areas of Astro2020?

- Questions? Contact the PhysPAG, COPAG, and ExoPAG Chairs (Grant Tremblay: grant.tremblay@cfa.harvard.edu; Janice Lee: janice.lee@noirlab.edu; Ilaria Pascucci: pascucci@arizona.edu, respectively).

- See https://www.greatobservatories.org/sag

Summary

- Many exciting science opportunities in X-ray astronomy

- The XR SIG is open to all members of the community

For other inquiries, e-mail co-Chairs Grant Tremblay (Smithsonian Astrophysical Observatory) at grant.tremblay@cfa.harvard.edu, David Pooley (Trinity University) at dpooley@trinity.edu, Kristin Madsen (NASA/GSFC) at kmadsen@umbc.edu,
and Chien-Ting Chen (USRA/MSFC) at ctchen@usra.edu.