

X-ray Surveyor

Synergy Science Working Group

Rob Petre

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Existing Charge

Synergies with gravitational waves, WFIRST, LSST, etc.

Existing Charge Expanded...

Outreach: What capabilities does X-ray Surveyor need to help questions in other bands?

Needs: What do planned facilities in other bands add to X-ray surveyor questions?

Synergy: What questions become accessible specifically because of X-ray Surveyor capabilities coupled with others?

How X-ray Surveyor connects with astrophysics as a whole is:

- A topic that needs to be addressed by **all** of the SWGs
- A critical selling point for the mission

Coverage in the 2030s

- **SKA** – Bryan Gaensler, David Kaplan
- **ALMA** – Grant Tremblay
- **NGVLA** - TBD
- **Far-IR Surveyor** – *asking Dave Leisawitz*
- **SPICA** – *asking Jan-Willem den Herder*
- **LSST** (esp transients) – **Adam Mantz, Nora Troja, Suvi Gezari**
- **WFIRST** – *asking Niel Gehrels*
- **GMT / ELT** and other large optical – *asking Charles Alcock*
- **LUVOIR** – *asking Aki Roberge*
- **Athena** – **Randall Smith, Rob Petre**
- **CTA** – **Marcos Santander, Alberto Sadun, David Kieda**
- **LISA/LIGO** – **Federico Fraschetti, Michael Koss, Federico Fraschetti**
- **Super-K and other neutrino obs.** – **Greg Sivakoff**
- **Source-specific expertise** – **Albert Kong, Tonia Venters, Francesco Tombesi, Becky Canning**
- **CMB / SZ observatories** - TBD
- ***Others – please suggest!***

**HST, JWST
archives**

| Name / Institution | Topics of Interest / Expertise (as of 7/24) |
|--|--|
| Becky Canning KIPAC/Stanford University | Statistical populations of AGN in galaxy clusters. Our team combines robustly identified AGN using Chandra data with Radio/Optical/IR datasets and has worked on projections of the combination of future cluster surveys with Chandra follow-up data and other multi-wavelength data. The combination of Surveyor/W-FIRST/LSST/CMB stage 4 would be very exciting for evolution of AGN/host galaxy properties within clusters. |
| Federico Fraschetti University of Arizona | Modelling the electromagnetic counterpart of gravitational waves emission , producing new models for the X- and gamma-ray emission of gravitational waves bursts. |
| Suvi Gezari University of Maryland | Time domain astronomy, and in the study of transient and variable phenomena associated with supermassive black holes. I am particularly interested in the synergy between X-ray Surveyor and the exciting future landscape of time domain surveys (LSST, TESS, WFIRST) and gravitational wave experiments (LIGO, pulsar timing arrays). |
| David Kieda University of Utah | Multi-wavelength science from a future X-ray surveyor in conjunction with a future major VHE observatory as CTA . This is the most relevant instrument for the future proposal, as it is expected that the filed of VHE gamma-ray astronomy will make a transition from VERITAS and HAWC to the more sensitive CTA observatory at about the time of a proposed X-ray surveyor launch. |
| Albert Kong National Tsing Hua Univ. | Long-term X-ray variability of X-ray binaries in our Galaxy and also nearby galaxies , using multi-wavelength observations to investigate the physical properties of different types of compact binary systems. |
| Michael Koss Eureka Scientific | Galaxy mergers and recoiling black holes such as in dwarf galaxies ; observational X-ray constraints on the frequency of gravity waves and the black hole occupation fraction. |
| Adam Mantz Stanford University | Multiwavelength studies of clusters of galaxies, combining Surveyor with surveys completed by LSST, Euclid, SKA, CMB Stage-4 and others. Member of the clusters working group for the LSST Dark Energy Science Collaboration, involved in the planning process for CMB Stage-4, and SPT |
| Alberto C. Sadun University of Colorado Denver | Optical observations of Blazars and other AGN, and collaborating with my counterparts in X-ray, gamma-ray, and other wavelengths. I am an associate member of VERITAS (gamma-ray) and am also part of the WEBT collaborations (mainly optical, with collaborations with X-ray and gamma-ray). |
| Marcos Santander Barnard College, Columbia | Multi-messenger searches for the sources of astrophysical neutrinos , member of the VERITAS and IceCube collaborations |
| Gregory Sivakoff University of Alberta | Multiwavelength studies connecting the accretion process and relativistic jet production process in X-ray binaries, also following up neutrino detections in radio. |
| Francesco Tombesi UMCP | Connections between supermassive black holes and galaxy evolution. The comparison between X-ray observations and information from other wavelengths, such as mm, radio, IR and optical, can provide unique insights into this topic. |
| Eleonora Troja UMD, NASA/GSFC | Short gamma-ray bursts and their connection to gravitational wave sources , involving major facilities such as Chandra, XMM, Hubble, and Gemini; co-chair of the Athena WG dedicated to Target of Opportunity observations. |
| Tonia Venters NASA GSFC | Multimessenger studies of AGNs, GRBs, star-forming galaxies, and cosmic backgrounds. Modeling high-energy particle interactions to determine their broadband diffuse emission from X-rays to gamma rays and to assess their contribution(s) to the flux of astrophysical neutrinos and ultra-high energy cosmic rays. |

Plans / Next Steps

- Continue to reach out to leads for various observatories and/or source areas for suggested additional members
- Email exchange followed by telecon to identify opportunities for X-ray Surveyor **Outreach, Needs,** and true **Synergy**.
- Report back to STDT by the time of next F2F