X-ray Surveyor
Synergy Science Working Group

Rob Petre
Randall Smith
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!**
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<thead>
<tr>
<th>Name / Institution</th>
<th>Topics of Interest / Expertise (as of 7/24)</th>
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<tbody>
<tr>
<td>Becky Canning</td>
<td><strong>Statistical populations of AGN in galaxy clusters.</strong> 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.</td>
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<td>Federico Fraschetti</td>
<td><strong>Modelling the electromagnetic counterpart of gravitational waves emission,</strong> producing new models for the X- and gamma-ray emission of gravitational waves bursts.</td>
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<td>University of Arizona</td>
<td><strong>Time domain astronomy,</strong> and in the study of transient and variable phenomena associated with supermassive black holes. I am particularly interested in the <strong>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).</strong></td>
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<td>Suvi Gezari</td>
<td><strong>Long-term X-ray variability of X-ray binaries in our Galaxy and also nearby galaxies,</strong> using multi-wavelength observations to investigate the physical properties of different types of compact binary systems.</td>
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<td>University of Maryland</td>
<td><strong>Galaxy mergers and recoiling black holes such as in dwarf galaxies</strong>; observational X-ray constraints on the frequency of gravity waves and the black hole occupation fraction.</td>
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<td>David Kieda</td>
<td><strong>Multiwavelength studies of clusters of galaxies, combining Surveyor with surveys completed by LSST, Euclid, SKA, CMB Stage-4 and others.</strong> Member of the clusters working group for the LSST Dark Energy Science Collaboration, involved in the planning process for CMB Stage-4, and SPT.</td>
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<td>University of Utah</td>
<td><strong>Optical observations of Blazars and other AGN, and collaborating with my counterparts in X-ray, gamma-ray, and other wavelengths.</strong> 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).</td>
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<td>Albert Kong</td>
<td><strong>Multi-messenger searches for the sources of astrophysical neutrinos,</strong> member of the VERITAS and IceCube collaborations</td>
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<td>National Tsing Hua Univ.</td>
<td><strong>Multiwavelength studies connecting the accretion process and relativistic jet production process</strong> in X-ray binaries, also following up neutrino detections in radio.</td>
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<td>Michael Koss</td>
<td><strong>Connections between supermassive black holes and galaxy evolution.</strong> 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.</td>
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<td>Eureka Scientific</td>
<td><strong>Short gamma-ray bursts and their connection to gravitational wave sources,</strong> involving major facilities such as Chandra, XMM, Hubble, and Gemini; co-chair of the Athena WG dedicated to Target of Opportunity observations.</td>
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<td>Marcos Santander</td>
<td><strong>Modeling high-energy particle interactions</strong> 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.</td>
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<td>Barnard College, Columbia</td>
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<td>Gregory Sivakoff</td>
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<td>University of Alberta</td>
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<td>Francesco Tombesi</td>
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<td>UMCP</td>
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<td>Eleonora Troja</td>
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<td>UMD, NASA/GSFC</td>
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<td>Tonia Venters</td>
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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