



The STAR-X Observing Plan: Surveying the Fast, Furious and Forming Universe in X-rays and UV

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Learn MORE!

Check out the website!
<http://star-x.xraydeep.org/>



Driven by the Science Theme: Exploring the Fast, Furious, and Forming Universe

Observing Plan Goal:
Time-domain surveys + rapid-response (< 2 hr) ToOs

The STAR-X Science Story

The FAST: Locally rare, brief events have an outsized impact on the Universe.



The heavy elements needed for life are synthesized in and dispersed by supernovae and neutron star mergers. Similarly, a single stellar superflare can evaporate an ocean or catalyze prebiotic pathways. The STAR-X wide field UV/X-ray design and fast and flexible operations captures these events.

Wide field & flexible operations

The FURIOUS: Black holes grow extremely rapidly at early times in the Universe and are critical to galaxy evolution.



STAR-X will uniquely probe the physics of rapid accretion that allowed massive black holes to grow so quickly in the early Universe. STAR-X will catch transient, extreme black hole feeding events, such as TDEs, where entire stars are disrupted.

Catching and monitoring transient events

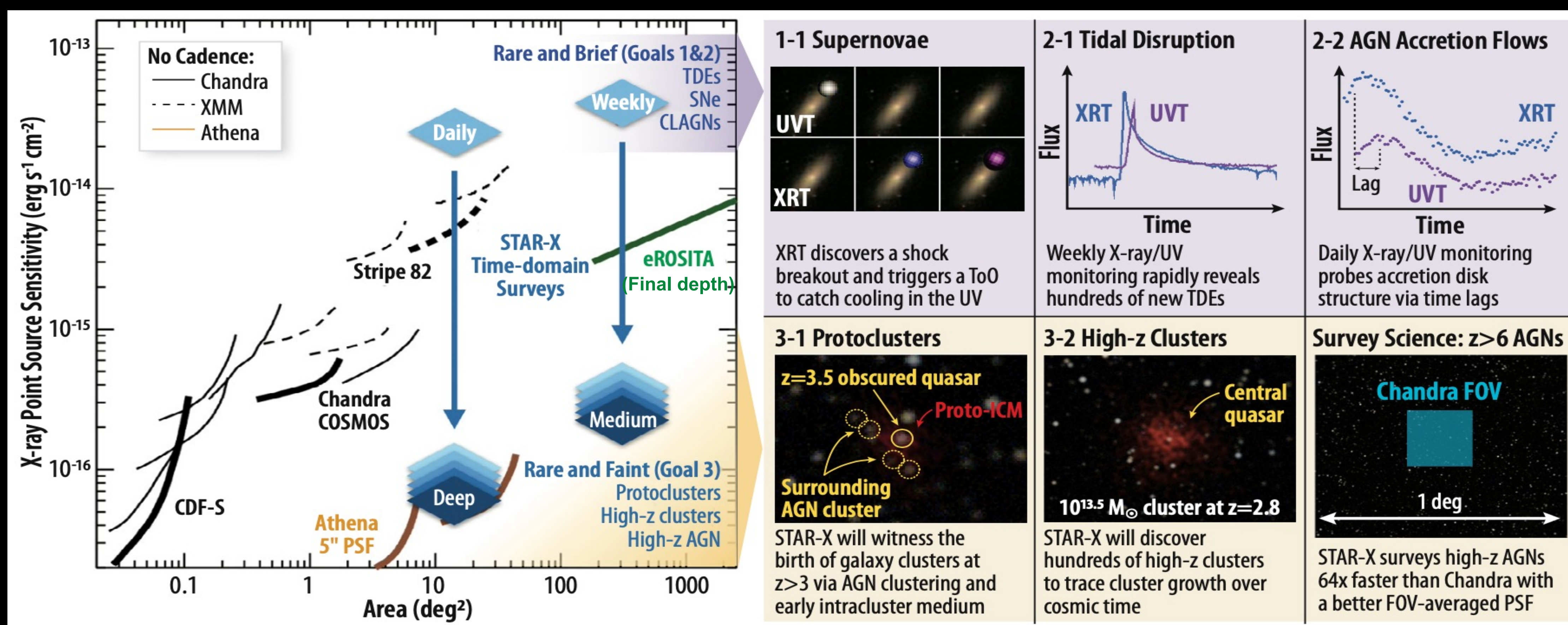
The FORMING: Distant galaxy clusters provide maximal leverage in evolutionary studies of structure formation and chemical enrichment.



STAR-X will conduct deep surveys and discover the elusive diffuse emission from the largest bound objects in the Universe (clusters of galaxies), shortly after their birth. STAR-X's combination of excellent imaging and low particle background (due to orbit choice) makes this possible in a way that no other mission can.

Low background & High sensitivity

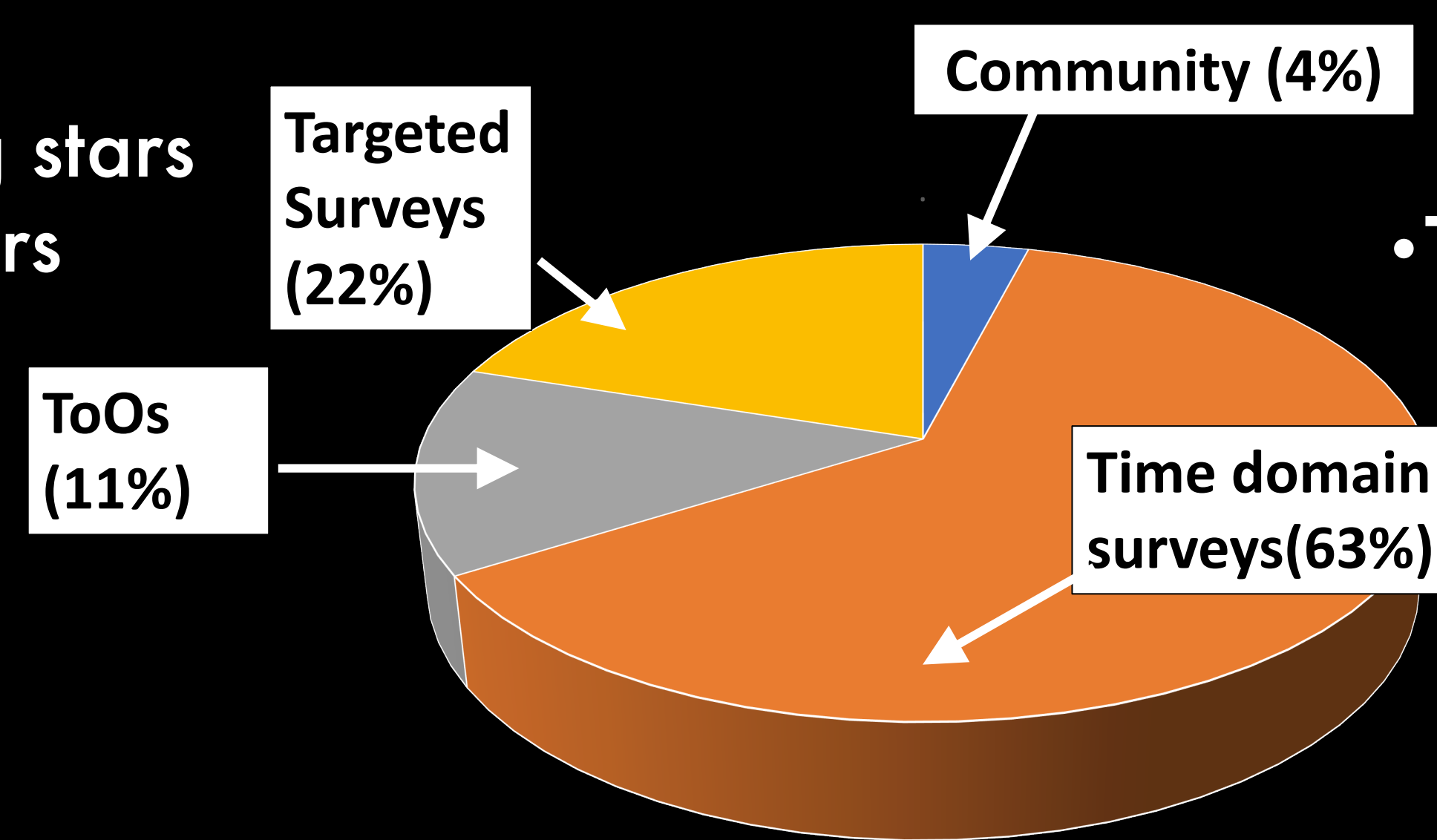
Survey Strategy: Weekly and Daily Cadences that build to medium (350 sq deg) and deep (13 sq deg) surveys



Final depths:
MEDIUM: 5x10⁻¹⁶ cgs over 350 deg² (~100 Chandra COSMOS fields),
DEEP: 9x10⁻¹⁷ cgs over 13 deg²

Science Program for the Two Year Prime Mission

- Targeted Surveys (22%)
 - 10 nearby galaxies
 - 20 low-mass, planet-bearing stars
 - 20 high-z SZ-detected clusters
 - 20 nearby clusters
- Targets of Opportunity (11%)
 - Rapid-response (<2 hours)
 - Young supernovae
 - GW X-ray/UV counterparts
 - GW source late-time follow-up
 - Tidal-disruption events



Community Program (4%, 1.8 Ms)
 Impromptu requests from the broader community

- Time Domain Surveys (63%)
 - Deep survey: Rubin deep drilling fields
 - 13 deg², **Daily Cadence**, 1500 s (10.5 deg² UVT+XRT)
 - Optimized for rapid transients and AGN variability
 - 1x10⁻¹⁴cgs (X-ray) and 22.5 mag (UV, F180M) and 22.1 mag (UV, F275M)
 - Medium survey: Stripe 82 + others, & Rubin deep drilling fields
 - 350 deg², **Weekly Cadence**, 500 s (280 deg² UVT+XRT)
 - Optimized for TDEs
 - 3x10⁻¹⁴cgs (X-ray) and 22.3 mag (UV, F180M) and 22.0 mag (UV, F275M)