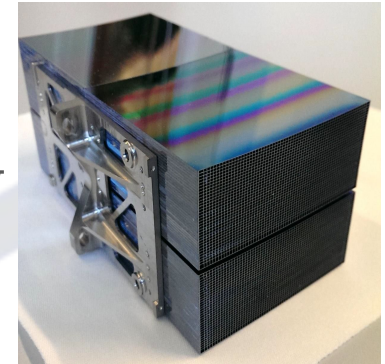


Athena: Advanced Telescope for High-Energy Astrophysics

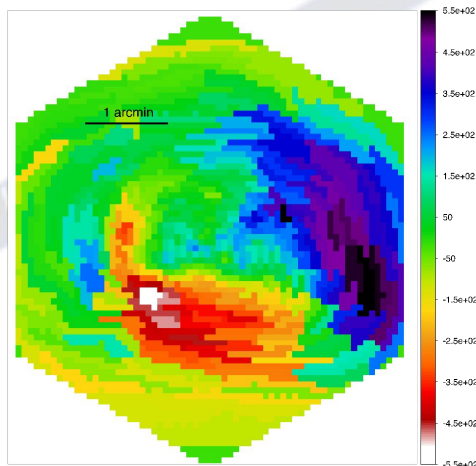
- ESA's Second Large 'Cosmic Vision' Mission
 - Launch early 2030s
 - L2 halo orbit planned
 - Lifetime: 4 yr + Possible extensions

- Uses Si-pore optics
 - 5" HEW on-axis
 - $\geq 1.4 \text{ m}^2$ area @ 1 keV
 - 0.25 m^2 area @ 6 keV



X-ray Integral Field Unit (X-IFU)

- 2.5 eV energy resolution < 7 keV
- Field of view: 5' diameter
- Pixel size ~5"



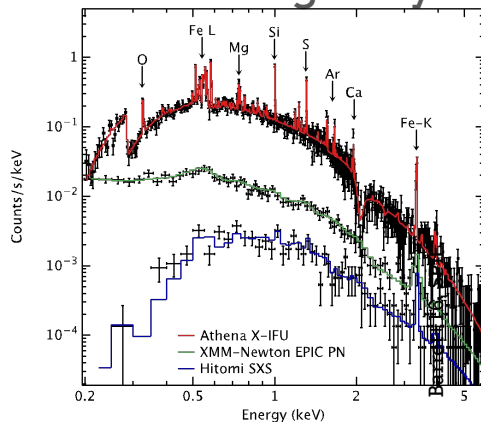
Wide Field Imager (WFI)

- 50-150 eV spectral resolution @ 6 keV
- Field of view: 40' x 40' square
- 2.2" pixel size

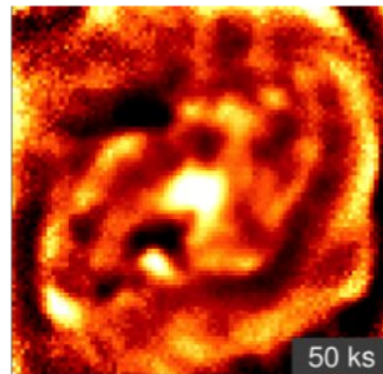


The Hot & Energetic Universe

- How does ordinary matter assemble into the large-scale structures that we see today?
 - Thermal history of hot baryons in clusters up to $z \sim 2$
 - The quest for early galaxy groups @ $z > 2$
 - Chemical evolution of cluster gas
 - AGN feedback on cluster scales
 - Missing baryons

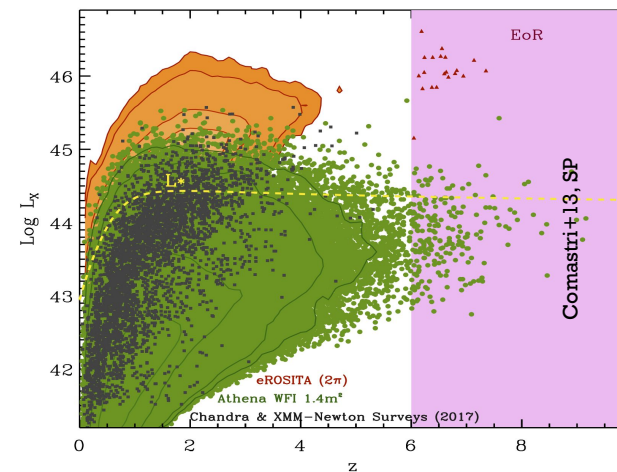


Galaxy group @ $z=1$



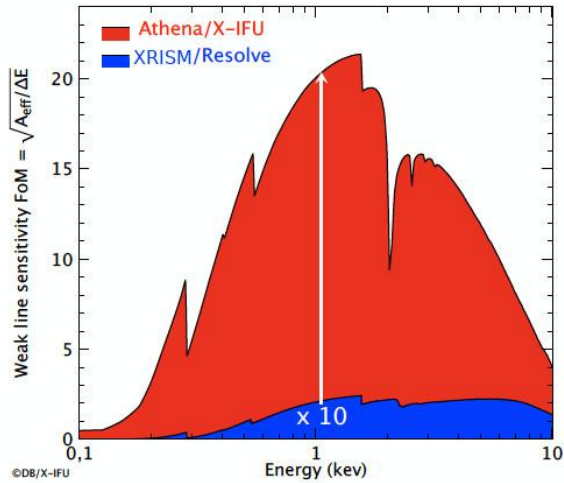
AGN-produced ripples

- How do black holes grow and influence the Universe?
 - The history of SMBH growth
 - Obscured AGN census $z \sim 1-3$
 - AGN winds and outflows $z \sim 0-3$
 - SMBH growth: accretion vs. mergers
 - BH & SMBH physics
 - Luminous extragalactic transients



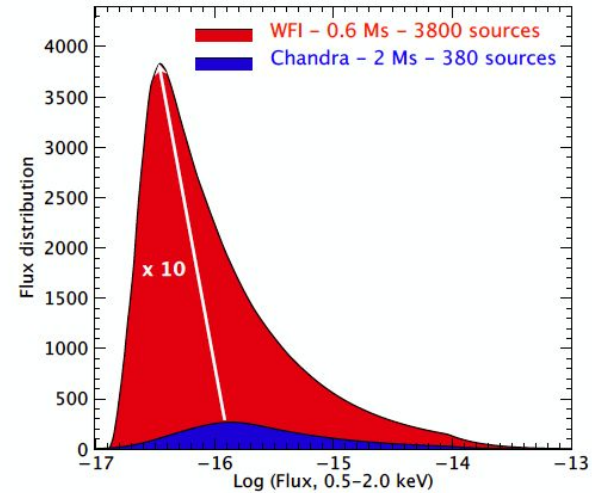
Athena: a transformational observatory

Spectroscopic line sensitivity



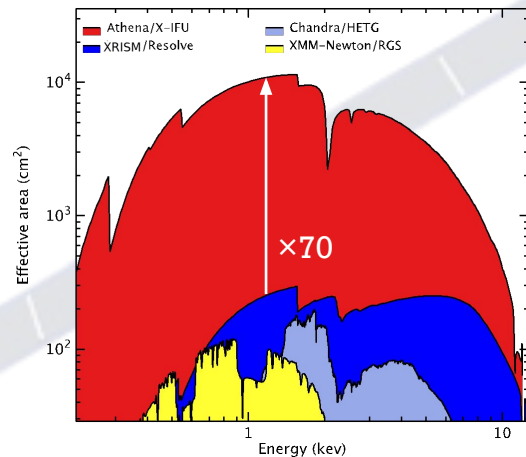
Credit: X-IFU team

Survey speed



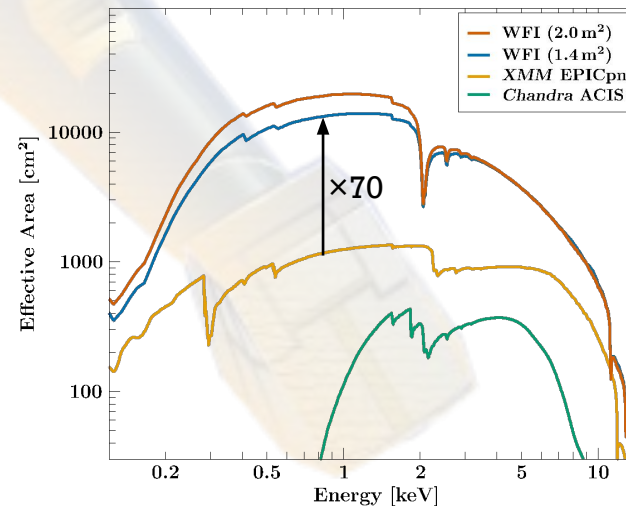
Credit: J. Aird/A. Rau (WFI team)

X-IFU+mirror collecting area



Courtesy D. Barret (IRAP)

WFI+mirror collecting area



Courtesy A. Rau (MPE)