

A Modest Modification of Athena Data Rights to Improve Transient Science Return

W. Niel Brandt (Penn State)

In recent years, a new extragalactic population of faint, fast X-ray transients has been discovered in observations with Chandra and XMM-Newton (e.g., Bauer et al. 2017; Xue et al. 2019). These transients last a few hours and their total energy release, assuming isotropic emission, is large at $\sim 10^{48}$ erg. One has been proposed to be a magnetar-powered X-ray transient resulting from a binary neutron-star merger, while the nature of others is less clear but could include orphan gamma-ray burst afterglows, supernova shock-breakout events, or peculiar tidal-disruption events (e.g., a white dwarf being accreted by an intermediate-mass black hole). Recently, Yang et al. (2019) set systematic rate constraints on such transients based on 19 Ms of high-quality Chandra surveys data. Athena, owing to its large grasp, should detect ~ 100 such transients per year (see Section 4.2 of Yang et al. 2019). Prompt searching of incoming pointed Athena observations should allow the discovery of such transients using the Yang et al. methodology, and indeed plans for such searching have been discussed. Prompt announcements of transient positions will allow rapid multiwavelength follow-up investigations by the worldwide community to characterize the nature of these transients.

If Athena will have a data-rights policy broadly similar to that of Chandra and XMM-Newton, then a small modification of this data-rights policy could substantially improve the science return for faint, fast X-ray transients. Specifically, once a new X-ray transient is serendipitously discovered by Athena, a small cut-out of the X-ray events for the transient could be made and promptly released publicly for X-ray spectral and timing analysis by the scientific community. This would allow the Athena discovery X-ray observation of the transient to be analyzed efficiently in conjunction with multiwavelength follow-up observations. Since these transients are expected to be point sources, the size of the cut-out could be small – say, 5-10 times the size of the point spread function (at the relevant location of the transient) in linear extent. The cut-out will thus constitute only a small fraction of the observed Athena field of view, and it is unlikely to compromise the data rights for the primary Athena science target being observed (any such unlikely cases could be dealt with on a case-by-case basis).

A similar small modification of data rights could also be employed to improve the science return for serendipitous fast Galactic transients.

Thanks for your consideration of this idea, which is purely science driven and neglects broader political or legal considerations.

References

- F.E. Bauer et al. 2019, MNRAS, 467, 4841
- Y.Q. Xue et al. 2019, Nature, 568, 198
- G. Yang et al. 2019, MNRAS, 487, 4721