

Searching Extragalactic X-ray transients in the Chandra Catalog 2.0

We will present the detection of eight candidate extragalactic fast X-ray transients (+ XRT 170831 which was identified previously by Lin et al. 2019) from a parent sample of 214,701 sources in the Chandra Source Catalog Release 2.0 above $|b| > 10^\circ$ (160.96 Ms over 592.4 deg^2). Our candidates have peak fluxes between 3.5×10^{-15} to $1.1 \times 10^{-13} \text{ erg cm}^{-2} \text{ s}^{-1}$ and span hardness ratios between -0.70 and -0.10. We characterize their X-ray light curves and spectra in detail using broken power-law models with break times of 0.3 to 9.9 ks and spectral indices of 0.4 to 3.4. For the two candidates with visible counterparts in archival imaging, we assess their photometric redshifts ($z_{\text{ph}} \sim 0.3\text{--}5.2$) and host properties. Moreover, a subsample of FXRTs shows possible association with GRBs (because of a plateau in their X-ray light curves and similarities with another X-ray transient, called XT2, which could be related to an off-axis short GRB), particularly with a proto-magnetar emission remnant. Also, we study the properties of the potential magnetars such as the magnetic field, rotational kinetic energy, and initial rotational period. Finally, we calculate an event rate of the total sample and also the sub-sample of objects likely related with GRBs of $8.68^{+7.93}_{-5.68} \times 10^2$ and $3.52^{+5.58}_{-3.38} \times 10^2 \text{ yr}^{-1} \text{ Gpc}^{-3}$, respectively, and discuss implications for future understanding of this enigmatic population.

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