



X-RAY ASTRONOMY 2019

Current Challenges and New Frontiers in the Next Decade

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Exponential Temporal Decay of Extended Emissions in Short Gamma-Ray Bursts with Possible Luminosity – E-folding Time Correlation

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The origin of extended emissions following prompt emissions of short gamma-ray bursts (SGRBs) is in mystery. The long-term activity of the extended emission is responsible for promising electromagnetic counterparts to gravitational waves and, so that it may be a key to uncovering the progenitor of SGRBs. We investigate the early X-ray light curves of 26 SGRBs with known redshifts observed with the X-Ray Telescope aboard the *Neil Gehrels Swift Observatory* (*Swift*). We find that the exponential temporal decay model is able to describe the extended emissions comprehensively with a rest-frame e-folding time of 20 – 200 seconds. We also estimate the isotropic equivalent energies of the extended emission with the exponential decay model and of the prompt emission, compared with those of the prompt emission. Then, it is revealed that the extended emission is 0 – 3 orders of magnitude less powerful than the prompt emission. Finally, we find a strong correlation between the expected maximum luminosity and e-folding time which can be described by a power-law with an index of -3.3 and whose chance probability of 8.2×10^{-6} if there is no observation bias of *Swift*. In this presentation, we discuss the detail of the analysis and the physical model of the exponentially decaying extended emission.

Topic

Multi-messenger and transient astronomy

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