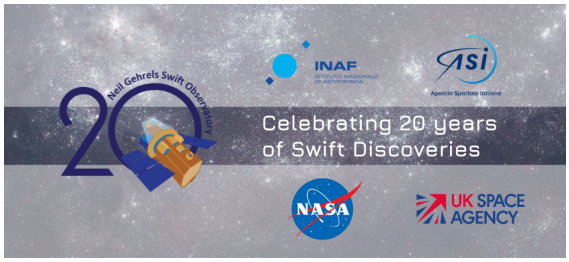

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Characterisation of the early X-ray emission of short Gamma-Ray Bursts

Tuesday 25 March 2025 14:29 (1 minute)

Over its 20 years of operation, the *Swift* satellite has led to breakthrough discoveries in the study of Gamma-Ray Bursts (GRBs). In particular, the rapid and automatic repointing capabilities of the X-Ray Telescope (XRT) have enabled the detection and localisation of the GRB afterglow in about one minute after the trigger provided by the Burst Alert Telescope (BAT). XRT observations have unveiled common features in soft X-ray lightcurves, such as steep decays and plateaus, whose physical origin remains poorly understood. These features cannot be explained within the standard afterglow model, which attributes the emission to electrons cooling via synchrotron and inverse Compton processes at the forward shock. The steep decay phase is also observed in a fraction of the short GRBs. Since the steep decay emission is significantly brighter than the forward shock emission, short GRBs provide a unique opportunity to observe it for a longer duration (up to 10-15 minutes) than long GRBs. In this talk, I will present a systematic analysis of early X-ray emission of short GRBs, including their temporal and spectral evolution. I will introduce a new technique to model the curvature and the intrinsic evolution of the GRB spectrum in XRT data. This work aims to understand the physics driving the steep decay phase and to optimise the detection strategies with current and future observatories.

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