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Spectral and temporal analysis of GRB 210410A detected by Fermi-LAT

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Gamma-ray bursts (GRB's) are highly energetic impulses of γ−rays that are categorised into two major categories, namely long and short GRBs. Their distinction lies in their duration, the former lasts for more than 2 s whilst the latter lasts for less than 2 s. Their prompt emission has an energy range of keV to GeV energy band. On the 10th of April 2021, the \emph{Fermi} Large Area Telescope (LAT) was triggered at trigger time T0 = 639708801 MET by a GRB located at RA, DEC = 268.9, 42.5 with a redshift z < 3.6, this event was subsequently dubbed GRB 210410A. Its extended LAT data was analysed for 1000 s using fermitools from the \emph{Fermi} Science Support Center. The LAT and the Gamma Bursts Monitor (GBM) data were fitted using the RMFIT software. Various spectral fitting models were utilised and the best spectral was the combination of power law (PL) and GRB band function which are the most common models that best describes GRB data amongst others. The analysis was done over a time window of 48s. GRB 210410A is a long GRB lasting for T90 = 48.1280 s. Its GeV emission is barely observed and this suggests that the GRB is not energetic. This is also confirmed by observations of its rather low rest frame Band function peak energy of 419.886 keV. The fit parameters that give the best-fit spectral model suggest that GRB 210410A is a long soft GRB with peak photon energy Epeak = 220.644 keV and a PL photon index of 1.224. Moreover, GRB 210410A is associated with an isotropic energy of Eiso ≈ 9.249 ± 1.131 × 1051 keV and intrinsic peak energy of Eip = 419.886 ± 84.579 keV.The Eiso and Eip obtained satisfies the Amati relation. From attributes, it is reasonable to conclude that GRB 210410A originated from the collapse of a massive star to form a black hole or a magnetar.

Abstract field

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