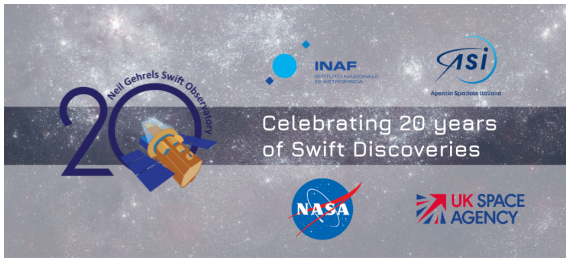

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Investigating High-Energy Time Lags in Gamma-Ray Bursts with Fermi-LAT and GBM

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Time lags between the arrival time of different photon energies provide valuable insight into the emission mechanisms of Gamma-Ray Bursts (GRBs). Using data from the Fermi Gamma-ray Burst Monitor (GBM, between 10 - 500 keV) and the Large Area Telescope (LAT), particularly those obtained with the Low Energy (LLE) technique (30 - 100 MeV), we analyze a sample of 70 GRBs to investigate the relationship between spectral lags and high-energy emission properties. Lags within the GBM energy range (10 keV −1 MeV) are predominantly positive (76%), namely lower-energy photons arrive later than higher-energy ones as a possible consequence of a hard to soft spectral evolution. However, when comparing LLE (30–100 MeV) and GBM bands, in 37% of cases high-energy photons are delayed relative to low-energy ones. These negative lags can be interpreted as due to an additional spectral component rising in the LLE energy range as supported by the spectral analysis of these events.

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