Contribution ID: **11** Type: **Contributed Talk**

Implications of Joint Spectral Analysis from Fermi(GBM, LAT, and LLE) on Phenomenological GRBs Correlations

Wednesday 2 October 2024 09:30 (15 minutes)

This study explores the implications of joint spectral analysis using data from Fermi's Gamma-ray Burst Monitor (GBM), Large Area Telescope (LAT), and LAT Low Energy (LLE) on phenomenological correlations in Gamma-Ray Bursts (GRBs). Combining spectral data from these three Fermi instruments, we aim to enhance our understanding of GRB characteristics and their potential as cosmological probes. We focus on refining key correlations, such as the Amati and Yonetoku relations, which relate intrinsic peak energy to energetics and luminosity. Our analysis covers GRB events from 2008 to 2022, emphasizing two critical time intervals —burst duration (T_{90}) and peak flux. Through this approach, we aim to improve fit quality and tighten constraints on critical spectral parameters, including $E_{\rm peak}$ and spectral indices. Building on previous studies, we compare the joint fit with the fit obtained from GBM data alone to assess any improvement. These spectral parameters will be used to evaluate the potential of GRBs as cosmological standard candles.

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Session Classification: Transients

Track Classification: Transients