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Neural Networks for Estimation of Gamma-Ray Burst Redshifts

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A wealth of Gamma-Ray Burst (GRB) data is available today with known redshifts (observed up to z =9.4), provided by different instruments with well-measured prompt gamma-ray flux and spectral information. In order to estimate redshifts of GRBs using a theoretical estimate (so-called pseudo-redshifts) from spectral relations, several phenomenological relations have been developed. Amati relation between the peak energy E_i,_peak, in the cosmological rest frame of the GRB at which the νfν spectrum peaks and the total isotropic-equivalent radiated energy in gamma rays E_iso is one such example. Another example is the Yonetoku relations between the E_i,_peak, and isotopic luminosity L_iso. In this work, we adopt a machine learning technique (Neural Networks) to estimate redshifts from different observable GRB properties with a large sample of data collected by the Gamma-ray Burst Monitor (GBM) onboard the Fermi Gamma-ray Space Telescope. Such a technique is useful to explore any hidden, non-linear relations between the parameters. Estimation of pseudo redshift is useful to standardize GRBs as cosmological probes.

Track

GRBs

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