

STUDY OF VERY SHORT GAMMA-RAY BURSTS

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Abstract

We have carried out a detailed study of the morphology of gamma-ray bursts (GRBs) with time duration less than 100 ms that includes: (1) a fast-Fourier spectrum analysis, (2) a comparison with the Stern analysis of longer bursts, (3) an inner comparison of the properties of the short bursts, and (4) a comparison of the short burst properties with the bulk of the GRBs from the Burst and Transient Source Experiment (BATSE) 4B catalogue. We have used the time tagged event (TTE) BATSE 3B data, which is available to the public, for part of the analysis. We show that these bursts are very different from the rest of the GRB events. The short bursts appear to be nearly identical, suggesting a separate class of GRBs. We also show that the short bursts have a Euclidean space-time distribution, in sharp contrast to the longer bursts with $\tau_{duration} > 100$ ms that implies that these sources are likely local. Finally we compare the bursts with a model of primordial black hole (PBH) evaporation at the quark-gluon (Q-G) phase transition temperature and other shock wave models.