Asymmetric subpeaks of short duration bursts

Varsha Gupta, Patrick Das Gupta (Department of Physics, University of Delhi, Delhi 110 007, India.), P. N. Bhat (Tata Institute of Fundamental Research, Homi Bhabha Road, Mumbai 400 005, India.)

Subpeaks in 65 short duration bursts belonging to the 3B catalogue have been identified and are fitted with lognormal functions as most subpeaks are of FRED kind. Characterising the symmetry of a subpeak by the ratio of rise to decay time, we find that statistically the first subpeak of a burst tends to be more asymmetric than the subsequent ones. If the FRED nature exhibited by the subpeaks in GRBs is due to relativistic beaming then one may obtain an estimate of the fire-ball shell 'speed' associated with a subpeak using the latter's rise time and width. Our analysis shows that the 'speed' associated with the first subpeak statistically tends to be larger than that for the subsequent peaks. In this work, we have also studied correlations between various parameters like hardness ratio, rapidity index etc. that characterise a burst.