

Studying the viewing geometry of sGRBs and central engine using prompt emission

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Prompt emission of short gamma-ray bursts (sGRBs) are analyzed using the model of the multi-color blackbody, which is interpreted as the emission from a non-dissipative photosphere with jet structure and viewing geometry inference. Nearly 69 % and 26 % of the sample is consistent with a multicolor blackbody and a pure blackbody model, respectively. Using this physical interpretation, a narrow jet core with a median of ~ 3 degrees and power-law index of 1.3 - 2.2 as decreasing Lorentz factor profile for the jet structure is deduced. Interestingly, based on the current LIGO sensitivity, the study predicts the rate of coincident detections of bright short GRBs with gravitational waves to be 0.19 - 2.87 events/yr. Another major quest in the field of GRB science is the nature of stellar remnants. Using the magnetar energy limit, 8 GRBs with black hole central engines are identified in 11 years of Fermi GRB sample (long and short both). The estimated masses of these bursts are found to range between 2 - 60 solar masses. A few of them are found to lie in the mass-gap region, suggesting that some of the lighter black holes in the Universe are formed via these catastrophic events.

Track

GRBs

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