

external inverse Compton emission from multi-episode GRBs: the case of GRB 221009A

The detection of ultra-high energy TeV photons from the brightest gamma-ray burst (GRB), GRB 221009A, has attracted intense investigations on its emission mechanism. Here we propose a general scenario of external inverse Compton (EIC) to explain observed very high energy emission from GRBs. GRBs are generally composed of multiple episodes, attributed to intermittent GRB central engine activities. Ejecta from a central engine due to its early activities (including a precursor), will run into a circumburst medium and decelerate, generating an afterglow shock. Accelerated electrons in the shock will possibly up-scatter the prompt photons in late episodes to very high energies. We find for not extreme parameters, TeV photons due to this EIC mechanism can be detected by the current instruments, such as LHAASO, MAGIC, and HAWC. We also find this scenario can be as an origin for the detected very high energy photons from GRB 221009A.

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