

Title: Effect of the brightest gamma-ray burst (GRB 221009A) on low energy gamma-ray counts at sea level

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Abstract:

Gamma-ray bursts (GRBs) are highly energetic explosions in the Universe that release massive amounts of energies exceeding 10^{46} joule s^{-1} . These GRBs are observed from Earth as intense flashes of gamma radiation that occur approximately once per day and come from all different directions of the sky. They are observed as short, intense, and pulsed gamma-ray emissions, in the sub-MeV energy range lasting from 0.1 s up to a few hundred seconds. In this colloquium, the recent GRB 221009A called the brightest of all time (BOAT), and its effects observed from the earth will be discussed. GRB 221009A occurred on 9th October 2022 and its frequency is estimated as once in 10,000 years. The gamma-ray and cosmic ray observatory LHAASO at 4410 m above sea level detected the highest energy photons beyond 10 TeV from this brightest GRB. The exceptionally bright fluence of this GRB was geographically centred on India. Hence, we study GRB 221009A with low-energy gamma-ray data (0.2–6) MeV obtained from the two NaI (Tl) scintillation detectors located at Tirunelveli (Geographic coordinates: 8.71°N, 77.76°E). After analysing gamma rays in the low energy range, we report no significant change in the observations associated with GRB 221009A. However, our observations in terms of the extent of attenuation of gamma rays in the atmosphere will be discussed. In addition, the parameters of a hypothetical GRB for which photons of similar energies would reach the ground are estimated.