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Constraining the SSC Model of GRB 221009A via Spectral Energy Distribution

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GRB 221009A is an exceptionally bright and relatively nearby event, displaying a substantial abundance of very high energy (VHE) photons as observed by the two LHAASO instruments: WCDA and KM2A. The prevailing model attributes the origin of these VHE photons to synchrotron self-Compton (SSC) radiation arising from external shocks within the afterglow of the burst. Nevertheless, when gamma photons traverse the vast cosmic distances to reach Earth, their flux becomes attenuated owing to the absorption by the extragalactic background light (EBL), particularly at energies surpassing the TeV scale. In this context, the axion-like particle (ALP) theory emerges as a potential explanation to resolve this problem. In this study, in conjunction with the ALP theory, we aim to employ SSC Model in the early stages of afterglow to explain the spectral energy distribution observed by the WCDA and KM2A instruments. We impose the constraints on the parameters of the SSC radiation model, thereby enhancing our understanding of the physics of GRB 221009A.

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