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Lepto-hadronic radiation models for GRB afterglows and prospects for VHE detection

Gamma-Ray Bursts (GRBs) are intense and short flashes of gamma rays followed by a long lasting multiwavelength afterglow emission, detected along the whole electromagnetic spectrum. Recently Very High Energy (VHE) emision (>100 GeV) has been obtained during the afterglow of a couple of GRBs. In this preliminary work we numerically investigate the production of VHE photons in GRB afterglows. We adopt the Relativistic Blast Wave (RBW) model which is thought to describe the production of a GRB after the initial explosion and examine numerically the temporal and spectral evolution of the multi-wavelength emission of VHE detected afterglows. We use firstly a one zone leptonic model assuming that synchrotron and synchrotron self-Compton is the radiative mechanism that produces the VHE emission and, as a second step, involve a hadronic component to the problem. In the latter case, we investigate how the secondary pairs produced via the photo-hadronic interactions affect the broadband afterglow spectrum and we estimate the all-flavor neutrino fluence produced by this model.

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