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Abstract:

As very high energy (VHE) photons propagate through the extragalactic background light (EBL), they interact with the soft photons of the EBL and initiate electromagnetic cascades of photons and electrons. The collective intensity of a cosmological population emitting at VHEs (such as blazars) will be attenuated at the highest energies through interactions with the EBL and enhanced at lower energies by the resulting cascade. As such, depending on the space density and spectra of the sources and the model of the EBL, cascade radiation can provide a significant contribution to the extragalactic gamma-ray background (EGB). Through deflections of the charged particles of the cascade, an intergalactic magnetic field (IGMF) may leave an imprint on the anisotropy properties of the EGB. The impact of a strong IGMF is to isotropize lower energy cascade photons, inducing a modulation in the anisotropy energy spectrum of the EGB. We discuss the implications of cascade radiation for the origins of the EGB and the nature of the IGMF, as well as insight that will be provided by data from the Fermi Large Area Telescope in the upcoming years.