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Absorption of gamma quanta from distant sources by thermal bremsstrahlung photons of hot gas in galaxy clusters

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The high energy gamma quanta from cosmological sources like blazar and active galactic nuclei interact with cosmological photon background [1]. At gamma quantum energy range $E \sim 100 \text{ TeV} - 10^7 \text{ TeV}$ the interaction with Cosmic Microwave Background (CMB) has the greatest impact on the spectra of distant sources [2]. At energy $E \sim 100 \text{ GeV} - 100 \text{ TeV}$ the interaction to optical and infrared photons of Extragalactic Background Light (EBL) is dominated [3]. At smaller energies $E \sim 100 \text{ MeV} - 10 \text{ GeV}$ the interaction to Cosmic Xray Background (CXB) photons [4] and Cosmic Ultraviolet (CUB) photons [5] may become important. The interaction of gamma quantum to thermal bremsstrahlung photons of hot intracluster gas with producing electron-positron pair in case of galaxy clusters was considered in [6]. In this paper we consider the interaction with bremsstrahlung photons of hot intracluster gas of some clusters. It is supposed that clusters are isothermal and electron number density has spherical distribution.

We receive that optical depth due to interaction with bremsstrahlung photons may be comparable to optical depth due to interaction with CXB and may sometimes exceed the last in $E \sim 1 - 10 \text{ GeV}$ range.

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