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The search for X-ray emission from electron/positron pair halo using XMM-Newton observatory

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An electron/positron pair halo is formed by electromagnetic cascades that initiate when the high energy gamma-rays from extragalactic sources – i.e. Blazar AGN – interact with the cosmic infrared background (CIB) so that are absorbed via the electron/positron pair production process. The high energy electron/positron pairs produced could up-scatter the cosmic microwave background (CMB) so that become gamma rays that could interact with CIB again. Thus, the process could happen continuously until the produced gamma-rays have insufficient energy to interact with the CIB. Indeed, given the presence of intergalactic magnetic field, the produced electron/positron pairs could gyrate before scattered with the CMB photons so that emit X-ray photons via synchrotron radiation process. In this work, we aim to determine whether the predicted X-ray photons emitted from the halo can be detected by the current generation X-ray observatory: XMM-Newton. The Spectral Energy Distributions (SEDs) and the angular distributions of the synchrotron radiation of the pair halo predicted to be obtained from the AGN H1426+428 are simulated by the Monte Carlo simulations method; these are used as a source model for simulating observed spectra. Then, the spectra of the halo virtually observed by XMM-Newton are generated using the instrument Response Matrix Files (RMFs) and Ancillary Response Files (ARFs) obtained from the official webpage of the telescope. Based on the simulated spectra, we will discuss whether the X-ray photons emitted from the pair halo could be detected by XMM-Newton.

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