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The Spectral Energy Distribution of X-ray Pair Halos from the Gamma-ray Sources with a Power-law Continuum

Very High Energy (VHE) Gamma-rays from Active Galactic Nuclei (AGNs) can interact with the infrared photons from the Extragalactic Background Light (EBL) and start electromagnetic cascades. In case that the extragalactic magnetic field near a host galaxy is strong enough (˜1 micro G), the cascades would develop isotropically around the AGN, and electron/positron pairs created along the development of the cascades would create an X-ray halo via synchrotron radiation process. Since the VHE Gamma-ray spectra from the AGNs have been believed that it could be approximated by a power-law model which is truncated at high energy end (hereafter, maximum energy), in this work we studied the X-ray Spectral Energy Distribution (SED) of the halo generated from the AGN spectra with different power-law indices and maximum energies. The results show that the SEDs are slightly higher and broader, i.e. obtaining higher flux if the power indices are lower. On the other hand, the SEDs are sensitive to the maximum energy between 100-300 TeV in which more flux could be obtained from the higher maximum energy; however, the SED becomes insensitive to this parameter when the maximum energy exceeds 500 TeV.

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