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A two-zone emission model for Blazars and the role of Accretion Disk MHD winds

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Blazars are a sub-category of radio-loud active galactic nuclei with relativistic jets pointing towards the observer. They exhibit non-thermal variable emission, which practically extends over the whole electromagnetic spectrum. Despite the plethora of multi-wavelength observations, the origin of the emission in blazar jets remains an open question. In this work, we construct a two-zone leptonic model: particles accelerate in a small region and lose energy through synchrotron radiation and inverse Compton Scattering. Consequently, the relativistic electrons escape to a larger area where the ambient photon field, which is related to Accretion Disk MHD Winds, could play a central role in the gamma-ray emission. This model explains the Blazar Sequence and the broader properties of blazars, as determined by Fermi observations, by varying only one parameter, the mass accretion rate onto the central black hole. Flat Spectrum Radio Quasars have a strong ambient photon field and their gamma-ray emission is dominated by the more extensive zone, while in the case of BL Lac objects, the negligible ambient photons make the smaller (acceleration) zone dominant.

Keywords

AGN, Blazars, radiation mechanisms, particle acceleration, gamma-rays, Fermi telescope, accretion disk winds

Collaboration

other Collaboration

Subcategory

Theoretical Results

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