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Emission models for extreme blazars

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Extreme-TeV blazars represent a distinct sub-class of BL Lac type Active Galactic Nuclei with very hard spectra and a high-energy bump peaking above ˜1 TeV. The multi-wavelength emission from such objects is difficult to interpret with standard emission models. The very narrow electron distribution and unusually low value of the jet magnetization that are required for a good fit are difficult to justify.

A solution to this problem might be a scenario where protons and electrons are co-accelerated on internal or recollimation shocks inside the relativistic jet. In this situation, energy transfer from the protons to the electrons naturally leads to a high minimum electron energy, while low magnetization is a necessary condition for efficient particle acceleration. Values of the magnetic field strength of a few mG and minimum electron Lorentz factors of 10ˆ3 to 10ˆ4 result here from first principles.

After a short introduction to blazar models, I will review a few leptonic and lepto-hadronic scenarios proposed for extreme-TeV blazars, before concentrating on the promising co-acceleration scenario.

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