

Mapping the blazar radiation zone with X-ray polarization and TeV gamma-ray observations

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The Imaging X-ray Polarimetry Explorer (IXPE) measures fluxes, spectra, and polarization properties of blazars at X-ray energies (2-8 keV). In its first two years of operation, IXPE has detected X-ray polarization from seven TeV-emitting blazars, constraining the geometry of the magnetic field in the X-ray emitting region and refining models for particle acceleration within relativistic jets. In leptonic models, X-rays detected with IXPE are produced by the same electrons responsible for the TeV radiation detected with ground-based observatories. In this contribution, we will summarize recent X-ray polarization results from blazar observations with IXPE and present the picture that emerges when simultaneous observations at TeV energies are taken into account. In particular, we will focus on recent observations of Mrk 421 with IXPE and the VERITAS observatory. We will end by discussing what observables and metrics from turbulent shocks and magnetic reconnection simulations can better distinguish between the particle acceleration scenarios within jets. These metrics allow us to compare the simulated evolution of accelerated particles with actual X-ray polarization observables.

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