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X-ray and MeV polarization signatures as a probe for hadronic signatures in blazars

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Polarimetry is a direct measurement of the magnetic field in astrophysical objects. With the launch of IXPE, as well as future MeV polarimeters under development, such as COSI and AMEGO-X, multi-wavelength polarimetry will shed light on the magnetic field and particle acceleration in blazars. Here we present our theoretical predictions of multi-wavelength blazar polarization signatures. We find that in low-synchrotron-peaked and intermediate-synchrotron-peaked blazars, high X-ray polarization degree (comparable to or higher than the optical counterpart) can be strong evidence for neutrino production in the blazar emission region. Additionally, high MeV polarization degree can be unique signatures of proton synchrotron, implying that blazars can be the source of ultra-high-energy cosmic rays. For high-synchrotron-peaked blazars, time-resolved X-ray polarization variability can distinguish particle acceleration mechanisms such as magnetic reconnection and turbulence.

Track

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