

Spin Asymmetry and Dipole Moments in τ -Pair Production from Photon-Photon Fusion

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The anomalous magnetic dipole moment (MDM) and electric dipole moment (EDM) of the τ lepton are vital probes for new physics beyond the Standard Model. Utilizing azimuthal angular asymmetry as an innovative tool in ultraperipheral collisions (UPCs), we achieve unprecedented precision in studying these properties. This approach, driven by the highly linear polarization of coherent photons, allows both the MDM and EDM to contribute to the $\cos 2\phi$ angular distribution with comparable significance. Crucially, our method significantly reduces the parameter space, excluding more than half of it compared to expected UPC-based measurements that rely solely on total cross-section analysis. This technique not only offers enhanced constraints but also minimizes the need for additional theoretical assumptions, providing a novel pathway for probing EDM effects.

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