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Sensitivity estimates on anomalous couplings of the tau-lepton in pp, e-p and e-e+ colliders

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In this paper, we present detailed studies for measuring the production cross sections and setting model independent limits on the anomalous magnetic and electric dipole moments \tilde{a}_τ and \tilde{d}_τ of the τ -lepton, through the tau pair production channels $pp \rightarrow p\tau\bar{\tau}\gamma p$, $e^-p \rightarrow e^-\tau\bar{\tau}\gamma p$ and $e^+e^- \rightarrow e^+\tau\bar{\tau}\gamma e^-$ via the $\gamma^*\gamma^* \rightarrow \tau^+\tau^-\gamma$ subprocess. Measurements of the anomalous electromagnetic couplings of the tau-lepton provide an excellent opportunity to probe extensions of the Standard Model. We found that of the three colliders considered LHC, FCC-he and CLIC, the prediction of the future CLIC at high energy and high luminosity should provide the best sensitivity on the dipole moments of the τ -lepton $\tilde{a}_\tau = [-0.00128, 0.00105]$ and $|\tilde{d}_\tau(\text{ecm})| = 6.4394 \times 10^{-18}$ at the 95% Confidence Level.

In-person participation

Yes

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