

Search for the Electric Dipole Moment and anomalous magnetic moment of the tau lepton

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Precise measurement of the Electric Dipole Moment (EDM) and anomalous magnetic moment ($g-2$) of particles is an important test of Beyond Standard Model (BSM) physics. It is generally believed that the tau lepton couples more strongly to BSM due to its large mass, but searching for tau EDM and $g-2$ has been difficult because it is highly unstable and the neutrinos from its decay are undetected at collider experiments. A new method to approximately reconstruct the neutrinos from the hadronic decays of $\tau^- \tau^+$ pairs produced at $e^- e^+$ tau factories is proposed. Using the information from the neutrinos, a significant improvement in the related measurements can be achieved. With the matrix element technique, and the estimated 50 ab^{-1} of data to be delivered by the *Belle-II* experiment, a tau EDM search with a $1-\sigma$ level precision of $|d_\tau| < 2.09 \times 10^{-19}$ e-cm, and $g-2$ search with $|\Delta a_\tau| < 1.80 \times 10^{-5}$ (1.5% of the SM prediction), can be expected. It offers an opportunity to search for BSM with tau leptons in current and future tau factories with high precision.

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