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Quantum information and CP measurement in Higgs to tau tau at future lepton colliders

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We introduce a methodology and investigate the feasibility of measuring quantum properties of tau lepton pairs in the $\rightarrow \tau^+ \tau^-$ decay at future lepton colliders. In particular, observation of entanglement and violation of Bell inequalities are examined for the ILC and FCC-ee. As a by-product, we show that a novel model-independent test of CP violation can be performed and the CP-phase of $H\tau\tau$ interaction can be constrained with an accuracy comparable to dedicated analyses.

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