

Testing Bell inequalities in $H \rightarrow \tau, \tau$ at lepton colliders

Monday, 10 October 2022 13:00 (1 hour)

It has been known that Quantum Mechanics allows a strong and bizarre correlation among particles, called entanglement, that is not possible in any alternative theories that are local and real. In those local-real theories, correlations among particles must satisfy Bell inequalities, while Quantum Mechanics can violate them.

The entanglement and Bell inequalities are therefore thought of the key to understand Quantum Mechanics in a deeper level and play important roles in quantum information and computation theories. Violation of Bell inequalities has been observed in low energy experiments but it has not been tested at high-energy collider experiments with energy higher or around the weak scale.

In this talk I will review the collider test of Bell inequalities and argue that $H \rightarrow \tau, \tau$ process at the ILC provides an ideal environment for it. We study the prospect of testing Bell inequalities at the ILC using Monte Carlo simulation including the detector effects.

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