Quantum Entanglement and Bell Inequality Violation in Semi-Leptonic Top Decays

Quantum entanglement is a fundamental property of quantum mechanics. Recently, studies have explored entanglement in the $t\bar{t}$ system at the Large Hadron Collider. In this talk, I will first introduce the search for evidence of quantum entanglement in the semi-leptonic decay channel of $t\bar{t}$. We find that this channel is both easier to reconstruct

and has a larger effective quantity of data than the fully leptonic channel, which is 60% more sensitive to quantum entanglement and a factor of 3 more sensitive to Bell inequality violation. Beyond the collider search, I will discuss the physics meaning of such entangled states, and some recent progress.

Authors: WU, Arthur; CHENG, Kun (University of Pittsburgh); LOW, Matthew (University of Pittsburgh); HAN, Tao

Presenter: WU, Arthur