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Entanglement and Bell's inequalities with boosted semi-leptonic top quarks at the LHC

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The Large Hadron Collider provides an excellent environment to study quantum entanglement and Bell's inequality at high energies. We explore the possible observation of entanglement and violation of Bell's inequality in the semi-leptonic channel of top quark pair production. We show that boosted top quarks are required to ensure they are spacelike separated. The density matrix of the top-pair system is reconstructed using an optimal hadronic polarimeter and NN-inspired reconstruction methods.

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