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Entanglement Witnesses Mediated Via Axion-Like Particles

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Entanglement is solely a quantum property and it can be extremely helpful to test the physics beyond the Standard Model in tabletop experiments with the advent of future quantum technologies. In this work, we provide an entanglement-based partial positive transpose (PPT) witness for Yukawa-type potentials in the infrared regime between pairs of neutral/charged particles in a spatial quantum superposition. The entanglement is created by the interaction beyond the Standard Model such as Axion-like particle (ALP) or physics motivated by string theory such as extra dimensions in the context of gravity. We will constrain the couplings along with the decoherence rate to show what parameters can be searched for in near future entanglement-driven experiments for the search of new physics.

Secondary track

T09 - Beyond the Standard Model

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