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# A first test on spooky actions between free-traveling charged lepton pairs

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Quantum entanglement is a cornerstone of quantum mechanics. While entanglement between confined electron pairs is well-studied, free-traveling electron pairs remain largely unexplored due to significant challenges in spin measurement. We hereby propose a novel theory-assisted quantum entanglement test for free-traveling electron-positron pairs through polarization correlation measurements. The entangled pairs are generated in a GeV-scale positron on-target experiment, approaching a Bell state theoretically. Then their polarization correlation is measured at two secondary scattering targets, where a high event rate can be achieved and the unique behavior of the Bell state theoretically known in prior helps verify the entanglement.

Based primarily on: arXiv:2411.12518 and arXiv:2502.07597

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