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Hong-Ou-Mandel interference for the orbital angular momentum Bell States - a high dimensional analysis

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Abstract content **
** ** ** **(Max 300 words)****
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Hong-Ou-Mandel (HOM) interference is a fundamental component in many quantum information protocols and one of the defining features of quantum science. Traditional HOM measurements are implemented in two-dimensional Hilbert spaces and are used to filter antisymmetric components from an input state. Here, we extend the concept of HOM interference to photons entangled in high dimensions, implementing a HOM measurement for orbital angular momentum (OAM) states. In this manner, we are able to filter the antisymmetric components from a high-dimensional entangled field. We use Dove prisms to control the precise form of the high-dimensional two-photon state and reveal state-specific constructive and destructive quantum interference. This work paves the way for high-dimensional processing of multi-photon quantum states, for example, in teleportation beyond qubits.

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