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Two-photon polarisation entangled states using partially spatially coherent pump beam

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Thus far the development of entangled photon sources is based on the use of a fully coherent pump beam through a process of spontaneous parametric down conversion (SCPD). Of recent, there has been numerous theoretical studies based on the temporal and spatial coherence properties of the twin beam state [1]. In particular, for its relevance in the field of quantum information processing and communication. It has been shown that the spatial-spectral and spatial-temporal properties of the entangled photons are affected by crystal and pump beam parameters [2]. Previous experiments considered the pump beam to be spatially coherent however it has been shown theoretically, that the spatial coherence properties of the pump field is entirely transferred to the spatial coherence properties of the down-converted two-photon field [3]. It has also shown that the entanglement of a spatial two-qubit state is affected by the spatial coherence properties of the two photon field [3].
Here we present, the spatial coherence properties of the entangled-photon pairs produced by SPDC. The experimentally produced entangled photons are investigated by taking into consideration the partial spatial coherence of the pump beam. For spatial correlation in SPDC, coincidence counts are recorded as a function of the detectors. These two photon states are significant for the application of quantum communication.

Reference
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