

Quantum Physics

An all fiber source of frequency entangled photon pairs

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We present an all fiber source of frequency entangled photon pairs by using four wave mixing in a Sagnac fiber loop. Special care is taken to suppress the impurity of the frequency entanglement by cooling the fiber and by matching the polarization modes of the photon pairs counter-propagating in the fiber loop. Coincidence detection of signal and idler photons, which are created in pair and in different spatial modes of the fiber loop, shows the quantum interference in the form of spatial beating, while the single counts of the individual signal (idler) photons keep constant. When the production rate of photon pairs is about 0.013 pairs/pulse, the envelope of the quantum interference reveals a visibility of $(95 \pm 2)\%$, which is close to the calculated theoretical limit 97.4%

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