

Quantum Physics

Pure single photon generation by type-I PDC with backward-wave amplification

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We explore a promising method of generating pure heralded single photons. Our approach is based on parametric downconversion in a periodically-poled waveguide. However, unlike conventional downconversion sources, the photon pairs are counter-propagating: one travels with the pump beam in the forward direction while the other is backpropagating towards the laser source. Our calculations reveal that these downconverted two-photon states carry minimal spectral correlations within each photon-pair. This approach offers the possibility to employ a new range of downconversion processes and materials like PPLN (previously considered unsuitable due to their unfavorable phasematching properties) to herald pure single photons over a broad frequency range.

Comments: 8 pages, 3 figures, minor text changes and reformatting

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