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Development of highly nondegenerate polarization entanglement on a waveguide SPDC source[1] KRISTINA MEIER, University of Illinois at Urbana-Champaign, FUMIHIRO KANEDA, Frontier Research Institute for Interdisciplinary Sciences, Tohoku University, Japan, PAUL KWIAT, University of Illinois at Urbana-Champaign — As benchtop quantum information protocols become increasingly more advanced and the distances over which these experiments are performed become significantly longer, integrated optics provides a small, robust, and practical alternative to traditional bulk optics. Specifically, waveguide technology makes it possible to create bright single-photon sources for use on platforms where weight and stability requirements are limiting factors. For our goals, we are working on the characterization of a highly nondegenerate Spontaneous Parametric Down-Conversion waveguide source of polarization-entangled pairs on a PPKTP crystal. Our source uses type-II phase-matching to create collinear signal and idler photons at 1550 nm and 810 nm, respectively. Our past waveguide iterations have produced polarization-entangled pairs with a concurrence of 0.63 and a state purity of 0.72. To improve these numbers, we are experimenting with interleaved periodic poling, in contrast to consecutive poling, to reduce the amount of post-compensation required to achieve high polarization entanglement, as well as various mode filtering methods to reduce instabilities arising from the multiple pump spatial modes supported by the waveguide source.

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