Engineering spectrally unentangled photon pairs from nonlinear microring resonators by pump manipulation

The future of integrated quantum photonics relies heavily on the ability to engineer refined methods for preparing the quantum states needed to implement various quantum protocols. An important example of such states is quantum-correlated photon pairs, which can be efficiently generated using spontaneous nonlinear processes in integrated microring-resonator structures. In this work, we propose a method for generating spectrally unentangled photon pairs from a standard microring resonator. The method utilizes interference between a primary and a delayed secondary pump pulse to effectively increase the pump spectral width inside the cavity. This enables on-chip generation of heralded single photons with state purities in excess of 99% without spectral filtering. (C) 2018 Optical Society of America