

Engineering integrated pure narrow-band photon sources

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Engineering and controlling well defined states of light for quantum information applications is of increasing importance as the complexity of quantum systems grows. For example, in quantum networks high multi-photon interference visibility requires properly devised single mode sources. In this paper we propose a spontaneous parametric down conversion source based on an integrated cavity-waveguide, where single narrow-band, possibly distinct, spectral modes for the idler and the signal fields can be generated. This mode selection takes advantage of the clustering effect, due to the intrinsic dispersion of the nonlinear material. In combination with a CW laser and fast detection, our approach provides a means to engineer a source that can efficiently generate pure photons, without filtering, that is compatible with long distance quantum communication. Furthermore, it is extremely flexible and could easily be adapted to a wide variety of wavelengths and applications.

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