Integrated Quantum Frequency Combs

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Abstract:
The generation of optical quantum states on an integrated platform will enable low-cost and accessible advances for quantum technologies such as secure communications and quantum computation. We demonstrate that integrated quantum frequency combs (based on high-Q microring resonators made from a CMOS-compatible, high refractive-index glass platform) can enable, among others, the generation of pure heralded single photons, cross-polarized photon pairs, as well as bi- and multi-photon entangled qubit and quDit states over a broad frequency comb covering the S, C, L telecommunications band, constituting an important cornerstone for future practical implementations of photonic quantum information processing.