Multi-photon Quantum Information Science And Technology In Integrated Optics

Photons are an attractive option for testing fundamental quantum physics and developing new quantum-enhanced technology, including highly advanced computers and simulators, as well as precision sensing beyond shot-noise. Traditionally, bulk optical components have been bolted onto optical benches to realize metre-scale quantum circuits. However this approach is ultimately proving unwieldy for increasing the complexity and for scaling up to practical quantum technologies based on photons. The work presented here demonstrates a series of quantum photonic devices based on waveguide circuits embedded in miniature monolithic chips. This represents a paradigm shift in the underlying architecture of quantum optics and provides key building blocks for all-optical and hybrid quantum technologies.
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