Multiplexed Entangled Photon Generator Based On Integrated Photonic Microresonator Array

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OTHER INFORMATION

KEYWORDS

quantum, quantum computing, photonic, quantum light, quantum communications, communications, photon

CATEGORIZED AS

- **Semiconductors**
- Other

RELATED CASES

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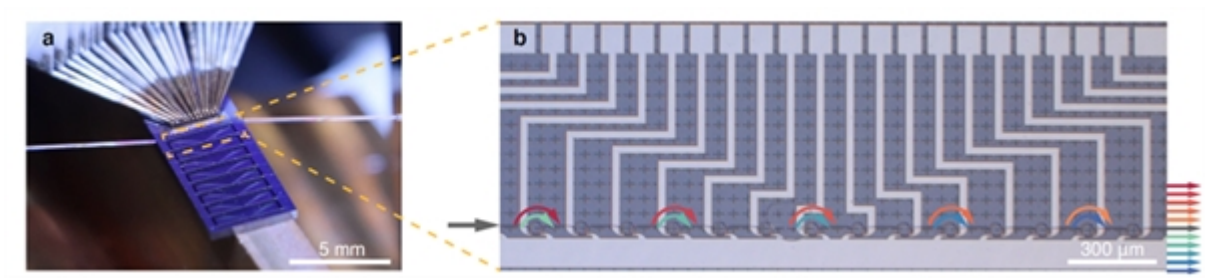
BACKGROUND

Photonic quantum computing and communication systems transmit information via quantum light, with an entangled photon pair encoded with information. To generate quantum light in sufficient quantities, bulk, tabletop optical systems are used, however they require significant power and spatial resources. Quantum systems require memory devices that operate at visible wavelengths to store the quantum state. Fiber optical cables are used to transfer quantum photonic information between devices, however transmission of photons at visible wavelengths results in transmission loss. Generating telecommunication wavelength photons for transmission through fiber optic channels and generating visible wavelength photons for memory systems would represent a significant step forward in quantum computing.

DESCRIPTION

Researchers at UC Santa Barbara have created a compact device that leverages integrated photonic microresonators on a single chip to generate quantum light at unprecedented rates with brightness exceeding 20 GHz/mW2. Utilizing III-V semiconductors surrounded by silica, it efficiently emits quantum light into waveguides coupled with optical fibers, marking a significant advancement in quantum computing and communication systems with >200 million entangled pairs per second on chip from a single microresonator with >99% entanglement fidelity and >99.9% single-photon purity. By combining many integrated photonic sources onto a single chip, this innovation generates quantum light at a much higher rate than other similarly sized chips, enabling an integrated photonic chip that is small in size and weight but that generates quantum light at rates exceeding bulk optical sources.



ADVANTAGES

- Small physical size that generates rates comparable to or exceeding bulk optical sources
- Enables collection into a single optical fiber
- Photons generated across visible and telecom wavelengths
- Can be scaled to large networks
- Low power

APPLICATIONS

- Quantum computing
- Quantum networking
- Quantum communications

PATENT STATUS

Patent Pending

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- Integrated Reconfigurable Circulator

▶ Magneto-Optic Modulator

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