An entangled-photon transceiver microchip

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Silicon photonic integrated devices, supplemented with microelectronic circuits, may reduce the cost and difficulty of making transceivers for the emerging technology of quantum optical communications.

Whereas the conventional technology of optical communications – fibers and glass-based integrated optics – has been used in quantum communications over a decade ago [1], there are good reasons to now consider using silicon photonics, which has made much progress in the same time.

I will discuss some of the obvious and not-so-obvious challenges that lie ahead, and potential strategies for overcoming them, and discuss why the goal of making a microchip-scale entangled-photon transceiver is still futuristic but achievable.

[1] H. Takesue and K. Inoue, “Generation of 1.5-μm band time-bin entanglement using spontaneous fiber four-wave mixing and planar light-wave circuit interferometers” Phys Rev A, 72, 041804 (2005)

Bio:

Shayan Mookherjea is a Professor of Electrical and Computer Engineering at the University of California, San Diego. He received the BS degree with honors from Caltech, the SM degree from MIT, and the PhD from Caltech in Electrical Engineering with a minor in Physics. His awards include: Wilts Prize, Hellman Faculty Fellow, NSF CAREER grant, IEEE Senior Member, and OSA Fellow. The Micro/Nano-Photonics Group (http://mnp.ucsd.edu) has active collaborations with several external industrial partners, government laboratories and foundries, and participates in the 2016-2020 NSF (EFMA) “Advancing Communication Quantum Information Research in Engineering” projects.