

RAISE-EQuIP: Single-Chip, Wall-Plug Photon Pair Source and CMOS Quantum Systems on Chip

PI: Miloš Popović (Boston U.); co-PIs: Prem Kumar (Northwestern), Vladimir Stojanović (UC Berkeley)

Funded by: NSF grant ECCS 1842692, and Catalyst Foundation supplemental grant

Keywords: Electronic-photonic quantum system-on-chip (epQSoC), photon pair source, quantum networks

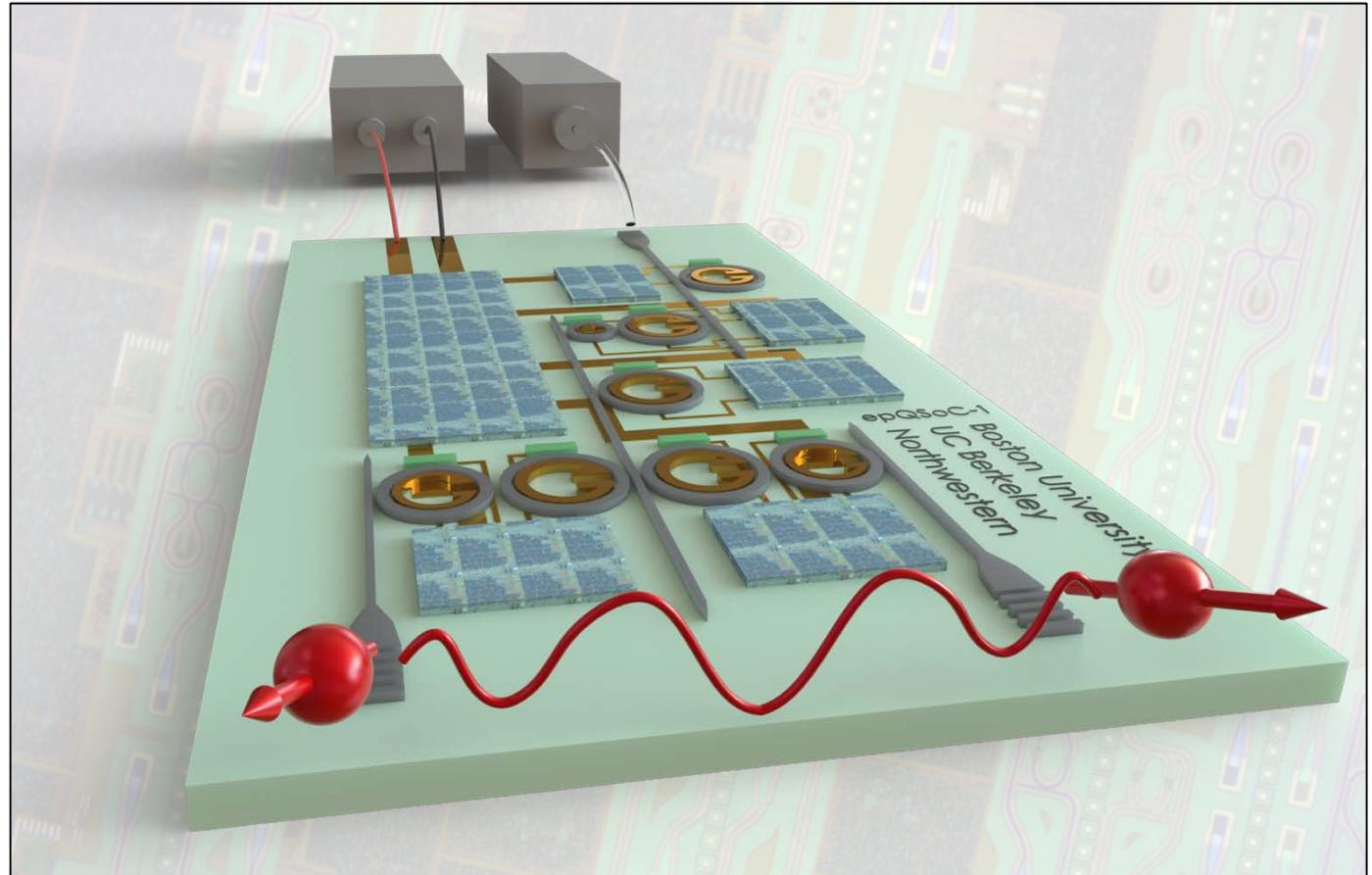
Research Objective: Demonstrate high-performance photon pair source with all photonic and electronic functions on a single chip, except DC power and CW light supply. Develop new class of quantum CMOS electronic-photonic ICs and building blocks.

Intellectual Merit:

- Building blocks enabling epQSoCs, new class of electronic-photonic SoCs with quantum functions
- Demonstration of single-chip “wall plug” photon-pair source with all processing integrated on chip
- Investigate first application demos for epQSoCs

Broader Impacts:

- Framework to accelerate development & impact of electronic-photonic ICs in quantum technology
- Train students in new cross-disciplinary area of electronic-photonic integrated system design
- Educate new generation of engineers in quantum photonics technology and applications



Caption: Electronic-photonic quantum system-on-chip (epQSoC) providing a high-performance photon pair source. The system comprises only a 45nm SOI CMOS electronic-photonic chip, DC power supply and continuous-wave laser light supply. The epQSoC functions include correlated photon generation, filtering, and pulse carving, including electronic drive, control and stabilization.