

*Towards quantum interconnects:  
Entangling microwave and optical photonic qubits*

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**Abstract**

Modern computing and communication technologies, such as supercomputers and the internet, are based on optically-linked networks of information processors operating at microwave frequencies. An analogous architecture has been proposed for quantum networks using optical photons to distribute entanglement between remote superconducting quantum processors. Here I will discuss our recent demonstration of a chip-scale source of entangled optical and microwave photonic qubits – an essential milestone towards realizing such an architecture. Our device platform integrates a piezo-optomechanical transducer with a superconducting resonator that is robust under optical illumination. We drive a photon-pair generation process and employ a dual-rail encoding to prepare entangled states of microwave and optical photons. This entanglement source can directly interface telecom wavelength time-bin qubits and GHz frequency superconducting qubits; two well-established platforms for quantum communication and computation, respectively.

**Bio**

David Lake is a Research Scientist at the California Institute of Technology, where his research focuses on the intersection of superconducting qubits and quantum optics. Prior to his current role, he was a Postdoctoral Scholar in the Painter Lab leading research on quantum transduction and optomechanics. He completed his doctoral studies at the University of Calgary. There, he investigated diamond photonic devices containing color centers and developed novel nanofabrication techniques.

**Host**

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