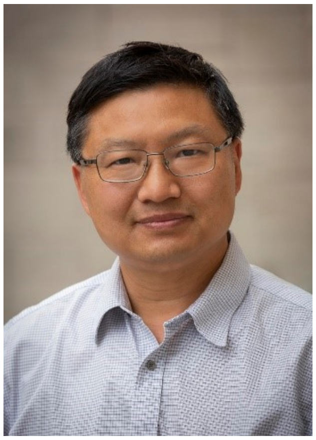
Hybrid Quantum Photonic Circuits and Quantum Frequency Conversion



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Abstract

The ability to generate, detect and manipulate photons with high fidelity is of critical importance for both fundamental quantum optics studies and practical device applications. Quantum frequency conversion, in particular, is in great demand for bridging the carrier frequency gaps in quantum networks and hybrid quantum systems. The efficiency of photon control including quantum frequency conversion is dictated by photon-photon interaction in a nonlinear optical media. However, the mainstream integrated photonic platform such as those based on silicon and silicon nitride lack the preferred optical nonlinearity, which limits the strength of photon-photon coupling and many active photon control functionalities. In this talk, I will present our progresses in developing hybrid quantum photonics platform based on nonlinear materials and their interface with superconducting circuits for achieving efficient detection, generation, and manipulation of single photons as well as high fidelity quantum frequency conversion.

Bio

Hong Tang is the Llewellyn West Jones, Jr. Professor of Electrical Engineering, Physics and Applied Physics at Yale University. He obtained his B.S. degree at the University of Science and Technology of China and Ph.D. at Caltech. His research utilizes integrated photonic circuits to study photon-photon, photon-mechanics and photon-spin interactions as well as quantum photonics involving microwave and optical photons. He has been on Yale faculty since 2006. He is a recipient of Packard Fellowship in Science and Engineering.

Hosts

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