

Abstract Submitted
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Novel quantum electro-optic transducer for quantum information processing using superconducting 3D qubits¹ H. PAIK, L. S. BISHOP, D. T. MCCLURE, S. FILIPP, J. M. GAMBETTA, C. B. LIRAKIS, IBM T J Watson Research Center, C. A. RYAN, J. SCHLAFER, M. P. DA SILVA, M. SOLTANI, M. PATEL, Z. DUTTON, Raytheon BBN Technologies — We propose a novel electro-optic system, SQOT (Superconducting Qubit Optical Transducer) [1] which can directly exchange quantum information between optical photons at telecom frequencies and superconducting qubits. Our scheme is to fabricate 3D qubits directly on top of a ultra-high Q whispering gallery mode optical cavity. The optical cavity is itself made from an electro-optic material such that we obtain a direct microwave-optical interaction between the qubit and optical mode. In this talk, we present recent progress toward designing and building the SQOT device and address challenges such as fabricating Josephson junctions on the electro-optic material and cryogenic microwave losses and possible solutions. [1] H. Paik, U.S. Patent Submitted (2013)

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