

Abstract Submitted
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Demonstrating Multi-Qubit Operations in a Superconducting 3D circuit QED Architecture¹ HANHEE PAIK, M.O. SANDBERG, A. MEZZACAPO, D. T. MCCLURE, B. ABDO, O.E. DIAL, A.W. CROSS, A.D. CORCOLES, S. SHELDON, E. MAGESAN, S.J. SRINIVASAN, J.M. GAMBETTA, J.M. CHOW, IBM T. J. Watson Research Center, Yorktown Heights, NY 10598 USA, D. BOGORIN, B.L.T. PLOURDE, Department of Physics, Syracuse University, Syracuse, NY 13244, USA — We present our recent results on multi-qubit operations in a superconducting 3D circuit QED (cQED) system using a resonator-induced phase (RIP) gate. In our system, four qubits are coupled by a single bus resonator. The RIP gate is implemented by applying a microwave pulse to the bus that performs entangling operations. We demonstrate controlled-phase gates using RIP on 2-qubit subsystems with gate fidelities between 95%-97% evaluated by randomized benchmarking. Via a multi-qubit echo scheme, we perform isolated two-qubit interactions in the full 4-qubit system to generate a GHZ state.

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Hanhee Paik
IBM T. J. Watson Research Center, Yorktown Heights, NY 10598

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