

Abstract Submitted
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A three-qubit superconducting circuit implementing pairwise longitudinal coupling¹ TANAY ROY, SUMAN KUNDU, MADHAVI CHAND, SUMERU HAZRA, N. NEHRA², R. COSMIC³, A. RANADIVE, MEGHAN P. PATANKAR, KEDAR DAMLE, R. VIJAY, Tata Institute of Fundamental Research, Mumbai 400005 — We present a superconducting circuit, the “trimon”, consisting of three qubits in the 3D circuit-QED architecture with pairwise longitudinal coupling. The design is based on the Josephson Ring Modulator where the three orthogonal anharmonic oscillator modes act as three transmon-type qubits. The strong inter-qubit longitudinal coupling is always-on and enables fast controlled rotations delivering a universal set of gates. We will describe our joint readout technique for single-shot measurement of the trimon device. We will then present our implementation of single-pulse high-fidelity CNOT gate and optimal SWAP operation between pairs of qubits. We will conclude by discussing the extension to three-qubit gates like Toffoli and Fredkin and present preliminary results. Reference: arXiv:1610.07915.

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