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Dephasing of superconducting asymmetric transmon qubits M. HUTCHINGS, MATTHEW WARE, YEBIN LIU, syracuse university, JARED B. HERTZBERG, JERRY M. CHOW, IBM T.J. Watson Research Center, Yorktown Heights, NY 10598, USA, B. L. T. PLOURDE, syracuse university — As quantum computing implementations based on superconducting qubits increase in scale and complexity, fabrication tolerances and frequency crowding make it desirable to have layouts with at least some of the qubit frequencies being tunable. Split-junction transmon qubits allow for the tuning of qubit energy levels with a magnetic flux. However, this tunability can lead to excess dephasing due to flux noise. By making the two junctions asymmetric, the modulation range of the qubit energy bands can be reduced along with the sensitivity to flux noise. Such asymmetric transmons have been used previously for demonstrations of flux-modulated first-order sideband transitions between a qubit and cavity. We will report on the sensitivity of qubit dephasing to magnetic flux noise for different junction asymmetry. For large asymmetries, of the order of 10:1, the dephasing due to flux noise is greatly reduced compared to a symmetric junction device, whilst still maintaining a useful level of frequency tunability.

M. Hutchings
syracuse university

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