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**Ground states and excitations of inductively coupled fluxonium qubits** R.T. BRIERLEY, H. MEIER, A. KOU, L.I. GLAZMAN, S.M. GIRVIN, Yale University — We consider fluxonium qubits arranged in a one dimensional array, where the inductors are shared between neighboring qubits. For an infinite system with small charging energies, there are a series of different phases that depend on the applied magnetic flux and the ratio of the inductive and Josephson energies. For small flux and large Josephson energy, the behavior of the classical ground state is similar to the Frenkel-Kontorova model, while when the flux is half a flux quantum it is similar to an Ising antiferromagnet. A realistic finite system will not exhibit a phase transition but some features of the infinite-size limit should persist. We investigate theoretically the ground and low-lying excited states for experimentally relevant parameters. We discuss how the nature of the ground state changes, and what experimental signatures would be expected.

Richard Brierley
Yale University

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