NEW YORK CITY COLLEGE OF TECHNOLOGY

Physics Department

Center for Theoretical Physics

Quantum phases in a chain of coupled fluxonium qubits

Presented by:

Dr. Richard Brierley

Yale University
New Haven, CT

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Abstract

Recent progress in the field of superconducting circuits has led to the development of many different types of qubit that can be precisely controlled and monitored. The techniques of circuit QED, where qubits are strongly coupled to microwave cavities, enable direct access to excitations and control of dissipation, making large arrays of superconducting qubits a promising platform for studying quantum many-body physics.

I will present a theoretical study of an array of "fluxonium" qubits, consisting of a chain of Josephson junctions that are coupled to ground via linear inductors. When an external magnetic field is applied, the competition between inductive and Josephson energies leads to a rich classical phase diagram, including a devil's staircase of phases. The inclusion of quantum effects results in regions of Luttinger liquid behavior and phase transitions in the commensurate-incommensurate, Kosterliz-Thouless and Ising universality classes. As well as discussing the ground states, I will show how the different phases may be experimentally identified through their excitation spectra.

Light refreshments will be served.