

## **Physics with superconducting qubits**

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### Abstract:

Superconducting qubits based on Josephson junctions are being intensively investigated as a promising platform to build a working quantum computer. While this final goal has not yet been reached, superconducting qubits have made possible detailed studies of certain physical phenomena. After briefly reviewing the physics of these devices, I will give an overview of some of the phenomena that are being (or could be) probed with them. In particular, I will consider the fluxonium, a system comprising a large number of Josephson junctions and hence having many degrees of freedom. I will examine the interactions between the low-energy, highly anharmonic qubit mode and the higher-energy, weakly anharmonic collective modes of this circuit; I will show that these interactions do not significantly contribute to the fluxonium decoherence rate, if the collective modes are weakly affected by the environment.