



Physical Sciences Seminar

Quantum Simulations with Superconducting Qubits and Josephson Junction array resonator

Gerhard Kirchmair

Host:

In this talk I want to present the research activities of the Superconducting Quantum Circuits group at the Institute for Quantum Optics and Quantum Information in Innsbruck.

In the first part I will give an introduction to circuit quantum electrodynamics and the 3D architecture. I will show how we want to use this architecture to realize a platform for quantum many body simulations of dipolar XY models on 2D lattices using state of the art circuit QED technology. The central idea is to exploit the naturally occurring dipolar interactions between 3D superconducting qubits to simulate models of interacting quantum spins. The ability to arrange the qubits on essentially arbitrary geometries allows us to design spin models with more than nearest-neighbor interaction in various geometries. In the second part of my talk I want to present an experimental analysis of the Kerr effect of extended plasma resonances in a 1000 Josephson junction(JJ) chain resonator inside a rectangular waveguide. We study the bistable behavior, using a pump probe scheme on two modes of the JJ array, exploiting the Cross-Kerr effect in our system. In order to understand the behavior of the bi-stability we perform continuous time measurements to observe the switching between the two metastable states. We observe a strong dependence of the switching rates on the photon number and the drive frequency.

Wednesday, December 7, 2016 09:15am - 10:15am

Seminar room Big Ground floor / Office Bldg West (I21.EG.101)



This invitation is valid as a ticket for the ISTA Shuttle from and to Heiligenstadt Station.

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