SFB/TRR 21 - Seminar
10. Mai 2010, Tübingen

Britton L.T. Plourde
(Syracuse University, USA)

Superconducting microwave resonators in magnetic fields

Microwave resonators with high quality factors have enabled many recent breakthroughs with superconducting qubits and photon detectors. Efforts are underway to improve the quality factors in these resonators further and to develop strategies for tuning the resonance frequencies. Vortices trapped in a superconducting resonator due to insufficient shielding or pulsed control fields constitute one potential loss mechanism. The response of vortices at microwave frequencies is related to the interplay between the vortex viscosity, pinning strength, and flux creep effects. We have characterized the magnetic field and frequency dependence of the microwave response of a small density of vortices with field-cooled measurements of resonators fabricated from thin films of Re and Al, which are common materials used in superconducting microwave circuits. In addition, we have developed a straightforward method for enhancing the pinning, and thus reducing the excess loss from vortices, in Al resonators using nanofabricated surface pinning. We have also studied resonators in the absence of field-cooling, where magnetic fields can still influence the behavior of superconducting microwave resonators, by producing reversible shifts in the resonance frequency for small fields and by injecting vortices into the films at larger fields.

10. Mai 2010, 11:15 Uhr

Universität Tübingen, Raum D4 A19
Auf der Morgenstelle 14, 72076 Tübingen

CO.CO.MAT