TT 19: Poster Session: Disordered Quantum Systems

Time: Monday 15:00–18:30 Location: Poster D

TT 19.1 Mon 15:00 Poster D

Weak localization corrections to the thermal conductivity in disordered conventional superconductors — •Lucía González[1,2], Gianluigi Catelani[1], and Fabian Hassler[2] — [1]JARA-Institute for Quantum Information (PGI-11), Forschungszentrum Jülich, D-52425 Jülich, Germany — [2]JARA-Institute for Quantum Information, RWTH Aachen University, D-52056 Aachen, Germany

Particle diffusion in a disordered system is affected by quantum interference between self intersecting paths giving rise to weak localization and weak anti-localization effects, which respectively decrease or increase the probability of diffusion.

We study the corrections to the thermal conductivity in conventional superconductors due to such effects using semiclassical Green's functions. We analyze the repercussions of time reversal symmetry breaking by including a supercurrent flow.

TT 19.2 Mon 15:00 Poster D

Direct Probing of the Nuclear Quadrupole Impact onto Tunnelling Systems in Glasses at Low Temperatures — •Aljoscha Auer, Lukas Münch, Benedikt Frey, Andreas Schaller, Andreas Reiser, Andreas Fleischmann, and Christian Enss — Kirchhoff-Institute for Physics, Heidelberg University

The low temperature behaviour of amorphous solids are often well described with the phenomenological standard tunneling model (STM), which assumes a distribution of two level systems (TLS) inside the glass. However, several experiments like polarisation echo experiments and dielectric measurements on glasses containing large nuclear quadrupole moments have shown significant deviation from the STM. Thus over the years several extensions revolving around the coupling of Nuclear Quadrupole Moments (NQM) to local electric field gradients were proposed.

To get a better understanding of this mechanism we measured the TLS dynamics via the dielectric permittivity. Hereby we tune the frequency to the nuclear quadrupole frequency. In the second experiment we measured the low frequency dielectric permittivity using a superconducting interdigital capacitor surrounded by a single-loop coil. This coil enables us to apply a radio-frequency magnetic field at the dominant quadrupole splitting frequency to the sample, while directly measuring the dielectric response. We will present this new approach as well as current data from both experiments.

TT 19.3 Mon 15:00 Poster D

Influence of Nuclear Quadrupole Moments on the Dielectric Properties of Amorphous Solids in the MHz-regime at Low Temperatures — •Lukas Münch, Timothy Jay Herbst, Alexander Werner, Benedikt Frey, Andreas Fleischmann, Andreas Reiser, and Christian Enss — Kirchhoff-Institute for Physics, Heidelberg University, D-69120 Heidelberg

The low temperature behavior of amorphous solids is mainly governed by atomic tunneling systems and can be described in many cases by the phenomenological standard tunneling model (STM). Acoustic and dielectric measurements however have also revealed deviations from the STM. These led to a number of refinements of the STM, among others for glasses containing elements with large nuclear quadrupole moments. In order to further investigate the influence of nuclear quadrupole moments, we performed dielectric measurements in the MHz regime, using an LC resonator filled with the samples as dielectric material.

In a first attempt, we performed measurements on two brominated samples with a well known quadrupole splitting of about 12 mK, which is thermally accessible in our experiment. For both samples we observe slight deviations towards the quadrupole splitting energy. In a second experiment we stimulated the quadrupole moments of As_2S_3 directly by tuning the resonance frequency of the LC resonator to the sample's quadrupole splitting of 72 MHz. Comparing the result to a measurement with a slightly detuned excitation frequency, we are able to relate existing deviations to the nuclear quadrupole moments.