Bachelor Thesis Project:
Hall measurements in high kinetic inductance superconducting thin films

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THE PROJECT

The group of Prof. C. Strunk offers a **bachelor thesis project** on **Hall measurements in disordered thin superconducting films of NbN.**

The goal

The goal of the thesis is to measure at low temperature the Hall coefficient of devices where the kinetic inductance and the spectroscopic gap have already been studied in detail.

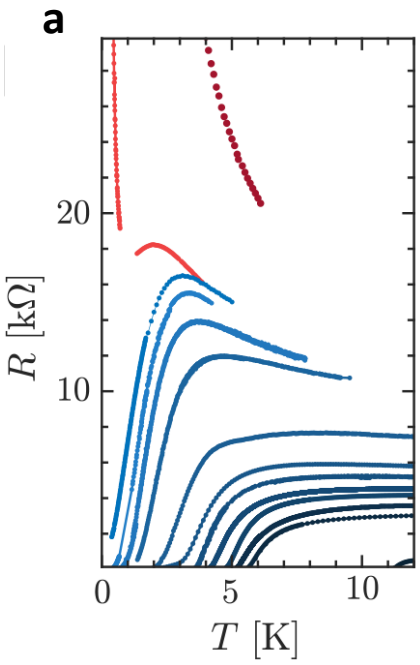
Why is that interesting?

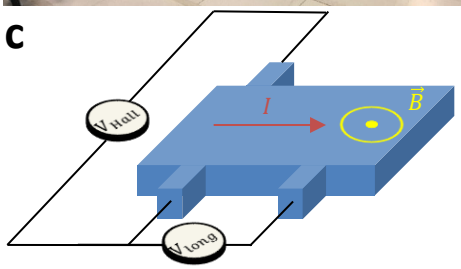
Our group extensively studied highly disordered thin films. At sufficiently strong disorder, the ground state changes from **superconducting** to **insulating** (a). The precise mechanism of this quantum phase transition is an open experimental question. So far, our main observables were kinetic inductance, spectroscopic gap and sheet resistance. These measurements allowed us for example to show the first sharp BKT-transition, that leads to an abruptly vanishing superconducting order parameter at the critical temperature, and elucidate the behavior of the superconducting order parameter in films with large normal state resistance.

However, the characterization of these materials is not yet complete. For that we would need to combine the existing information with data on electron density and magnetoresistance. For that, a Hall measurement characterization is needed.

What you will learn/What you will do

In this Bachelor thesis project you will learn how to build basic superconducting devices in a modern cleanroom, how to conduct low temperature measurement in high magnetic field and how to analyze the resulting data.





(a) Sheet resistance vs. temperature for several NbN devices. (b) Clean room facility. (c) Hall bar measurement scheme. (d) One of our cryostats (dilution refrigerator).