

PHYSIKALISCHES KOLLOQUIUM

Wintersemester 2023/24

Das Kolloquium findet (soweit unten nicht anders angegeben) jeweils montags **jeweils montags um 17:15 Uhr online via Zoom** statt.

(Der jeweilige Link wird noch zur Verfügung gestellt.).

30.10.2023

Vorstellungsvortrag im Rahmen des Habilitationsverfahrens

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Advanced experimental methods for studying the supercurrent transport in HgTe-based Josephson junctions

Abstract

The studies of hybrid Josephson junctions with semiconductor weak links have led to a fusion of experimental methods from two worlds - semiconductor and superconductor physics. In this colloquium, I will discuss the measurements of electronic noise, a technique originating from the mesoscopic physics field, which is nowadays used for superconducting structures as well.

Contrary to a common misconception, electronic noise is not a pure inconvenience in one's measurement but can be a valuable source of information, or, citing the title of the article [1]: "The noise is the signal." Indeed, the capabilities of noise measurements can impress: not only does it provide a hint about the specifics of electronic transport, but it also acts as a source of primary thermometry of the electron subsystem.

I will describe the phenomenon of electronic noise and the mechanisms of how it emerges in mesoscopic systems. Additionally, I will list some prominent experiments from the recent decades. I will then move to the specifics of hybrid structures with a superconductor in noise studies. Finally, I will present some of my own contributions [2] to the field and the ongoing research targeting heat transport in topological insulator-based Josephson junctions.

[1] Landauer, R. The noise is the signal. *Nature* 392, 658–659 (1998).

[2] A O Denisov et al *Semicond. Sci. Technol.* 36 09LT04 (2021).

Für die Dozentinnen bzw. Dozenten der Fakultät

Prof. Dr. Assaad, Prof. Dr. Hinrichsen, Prof. Dr. Pflaum und Hr. Kuhr