GOETHE UNIVERSITÄT FRANKFURT AM MAIN

Fachbereich Physik
Institut für Theoretische Physik

SPECIAL CONDENSED MATTER THEORY SEMINAR

Subject: **Anomalous Quantum Oscillations in Metals and Insulaotors**

Speaker: **Prof. Dr. Johannes Knolle (TU München)**

Date & time: **Tuesday, 30thth of January 2024 at 14 p.m.**

Venue: **Room 02.201**

Abstract:

Quantum oscillation phenomena describe the periodic variation of thermodynamic and transport properties of materials as a function of magnetic field. Since their discovery in 1930, their observation is commonly assumed to be a definite sign for the presence of a Fermi surface (FS) in a metal. Indeed, the effect forms the basis of a well-established experimental procedure for accurately measuring FS topology and geometry of metallic systems. In this talk I will discuss recent developments which challenge the canonical description of quantum oscillations. I will first review our work on quantum oscillations in insulators. Next, I will discuss the possibility of sharp quantum oscillation frequencies in metals which do not correspond to Fermi surface orbits and the effect of strong electron interactions. Finally, I will present experimental results confirming our theoretical predictions and discuss the broader implications of anomalous quantum oscillations.