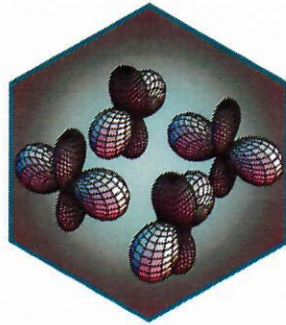


Max-Planck-Institut für Festkörperforschung

S E M I N A R
ABTEILUNG QUANTENVIELTEILCHENSYSTEME



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Inducing superconductivity in Quantum Hall systems

A chiral quantum Hall (QH) edge state placed in proximity to an s-wave superconductor experiences induced superconducting correlations. Recent experiments have observed the effect of proximity coupling in QH edge states through signatures of the mediating process of Andreev reflection. In the first part of the talk, I will present a microscopic theory for this effect by modeling the system with a many-body Hamiltonian, consisting of an s-wave superconductor coupled by electron tunneling to an integer or fractional QH edge state. In particular, I will show how two surface phenomena of the superconductor, namely Rashba spin-orbit coupling and a screening supercurrent due to the Meissner effect, are essential for the Andreev reflection.

In the second part of the talk, I will discuss induced superconductivity in quantum anomalous Hall (QAH) systems, in particular magnetic topological insulators. Our numerical and analytical calculations show that depending on the device geometry, superconducting pairing can lead to a plethora of phases characterized by chiral Majorana edge states or Majorana bound states. I will discuss these possible phases as well as their respective experimental signatures.

Thursday, May 23, 2024

3:00 PM

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J. Schüller-Knapp (1701)