RUHR-UNIVERSITÄT BOCHUM

RUB

PHYSIKALISCHES KOLLOQUIUM

SOMMERSEMESTER 2024

Montag, 17.06.2024, 12 Uhr c.t.

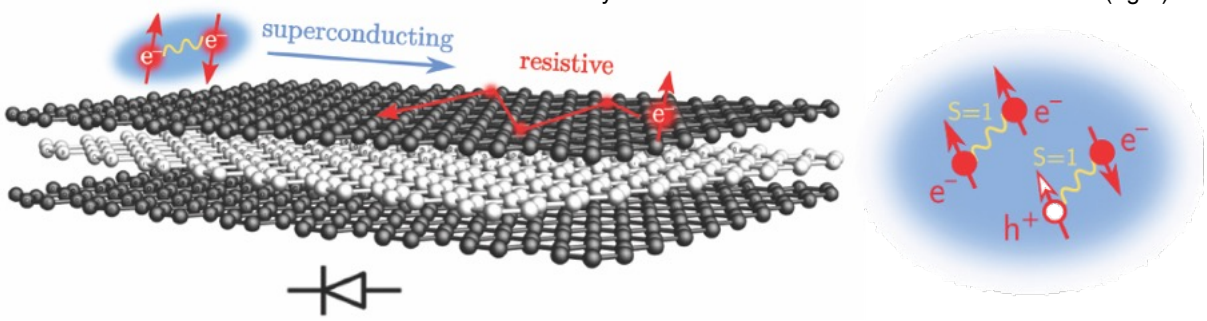
CONVENTIONAL SUPERCONDUCTORS WITH UNCONVENTIONAL PROPERTIES

Mathias S. Scheurer, University of Stuttgart

Superconductivity, which is characterized by dissipationless currents and the expulsion of magnetic fields, is a remarkable demonstration of the quantum nature of electronic transport in solids at low temperature. Although already discovered experimentally in 1911, it took until 1957 to develop a first microscopic theory of superconductivity, which is now known as the Bardeen-Cooper-Schrieffer (BCS) theory. In this "conventional" description, the superconducting order parameter is a complex field, that does not change when applying point symmetry transformations to it. Later, it was realized that there are also superconductors where this is not the case and point symmetry do change the order parameter; these are now referred to as "unconventional superconductors".

Using examples from our recent research, I will illustrate how superconductors that, in the canonical sense, would be referred to as conventional can show rather unusual properties. More specifically, we will discuss superconductors where the maximum current the superconductor can sustain is different in opposite directions, realizing a superconducting diode. We will also discuss superconductors where the elementary building blocks are more complex than in the BCS theory, and pairing in strongly interacting metals with bands that do not admit a local real-space description.

Superconducting diode (left) and superconductivity by condensation of three electrons and a hole (right).



Die Einführung erfolgt durch Michael Scherer

Die Fakultät lädt alle Interessierten herzlich ein. Die Veranstaltung findet im Hörsaal HNB statt.

Physik und Astronomie
from matter to materials