

Einladung zum Physikalischen Kolloquium

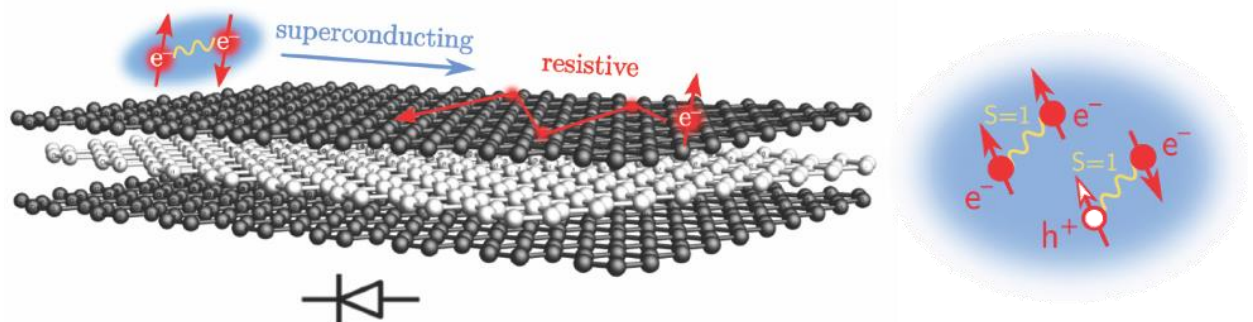
19.07.2024 **Mathias S. Scheurer, Universität Stuttgart**

»Conventional superconductors with unconventional properties«

Einführung: J. Schmalian

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 operations do change the order parameter; these are now referred to as “unconventional superconductors”.

After an introduction to the basic theory of superconductivity, I will illustrate, using examples from our recent research, 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).

Der Vortrag findet **am Freitag, den 19. Juli 2024 um 15:45 Uhr im Otto-Lehmann-Hörsaal**, Physik-Flachbau (Geb. 30.22), KIT-Campus Süd statt.