PHYSIKALISCHES KOLLOQUIUM

des Fachbereichs Physik
der Johann Wolfgang Goethe-Universität Frankfurt

Mittwoch, den 30.11.2022, 16 Uhr c.t.
Großer Hörsaal, Raum _0.111,
Max-von-Laue-Str. 1

Antrittsvorlesung

Prof. Dr. Falko Pientka

Institut für Theoretische Physik (ITP)
Johann Wolfgang Goethe-Universität Frankfurt

" Particle physics in the solid state"

The collective behavior of many interacting particles in solids gives rise to a wealth of fascinating phenomena. While a full theory of many particles is typically out of reach, there are usually only a few parameters relevant for the description of the low-energy material properties. It is often convenient to introduce effective quasiparticles, whose properties govern the response of the solid at low energies and which may or may not have counterparts as elementary particles in nature.
A key feature of a quasiparticle is that it cannot exist on its own, but it is intimately linked to its environment, with which it interacts. Hence, probing their properties can yield insight into the complex many-body state of the system. Moreover, as the properties of quasiparticles can be very exotic and potentially tunable, they provide excellent building blocks for novel devices.
In this talk I will discuss several examples of the sometimes surprising behavior of elementary excitations occuring in different states of matter ranging from ordinary Fermi liquids over excitons in semiconductors to topological superconductors and spin liquids. I will highlight how the peculiarities of quasiparticles can teach us about the entire system and potentially lead to new applications.

Die Dozenten der Physik

local host: Prof. Dr. Roser Valenti | valenti@itp.uni-frankfurt.de