UNIVERSITÄT BONN

Bethe Colloquium

Qimiao Si

Rice University, Houston

A Tale of Quantum Universe: Strange Metals for Topology and Entanglement

In a variation on Carl Sagan's theme, a grain of sand contains more electrons than stars in the universe. A primary objective of condensed matter physics is to determine the organization of the many billions of billions of electrons in the quantum universe of a solid, taking into account both the electrons' quantum mechanical nature and their electrostatic repulsive interaction. In the standard model, quasiparticle is a central concept. It acts as the adiabatic continuation of a bare electron in the presence of interactions, and is resilient when the electron interactions are treated perturbatively. In this colloquium, I will address some of the notable quantum phases that are driven by strong correlations in a variety of settings. I will describe how quasiparticles break apart [1,2], which leads to strange metals, and how strange metallicity nucleates new types of topology [3] and amplifies quantum entanglement [4].

[1] S. Paschen and Q. Si, Nat. Rev. Phys. 3, 9 (2021); S. Kirchner et al., Rev. Mod. Phys. 92, 011002 (2020).
[2] L. Chen et al. arXiv:2307.09431; H. Hu and Q. Si, Sci. Adv. 9, eadg0028 (2023).
[3] H. Hu et al., arXiv:2110.06182; L. Chen et al., Nat. Phys. 18, 1341 (2022).
[4] Y. Fang et al., arXiv:2402.18552.

BCTP, Room W 2.019 - Wegelerstr. 10 - 53115 Bonn

Thursday, June 13, 2024, at 4:15 p.m.

Bethe Center for Theoretical Physics

Physikalisches Institut
Universität Bonn
Nussallee 12
53115 Bonn

phone (+49) 228/73-3770
mail theory@physik.uni-bonn.de

bctp

For detailed information visit us at: http//bctp.uni-bonn.de