Contribution ID: 10

Type: Invited Talk

Topological Landau theory

Saturday 7 June 2025 09:30 (30 minutes)

I will discuss a notion of topology "hidden" in Landau's theory of phase transitions. When the order parameter comprises several components in the same irreducible representation of symmetry, it can possess a nontrivial topology and acquire a Berry phase under the variation of thermodynamic parameters. To illustrate this idea, I will focus on the superconducting phase transition of an electronic system with tetragonal symmetry and an attractive interaction involving two partial waves, both transforming in the trivial representation. From the time-dependent Ginzburg-Landau equation in the adiabatic limit, we find that the order parameter acquires a Berry phase after a cyclic evolution of parameters. I will discuss two concrete models—one preserving time-reversal symmetry and one breaking it—and show that the nontrivial topology of the order parameter originates from thermodynamic analogs of gapless Dirac and Weyl points in the phase diagram. Finally, I will propose an experimental signature of the topological Berry phase in a Josephson junction.

Authors:MACIEJKO, Joseph (University of Alberta);Dr SUN, Canon (University of Alberta)Presenter:MACIEJKO, Joseph (University of Alberta)

Session Classification: Condensed Matter Theory