Department of Physics Colloquium

Speaker: Dr. Ramakanta Chapai

Postdoctoral Fellow
Argonne National Laboratory

"Consequences of Electronic Correlations in Kagome Metals"

Open to the public, free of charge

Monday, March 25, 2024 - 4 p.m. – 1110 Rood Hall

Refreshments: 3:30-3:50 p.m., Bradley Commons, 2202 Everett Tower

Abstract: Metallic materials with a Kagome lattice have emerged as a new frontier in Condensed Matter Physics in recent years. Key features in their electronic band structure include Dirac points, van Hove singularities (VHS), and flat bands. In this talk, I will discuss some insightful cases of a Kagome superconductor CsV_3Sb_5 (CVS), where a complex interplay exists between superconductivity, charge density wave (CDW), and a non-trivial topology. Through the measurement of magnetic quantum oscillations in fields up to 86 T, we have identified the fundamental 'building blocks' of the reconstructed Fermi surface, comprising 'hyperbolic hexagon' and 'triangular' pockets within the CDW state in CVS. These pockets are characterized by sharp corners and strong variations of the Fermi velocity, arising from the proximity to the VHS. I will demonstrate that the observed unconventional transport behavior, such as non-monotonic magnetoresistance and apparent anomalous Hall effect, can, in a semi-quantitative way, be accounted for by the reconstructed Fermi surface structure. This versatile approach can be extended to account for the anomalous magneto-transport observed in a large family of metallic systems hosting singular features in their electronic spectrum. As I conclude the talk, I will briefly discuss anomalous features observed in the temperature dependence of upper critical field $H_{c2}(T)$ of CVS and propose an explanation based on Fermi surface reconstruction.

Parking: Metered parking is available in Parking Structure #2, near Miller Auditorium.
More information: (269) 387-4941 Department of Physics email Campus map

WESTERN MICHIGAN UNIVERSITY