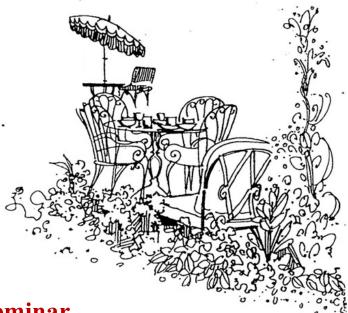


Presents ... Monday, April 7, 2025 12:00 pm - 1:00 pm Duboc Room - 4-331



Chez Pierre Seminar

Qimiao Si, Rice University

"Strange metals and flat bands: From topological heavy fermions to superconducting twisted-WSe2".

Strong correlations and topology can mutually enrich each other. In this talk, I will illustrate both directions of this outstanding issue in two contexts. From one side, heavy fermions represent a canonical system for correlation physics. With appropriate symmetry, strong correlations lead to Weyl-Kondo semimetals [1] and, furthermore, strange metallicity gives rise to topological semimetals without quasiparticles [2.3]. From the other side, the very recent discovery that twisted-WSe2 superconducts has generated considerable excitement. I will argue that the moiré transition metal dichalcogenides represent a particularly transparent case where band topology yields new correlation physics. In an intermediate correlation regime, the band topology generates quantum fluctuations [4] that weaken an active flat band's natural tendency towards electronic order. The resulting competition enables a quantum critical regime from which superconductivity develops [5]. Some general implications of these exemplary cases will be discussed.

References:

[1] H.-H. Lai, S. E. Grefe et al., <u>PNAS 115, 93 (2018)</u>
[2] H. Hu et al., <u>arXiv:2110.06182</u>
[3] D. M. Kirschbaum, L. Chen et al., <u>arXiv:2404.15924</u>
[4] H. Hu, Q. Si, <u>Sci. Adv. 9, eadg0028 (2023)</u>

[5] F. Xie, L. Chen, S. Sur, Y. Fang, J. Cano, Q. Si, arXiv:2408.10185