CSU PHYSICS COLLOQUIUM

"Hydrodynamics of viscous electron fluids"

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Monday March 7th at 4:00pm

120 Engineering (Hammond Auditorium)

Abstract

Hydrodynamics is a universal effective theory which describes how complicated and chaotic many-body systems reach global thermal equilibrium. In ultra-clean solid-state devices, such as single-layer graphene, it is possible to observe a viscous hydrodynamic flow of interacting electrons through the device. In this talk, I will overview the necessary ingredients to see textbook viscous fluid flow, why they are not satisfied in most metallic systems, and why ultra-clean graphene is an exception. I will then overview the experiments which suggest viscous flow is possible in graphene. Finally, I will show how the reduced spacetime symmetries due to the lattice could give rise to new fluid phenomena, and propose experiments to detect them in the near future.

Biography

Andrew Lucas received his B.S. in Physics from Stanford in 2012 and PhD in Physics from Harvard in 2016. After a Gordon and Betty Moore postdoctoral fellowship at Stanford, he was appointed Assistant Professor of Physics at the University of Colorado Boulder in 2019. He was awarded a Sloan Fellowship in 2020, an NSF CAREER award in 2022, and received the 2022 George E. Valley Jr. Prize from the American Physical Society for promising early career work on the theory of electron hydrodynamics. His research is currently funded by the Sloan Foundation, the Moore Foundation, AFOSR, and NSF.