Massachusetts Institute of Technology
Department of Physics

Condensed Matter Theory Seminar

"Superballistic conduction and viscous electronics"

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Abstract: Strongly interacting electrons can move in a neatly coordinated way, reminiscent of the movement of viscous fluids and leading to unusual collective behaviors. This talk will focus on superballistic conduction of viscous electron flows in which interactions facilitate transport and allow conductance to exceed the fundamental Sharvin-Landauer ballistic limit. It will describe a theory of the ballistic-to-viscous crossover in a constriction, where ballistic transport occurs at zero temperature and electron hydrodynamics sets in at elevated temperatures. Recent measurements of electron transport through graphene constrictions find that conductance below 150 K increases with increasing temperature. The measurements help to identify the contribution to conductance arising due to electron viscosity and determine its temperature dependence. Besides fundamental interest, this work shows that viscous effects can facilitate high-mobility transport at elevated temperatures, a potentially useful behavior for designing graphene-based devices.

https://arxiv.org/abs/1607.07269
https://arxiv.org/abs/1703.06672
https://arxiv.org/abs/1612.09239

1:15pm
Friday, December 8, 2017
Duboc Room (4-331)

Host: Leonid Levitov