

# *Chez Pierre*

Presents ...

**Monday, November 7, 2016**

**12:00pm Noon**

**MIT Room 4-331**

## **Chez Pierre Seminar**

**Kin Chung Fong - Harvard University**

**“Listening to the noise of Dirac fluid in graphene”**

Interactions between the Dirac fermions in graphene can lead to new collective behavior described by hydrodynamics. At high temperature near the neutrality point, using high frequency, wide bandwidth Johnson noise thermometry, we find a strong enhancement of the thermal conductivity and breakdown of Wiedemann-Franz law in graphene. This is attributed to the non-degenerate electrons and holes forming a strongly coupled Dirac fluid, as predicted in hydrodynamic theory. At low temperature, the Dirac fermions are in extreme thermal isolation with minute specific heat that can be exploited for ultra-sensitive photon detection. We will present our latest experimental result towards observing single microwave photons and explore its role in scaling up the superconducting qubit systems. Our model suggests the graphene-based Josephson junction single photon detector can have a high-speed, negligible dark count, and high intrinsic efficiency for applications in quantum information science and technologies. These works are in collaborations with my colleagues at BBN Technologies, Prof. Dirk Englund at MIT, and Prof. Philip Kim at Harvard University.

Ref: Science **351**, 1058 (2016)

