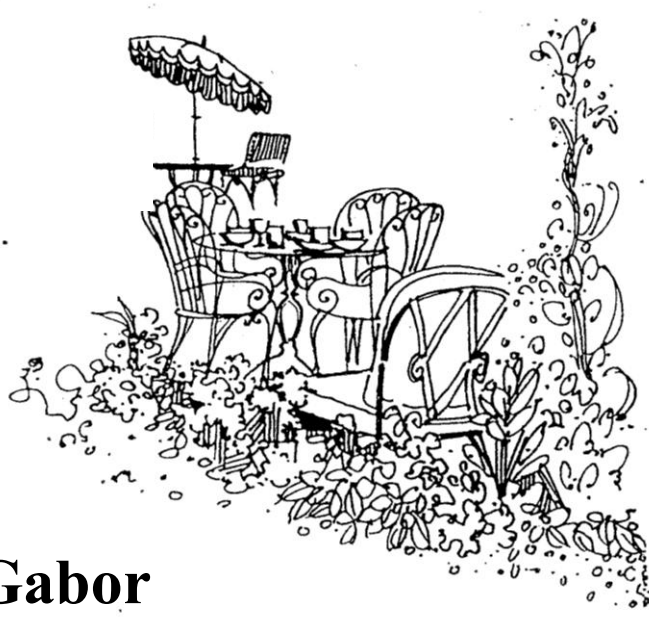
Chez Pierre

Presents ...

Monday, March 11, 2013
12:00pm
MIT Room 4-331

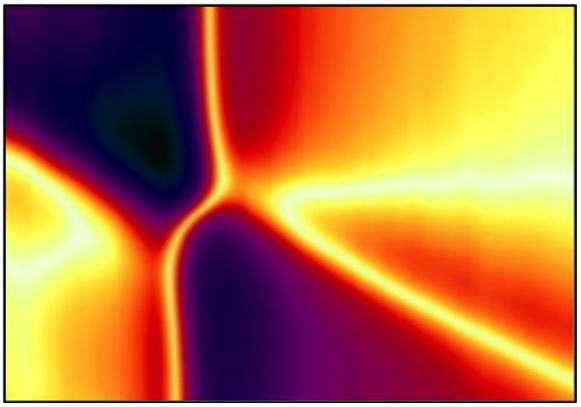


Nathaniel Gabor

Massachusetts Institute of Technology

"Photoresponse in Graphene Quantum Devices: Hot Dirac Fermions and the Emergence of Nonlocality"

Dirac fermions, which exhibit light-like conical band structure with vanishing band gap, have generated tremendous interest within the fields of condensed matter physics and nanoscience. Strongly interacting Dirac fermions, particularly near the charge neutrality point (CNP) in graphene, have been the focus of intense research. As the quality of graphene-based quantum devices has improved, electronic measurements have probed many-body effects at the CNP, revealing Coulomb drag, nonlocality, and interaction-assisted band gap opening. While quantum electronic measurements probe charge transport of carriers at low energy, photoexcitation may drive the system into a regime dominated by high-energy carrier interactions. In this talk, I will discuss photoresponse measurements of graphene-based quantum systems that reveal a novel hot carrier transport regime, and explore the emergence of giant nonlocality near the CNP. By combining quantum transport with precision optical techniques, these measurements provide a glimpse into the strong interactions of Dirac fermions, and establish the first steps in the search for correlated electron behavior in the regime of strong light-matter interactions.



Gabor, et al. *Science* **334**, 648 (2011).