

Chez Pierre

Presents ...

Monday, October 17, 2016

12:00pm Noon

MIT Room 4-331

Chez Pierre Seminar



Landry Bretheau – Massachusetts Institute of Technology

“Tunneling Spectroscopy of Andreev States in Graphene”

Although not intrinsically superconducting, a normal conductor can inherit electronic properties of a superconductor placed in good contact with it. This proximity effect originates from the formation in the conductor of entangled electron-hole states, called Andreev states. Spectroscopic studies of Andreev states have been performed in just a handful of systems. With its large mobility, ease of access and electrostatically tunable carrier density, graphene provides a novel platform for studying Andreev physics in two dimensions. Using a full van der Waals heterostructure, we have performed a direct tunnelling spectroscopy of proximitized graphene. The measured energy spectra, which depend on the phase difference between the superconductors and on graphene carrier density, evidence a continuum of Andreev bound states with energies smaller than the superconducting gap. Notably, out of gap modulations are also observed and could be related to the long-predicted Andreev scattering states. This work opens up new avenues for probing exotic phase of matter in hybrid superconducting Dirac materials.