Graphene viewed through STM and transport experiments.

Graphene, a one-atom thick form of crystalline-carbon possesses extraordinary electronic properties making it a prime-candidate for novel nano-electronic devices, at the same time raising the prospect to observe phenomena hitherto unseen in condensed-matter-physics such as Klein tunneling. These unusual properties, arising from a unique type of charge-carriers that behave like massless Dirac fermions, are most prominent near the Dirac point where their density vanishes. I will present STM and transport experiments on graphene samples decoupled from the supporting substrate which demonstrate the existence of the Dirac point and the Dirac fermions. In the presence of a magnetic field a sequence of discrete Landau energy levels carrying the distinctive signatures of long-lived massless Dirac-fermions is observed. The Dirac-fermions are slowed down by electron-phonon interactions and acquire a small mass, seen as a gap in the tunneling spectrum.