Laboratoire des Solides Irradiés, UMR 7642

Séminaire Invité

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Jeudi 16 Février – 10h30

Amphi Faure

10H00

Spying on relativistic-like electrons with a carbon nanotube

Graphene is a formidable test bed to verify fundamental theory of physics. Hydrodynamics, relativity and superlattice physics can all be explored by observing the behavior of electrons in graphene, either with electronic transport or with local probes. In this work, we use a carbon nanotube (CNT), placed on top of boron-nitride encapsulated graphene, simultaneously as local sensor and active component to probe and manipulate the behavior of graphene electrons.

Relying on the friction between electrons of this two closely-spaced but isolated conductors, we detect local variations of current in graphene and observe transition between compressible and incompressible states in the quantum Hall regime as well as quantum interferences between edge states.

If we operate the CNT as a single electron transistor, we probe the local density of states of graphene and, since its electrons constitute a natural analogue model for relativistic particles, we demonstrate predictions of relativity which differ from classical physics: Lorentz invariance and atomic collapse.