

GRAPHENE: A FASCINATING MATERIAL FROM THE TWO-DIMENSIONAL WORLD

Prof. Pastori Parravicini, Dept. of Physics "A. Volta", University of Pavia (Italy)

Graphene, a monolayer of carbon atoms on the honeycomb topology, is emerging as a solid-state reservoir of massless Dirac fermions, and related quantum electrodynamics phenomena. Graphene provides a rich unconventional phenomenology, with relevant perspectives both in fundamental physics and in technological aspects.

The electronic structure and the current profiles of graphene ribbons are investigated within the Keldysh nonequilibrium formalism in the tight-binding framework. Simulations of charge transport in field-effect controlled graphene ribbons highlight the striking transport properties of carriers controlled by the Dirac points in the low energy region; these include minimal conductivity, diffusive shot noise, Klein tunneling, half-integer relativistic quantum Hall effect, current profiles, valley-valve filtering effect. Manipulations with magnetic fields and gate voltages of the electron-hole nature of carriers, intervalley scattering and current flow, open perspectives for the development of unconventional carbon devices based on charge conjugation symmetry of Dirac particles.

Host: Marco Fornari

Cookies and coffee @ 3:30pm in Dow 201.