

NATIONAL INSTITUTE OF TECHNOLOGY, DURGAPUR
Department of Physics

Date:04.12.2019

Dear All,

Interested faculty members, research scholar and students of the Institute are invited to attend a seminar at Seminar Hall 1 (new administrative building) on 5th December 2019 at 3.45 PM.

Speaker: **Prof. Sushanta Dattagupta, INSA Senior Scientist, Bose Institute, Kolkata.**

Topic: **Carbon (C) Hybridization to Tight-Binding to Dirac Solid—the Wonder World of Graphene**

Abstract: We make a pedagogical survey on why the charge carriers (electrons) in graphene are called massless Dirac fermions. Our analysis begins at the beginning, namely, we start from the quantum chemistry of two nearby C atoms and show how their hybridized orbitals ‘valence-bond’ with each other to form an energy-band in the solid state. This yields a two-dimensional honey-comb lattice of graphene, which can be viewed as two interpenetrating triangular lattices. That recognition provides a perfect setting for describing the dynamics of the left-over, weakly-localized valence electron of C in a tight-binding model, which captures all the unusual electronic phenomena of graphene. The latter emerge from a resemblance to the relativistic Dirac theory of electrons because in the long-wavelength limit, the energy dispersion is linear in the wave vector. We build up, step-by-step – this remarkable transition of a carbon-based material to an exotic Dirac solid, in which much of the exciting quantum aspects of modern condensed matter physics can be tested in the laboratory.

Thanking you.

With regards,

On behalf of Organizing Committee & Department of Physics

Dr. M. K. Mandal (9434788050)
Associate Professor