Joint CQSE and CASTS Seminar

Weekly Seminar
Mar. 28, 2014 (Friday)

TIME Mar. 28, 14:30 ~ 15:30
TITLE Time-dependent density-functional theory of coupled electronic-lattice motion in two-dimensional crystals
SPEAKER Prof. Vladimir Nazarov
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PLACE Rm716, CCMS & New Physics Building, NTU

Abstract

Electron-holes, phonons, and plasmons come in close proximity to each other in the low-energy range of the excitation spectrum of two-dimensional (2D) crystals, breaking the validity of the weakly-interacting-quasiparticles picture. By including the lattice oscillations into the scheme of time-dependent density-functional theory, we open a pathway to the {\em ab initio} treatment of the coupled low-energy excitations in 2D crystals. With the use of graphene as an important test system, we find the strong coupling of the elementary excitations, giving rise to new hybrid collective modes.

The total (including both the electronic and ionic response) dielectric function $\varepsilon_{tot}(\omega)$ is constructed and the picture of the low-energy excitation spectrum of graphene drawn.