

Joint CQSE and CASTS Seminar

Weekly Seminar
Dec. 20, 2013 (Friday)

TIME Dec. 20, 14:30 ~ 15:30
TITLE Exciting Prospects for Low-Dimensional Semiconducting
Nanomaterials
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Abstract

The fascinating physical properties of novel nanomaterials can always be attributed to the sophisticated electronic structures inside materials. Requirement of probing such electronic structure from both fundamental theories and potential applications gives a very strong motivation to drive the diverse developments in both experimental and theoretical fields[1]. Among enormous techniques, optical response of materials usually gives the direct and unambiguous pictures which deliver the stringent evidence or fingerprint of the detail of the subtle electronic structure of nanosystems. Especially, a substantial excitonic effect in modern nanomaterials categorized by the strength of electron-hole interaction provides an exciting opportunity to design new functional optoelectronic devices in the future.

Therefore, in this talk, we are going to present the study of the optical response of low-dimensional nanostructures by performing the state-of-the-art hybrid method which solving highly accurate Bethe-Salpeter-equation on the basis within quasiparticle GW approximation (GW+BSE) according to the many-body perturbation theory. Indeed, our calculated optical properties indicate significant dimensionality-induced quantum confinement and charge screening effects in low-dimensional optoelectronic semiconductors [2] which are potential candidates for the future devices in optical engineering.

[1] Chi-Cheng Lee, Xiaoqian M. Chen, Yu Gan, Chen-Lin Yeh, H. C. Hsueh, Peter Abbamonte, and Wei Ku, Phys. Rev. Lett. **111**, 157401 (2013).

[2] H. C. Hsueh, G. Y. Guo, and Steven G. Louie, Phys. Rev. B **84**, 085404 (2011).

