Seminar

Electronic Excitation of Condensed Matter: electrons, holes, excitons, and their ab-initio description

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Time: 4:00pm, Sept. 23, 2014(Tuesday)
时间： 2014年9月23日 （周二）下午4:00
Venue: Conference Room 607, Science Building 5
地点： 理科五号楼607会议室

Abstract

Many properties of condensed matter (e.g. optical spectra, electronic transport, etc.) are determined by excited electronic states (in particular by the electronic band structure and by electron-hole pair excitations, i.e. excitons). The systematic description of these states can be achieved by ab-initio many-body perturbation theory, in particular by the GW method and the Bethe-Salpeter equation. In here the concept of non-local dielectric screening plays a particular role. The numerical evaluation of these concepts contributes to our understanding of the electronic structure of many systems, especially on the atomic length scale and in reduced dimensions. In the talk I will discuss the key elements of the theory, present the key properties of the involved physical quantities, and discuss a number of prototypical systems. In addition to conventional semiconductors, surfaces, and molecules I will discuss more complex systems, e.g. the electronic spectra of molecules adsorbed on metal surfaces and the optical properties of coupled carbon nanotubes.

About the Speaker

Michael Rohlfing is a professor of physics in the University of Muenster, German. Before that, he studied his Diploma and Ph.D in the University of Muenster, Germany, between 1988 and 1996. This is followed by two postdocs in the University of California, Berkeley (with Steven Louie) and the University of Muenster respectively, from 1997 to 2003. In 2001, he finished his Habilitation (qualification for a professorship). In 2003, he joined the International University Bremen as an associate professor. And in 2005, he moved to the University of Osnabrueck, Germany, as a full professor. Since 2013, he moved back to his homework (Muenster) and served as a full professor. He is the first one in the world who has implemented the well-known Bethe-Salpeter equation in an ab initio program. His research interest includes developing methods to understand the excited electronic state, in particular within the many-body perturbation theory, the interrelation between geometric and electronic structure, nanoscopic and low-dimensional systems, and non-local interaction mechanisms in electronic structure and theoretical spectroscopy.