



ICQM Weekly Seminar

Non-equilibrium in Quantum Lattice Systems

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Venue: Room 607, Conference Room A, Science Building 5

地点: 理科五号楼607会议室

Abstract

Recent success in equilibrium quantum many-body theory has fueled a new challenge of understanding non-equilibrium electron transport. Traditionally the transport theory has centered on the linear-response theory since an external field in the electronic scale of solids is only perturbative. However, in the new era of nano-electronics and cold atoms, the electric field can no longer be considered as perturbative. In recent years, many researchers have attempted to formulate non-perturbative and fully interacting theories and have had some limited success. In this talk, we introduce the basic concepts of fluctuation-dissipation theorem and the Joule heating, and go on to discuss the current status of the elementary models and their theoretical outcome. It turns out that, in nonequilibrium theories, commonly used condensed matter techniques do not hold and therefore the current numerical research often employs over-simplified models and faces fundamental limitations. Finally, we discuss a recent experimental work on a quantum point contact device in an extreme nonequilibrium and make a showcase of how little we understand on nonequilibrium processes and how to improvise.

About the Speaker

Jong Han is the assistant Professor of Physics 239 Fronczak Hall, Department of Physics, The State University of New York at Buffalo. His current research interests are: computational manybody theories for alkali-doped C60, heavy fermions, oxides etc. microscopic theory for spin-triplet pairing dynamical mean field theory magnetic nanostructure superconducting nanostructures computational algorithm for electronic transport in nanoscale.