

Center for Quantum Science and Engineering (CQSE)

量子科學與工程研究中心

Mini-course

March 5 to 26, Every Friday

自旋電子及石墨烯奈米系統中的量子傳輸現象

Quantum Transport in Spintronic and Graphene



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歡迎本校應力所、電機系所、工學院、物理及化學系所等具有物理電機、光電科學、工程等相關背景知識及修習過數學物理學及電磁學基本課程的碩博士研究生前來參加。本課程免收費，不計學分並採現場報名自由入座。

授課時間：98 學年度第 2 學期
(99.3.5-99.3.26)

每週五 15:20~17:20

授課地點：國立台灣大學
物理暨凝態新館 112 室

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課程簡介

Syllabus

The course provides a hands-on experience for graduate students in sciences (physics, chemistry) and engineering (electrical, chemical, materials), as well as advanced undergraduates, to analyze electronic structure and transport properties of basic classes of carbon, semiconductor, and magnetic nanostructures explored at the current research frontiers.

* Nanostructures in equilibrium: two-dimensional electron gas, graphene, carbon nanotubes, quantum wires and dots, magnetic nanostructures, elements of density functional theory (DFT).

* Nanostructure out of equilibrium: conductance quantization, weak and strong localization, quantum Hall effect, interferometers, magnetic tunnel junctions, Coulomb blockade, I-V curves.

* Theoretical techniques: Boltzmann equation, spin and charge diffusion equations, Landauer-Büttiker scattering formalism, nonequilibrium Green function (NEGF) techniques.

* Experimental techniques: Scanning Tunneling and Atomic Force Microscopy.

* Applications: nanoelectronics, molecular electronics and spintronics.

In this mini-course, Prof. Dr. Branislav Nikolić will provide a general introduction to some of the topics above and then focus on SPECIFIC theoretical/computational techniques (such as NEGF, NEGF+DFT, etc.) that an advanced student can use to solve problems of current interest.

Reference: https://wiki.physics.udel.edu/phys824/Main_Page