QPhysics
AT QUEENS COLLEGE

Colloquium Notice

Michael Stopa

Harvard University

Energy transfer in plants and photo-cells: calculating the interaction of light and matter

Photosynthesis starts when a photon is captured by a photosynthetic reaction center containing a chlorophyll molecule. The photon is converted into an excited state of the molecule, a so-called "exciton." In order for the plant to convert that energy into ATP, the energy must be transferred between molecules via a process called Förster resonant energy transfer (FRET). The same process is employed in the design of photovoltaic materials as well as various exotic kinds of excitonic circuits and is even contemplated as a mechanism for implementing quantum computation. The details of how the energy moves in FRET is both an important problem in understanding biological systems and a crucial issue in engineering efficient solar collectors. One of the ways that scientists have studied this problem is in simulations of the electronic structure of molecules and "artificial molecules" known as nanoparticles. The sophistication of these calculations continues to grow as increasingly powerful computer platforms and algorithms become available. In this talk I will describe the calculation of FRET as an important paradigm in electronic structure calculations and show how future developments might solve previously poorly understood problems, such as how quantum mechanics enters into the photosynthetic process in real plants.

Wednesday
February 23, 2011
Starts at 12:15 PM
Coffee at 12:00 PM
Physics Conference Room, SB B326