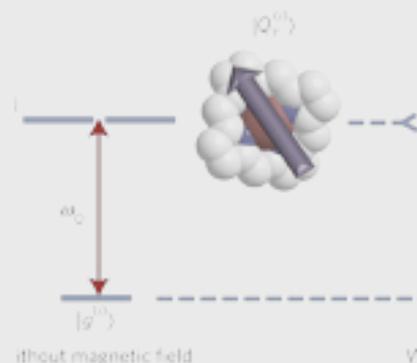


Spectroscopy and Topological Phases for Organic Excitons

Date: Monday 16th March, 2015, 12h00

Place: Department of Condensed Matter Physics, Facultad Ciencias, Module 3, Seminar Room (5th Floor).

Speaker: Joel Yuen-Zhou, Center for Excitonics, Massachusetts Institute of Technology, USA.



Abstract:

The understanding and control of energy flow at the nanoscale via exciton dynamics in organic materials is of fundamental chemical and physical interest, but is also technologically relevant for the design of novel photovoltaic materials. In the first part of my talk, I will explain some of our work designing spectroscopic protocols to understand exciton dynamics under coherent illumination via ultrafast Quantum Process Tomography (QPT), a technique which retrieves the time evolution of the quantum state of the excitons via nonlinear spectroscopy (1,2). As an application, I will describe the first ultrafast QPT experiment carried out with the Nelson and Bawendi groups at MIT on a nanotubular J-aggregate system at room temperature. In the second part, I will describe current work (3,4) designing topologically nontrivial phases that robustly and selectively move excitons in particular spatial directions of a molecular crystal, simulating solid state “topologically protected” phenomena like the Quantum Hall Effect, which are robust against material imperfections and static disorder.

References:

- J. Yuen-Zhou, Jacob J. Krich, Masoud Mohseni, and A. Aspuru-Guzik, [Quantum state and process tomography of energy transfer systems via ultrafast spectroscopy](#), Proc. Nat. Acad. Sci. USA. 108, 43, 17615 (2011).
- J. Yuen-Zhou, D. Arias, D. Eisele, J. J. Krich, C. Steiner, K. A. Nelson, and A. Aspuru-Guzik, [Coherent exciton dynamics in supramolecular light-harvesting nanotubes revealed by ultrafast quantum process tomography](#), ACS Nano 8 (6) 5527 (2014).
- J. Yuen-Zhou, S. Saikin, N. Yao, and A. Aspuru-Guzik, [Topologically protected excitons in porphyrin thin films](#), Nature Materials 13, 1026 (2014).
- J. Yuen-Zhou, S. Saikin, T. Zhu, V. Bulovic, M. Baldo, Topological plexcitons with organic molecular crystals, in preparation, (2015).

[More information on IFIMAC Website](#)