The School of Natural Sciences
Presents

Solving Quantum Many Body Problems One Pseudorandom Number at a Time

Dr. Jonathan L DuBois

Lawrence Livermore National Lab

Friday, May 7, 2010
3:15 cookies, 3:30 talk
COB 265

ABSTRACT:
I will show how solving for equilibrium properties of quantum many body systems can be as easy (and as difficult) as adding together random numbers. Examples of especially fruitful applications of this Monte Carlo approach to quantum mechanics can be found in strongly interacting quantum fluids as well as electronic structure problems in chemistry and condensed matter. Results from a few ongoing projects in these areas will be presented and used as a backdrop for a discussion of both the power and limitations of the approach. I will conclude with an outline of some recent algorithmic advances that hold the promise of obtaining unbiased results of arbitrary precision for both ground state and finite temperature properties of fermionic systems.

BIOGRAPHY:
Dr. DuBois received a PhD in physics from the University of Delaware in 2003 with a focus on quantum Monte Carlo studies of quantum fluids. During postdoctoral positions at Delaware and UC Berkeley he continued work on QMC methods development with applications ranging from rotating Bose-Einstein condensates to topological quantum computing. As a staff scientist in the Quantum Simulations Group at Lawrence Livermore National Lab he has worked on problems in hydrogen storage, first principles materials optimization, quantum optics and plasma physics.

For additional info contact Prof. Lin Tian, 209-228-4209, ltian@ucmerced.edu