

WEEKLY CALENDAR

February 8, 2010

Departmental Colloquium

"Dissipation (Friction) and Fluctuations in Quantum Mechanics with Applications"

3:40 PM, February 11, 2010
109 Nicholson Hall

Robert F. O'Connell
LSU – Department of Physics and Astronomy

Host: Juhan Frank

• *Refreshments served at 3:15 PM in 232 (Library) Nicholson Hall* •

Car tires on a road, raindrops falling through the atmosphere and Langevin's phenomenological theory of Brownian motion of particles in a fluid, are reviewed as examples of phenomenological friction theories. Next, a microscopic quantum theory is presented which leads to a generalized quantum Langevin theory which is shown to embrace a rich variety of phenomena. These include the solution to the problem of runaway solutions in quantum electrodynamics, atomic energy shifts due to blackbody radiation, entropy of an oscillator in a heat bath, mean square deviation of the phase of Josephson junctions for strong coupling, charge fluctuations on a small tunnel junction, as well as decoherence and disentanglement problems in quantum theory.

Publications:

"Wigner Distributions", in Compendium of Quantum Physics, **R. F. O'Connell**, Springer, 2009.

"Entanglement without dissipation: A touchstone for an exact comparison of entanglement measures," G.W. Ford, **Yang Gao**, **R.F. O'Connell**, Optics Communications 283 (2010) 831-838.

"New Frontiers at the Interface of General Relativity and Quantum Optics", C. Feiler, M. Buser, E. Kajari, W.P. Schleich, E.M. Rasel, **R.F. O'Connell**, Space Science Review 148, 123-148 (2010).

"Status of NINJA: the Numerical INjection Analysis project," **Peter Diener**, **Erik Schnetter**, et. al., Class. Quantum Grav. 26 (2009) 114008 (13pp).