EE 298-12
Solid State Technology and Devices Seminar

Friday, 8 November 2013
1-2pm
Hogan Room - 521 Cory Hall

Measurement Backaction for Cooling and Oscillation in Opto-Mechanical Devices

Dr. Trisan Rocheleau
UC Berkeley

Abstract

In any measurement of a system, quantum mechanics dictates that the measurement will inherently produce some "back-action" on the measured system. Such back-action effects produce fundamental limits on the precision with which a system can be measured, well-known in the form of Heisenberg's uncertainty principle, but can also can be engineered to generate specific effects on the measured system, such as heating and cooling. Opto-mechanical resonators have recently appeared as a unique, yet simple, platform that allows controlled use of back-action forces for applications ranging from quantum measurement to integrated oscillators. In this talk, I will discuss two conceptionally identical but practically very different looking implementations of opto-mechanical resonators intended, first, to provide quantum-limited position detection and cooling of a mechanical device to near its quantum ground state, and second, an exceptionally simple on-chip oscillator and modulator with low phase noise for use in chip-scale atomic clocks.