Yale Institute for Nanoscience and Quantum Engineering

Friday- October 11, 2013

12:00 to 1:00 p.m.

Becton Seminar Room

Light lunch will be served at 11:45 a.m.

Robert Style

Department of Mechanical Engineering, Yale University

"Solid surface tension effects at small scales"

The Classical continuum theories are very useful for predicting mechanical behaviour. For example, Young's law predicts the equilibrium shapes of droplets, while contact mechanics predicts how surfaces stick together. We are interested in whether such results breakdown at microscopic and nanoscopic lengthscales, and we study this using confocal microscopy. I will show how solid surface tension dramatically changes small-scale behaviour below a critical elastocapillary lengthscale. I will explain how this can be important for nanobubbles, nanodroplets, contact and AFM measurements on soft materials. Our results have also inspired novel control techniques for manipulating droplets on flat surfaces.

Shyam Shankar

Department of Applied Physics, Yale University

"Autonomous stabilization of an entangled state of two transmon qubits"

Quantum feedback control enables the stabilization of non-equilibrium states of a quantum system in the presence of decoherence-induced errors. Measurement-based feedback is the conventional approach, but requires a complicated external feedback loop to correct errors. We describe a simpler implementation, based on autonomous-feedback, to stabilize an entangled state of two transmon qubits. The scheme combines continuous microwave drives with a specifically engineered coupling between the two-qubit register and a dissipative reservoir to force the qubits into a Bell state. Such autonomous schemes, which counter-intuitively use dissipation to fight decoherence, will be an essential tool for the implementation of quantum error-correction of a logical qubit.

HOST: Paul Fleury