



Yale Institute for Nanoscience
and Quantum Engineering

Friday- October 16, 2015

12:00 to 1:00 p.m.

BECTON SEMINAR ROOM

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

Omur Dagdeviren

Department of Mechanical Engineering & Materials Science, Yale University

"Robust High-Resolution Imaging and Quantitative Force Measurement with Tuned-Oscillator Atomic Force Microscopy"

Abstract: Atomic force microscopy and spectroscopy are based on locally detecting the interactions between a surface and a sharp probe tip. For highest resolution imaging, noncontact modes that avoid tip-sample contact are used; control of the tip's vertical position is accomplished by oscillating the tip and detecting perturbations induced by its interaction with the surface potential. Due to this potential's nonlinear nature, however, achieving reliable control of the tip-sample distance is challenging, so much so that despite its power vacuum-based noncontact atomic force microscopy has remained a niche technique. Here we introduce a new pathway to distance control that prevents instabilities by externally tuning the oscillator's response characteristics. A major advantage of this operational scheme is that it delivers robust position control in both the attractive and repulsive regimes with only one feedback loop, thereby providing an easy-to-implement route to atomic resolution imaging and quantitative potential measurement.

Fred Walker

Department of Applied Physics , Yale University

TBA

Host: Professor Eric Altman