



# Physics Seminar

**Friday, 3:30 pm, April. 20th, 2012**

## **Precision single molecule force spectroscopy with optical traps and atomic force microscopy**

*Dr. Thomas Perkins, JILA, NIST and CU-Boulder*

Force spectroscopy is an important single-molecule technique to study the energetics and dynamics of biological systems. Both optical traps and atomic force microscopes (AFMs) can measure the dynamics of individual molecules. My talk will cover two applications of single molecule force spectroscopy. First, I will discuss overstretching DNA using an optical trap. Overstretching DNA is a remarkable transformation where DNA's extension increases by 70% in a narrow force window at 65 pN. The mechanism of overstretching has been an ongoing controversy since its discovery 15 years ago. Our work helps clarify this controversy by showing that there are two mechanisms for overstretching DNA that have nearly degenerate forces. Second, I will discuss the development of an ultra-stable AFM, where we optically stabilize both the sample and the tip in three dimensions to achieve a 100-fold improvement in stability at ambient conditions (in air at room temperature). We are now using this increased stability to study the folding and unfolding dynamics of a model membrane protein, bacteriorhodopsin.

**Location: Ross 0220 (Ground level of Ross Hall)**

(Refreshments will be served at 3:20pm.)

*Physics/EPS/NHS/UNC*

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