Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

in vivo* Measurements of Conformational Fluctuations of Chromosomal DNA in *Escherichia Coli RUDRA KAFLE, JENS-CHRISTIAN MEINERS, University of Michigan — The cell is the site of active, motor-driven processes far from thermodynamic equilibrium. Therefore, the intracellular dynamics are complex and subject to a multitude of constraints and forces. We study the conformational fluctuations of chromosomal DNA *in vivo* in live and dead *E. coli* cells by Fluorescence Correlation Spectroscopy (FCS). The fluctuations move the DNA-bound fluorophores stochastically into the diffraction-limited excitation volume of a focused laser beam in a confocal microscope. From the time correlation functions of the fluorescence intensity, we obtain the mean square displacements of the DNA on a time scale from microseconds to seconds. We see a substantial decrease in the power spectral density (PSD) of the displacement fluctuations at frequencies below 10 Hz in the dead cells, compared to the live cells. The larger fluctuations in the living cells may indicate that the fluctuations on this time scale may be driven by active processes involving molecular motors that generate forces by ATP hydrolysis. A small difference in PSD between live and dead cells on shorter time scales suggests that the processes on corresponding short length scales rely primarily on thermally-driven diffusive mechanisms.

Rudra Kafle
University of Michigan Ann Arbor

Date submitted: 17 Nov 2012 Electronic form version 1.4