Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Conformational Fluctuations of Chromosomal DNA in *E. coli* CLARISSA FREEMAN, JENS-CHRISTIAN MEINERS, University of Michigan — We measured the conformational fluctuations of the bacterial chromosome in *E. Coli in* vivo using fluorescence correlation spectroscopy (FCS). The chromosomal DNA was randomly decorated with a cell-permeable intercalating dye. Conformational fluctuations of the DNA move the fluorophores stochastically into the diffraction-limited excitation volume of a focused laser beam. The time correlation function of the fluorescence intensity reflects the underlying dynamics of the DNA on length scales down to ∼200 nm. A comparison between live cells and dead yet structurally intact cells shows identical fluctuation spectra for short time scales, yet substantial differences for frequencies below 100 Hz. Live cells show much stronger fluctuations in this regime. This observation points to the crucial importance of active molecular motor action, as opposed to passive thermal noise, in driving larger conformational fluctuations in the chromosomal DNA, in particular on length scales exceeding ∼500 nm.

Jens-Christian Meiners
University of Michigan

Date submitted: 21 Nov 2011 Electronic form version 1.4