Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Single Molecule Observation of the Cyclization of Short DNA Duplex TECKLA AKINYI, Xavier University, Department of Physics, I-REN LEE, University of Illinois at Urbana Champaign, Department of Physics, TAEKJIP HA, University of Illinois at Urbana Champaign, Department of Physics and Center for the Physics of Living Cells, Howard Hughes Medical Institute — In the presented work, a single molecule DNA cyclization assay was used to follow the looping kinetics of single DNA 83 bp molecules, utilizing single molecule fluorescence energy transfer (smFRET) technique. The assay was first prepared in a Na^+ free condition and the majority of the DNA was in its unlooped form. A sudden Na^+ jump was introduced at different concentrations (0.05-1.75M) and finally yielded DNA in its looping state by annealing the complementary single-strand overhangs of the assay. Looping and unlooping rates were obtained from the kinetic measurements. The result shows a positive and negative linear dependence of the Na^+ concentration to the looping and unlooping rate, respectively, until they reach a plateau at 500 mM. The plateau persists until about 1M. For concentrations beyond 1M, an immoderate increase in looping rate is noticed while the unlooping rate does so gradually. Above 1M Na^+ there is a preference of looping events that is attributed to the increase of the annealing rate of the overhangs rather than increased flexibility, consistent with earlier studies by Ibrahim Cisse *et al.* (2012). A protein mediated cyclization assay was also used in experiments with HU protein in which a dramatic increase in the looping rate is noticeable. However in high HU concentration, looping is prohibited implying filament formation.

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Date submitted: 15 Nov 2013 Electronic form version 1.4