Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Long time dynamics of single linear and circular ds-DNA confined in sub-100nm nanoslits PO-KENG LIN, JEN-FANG CHANG, I. STACHIV, CHIA-FU CHOU, Y.- L. CHEN, Institute of Physics, Academia Sinica, Taipei Taiwan — We investigate the role of topological constraints on DNA dynamics in very strong confinement to study the dynamics of nuclear chromosome and DNA viral packaging. Experiments and simulations were carried out to investigate the equilibrium shape and dynamics of the single linear and circular λ-DNA confined in a silicon/glass nanoslit. We measured the chain extension r, shape asphericity A, extensional ($\tau_{||}$) and rotational relaxation time τ_r, and examined the dependence on chain topology as functions of the slit height $h(20 \sim 780$ nm) and the solvent ionic strength I (0.8 $\sim$250 mM). We observed that the shape asphericity increases as h and$I$ decrease as the chain shape becomes anisotropic. Moreover, in sub-Kuhn length confinement, the DNA relaxation time increases with decreasing h in a smooth and broad transition.

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Date submitted: 16 Dec 2010 Electronic form version 1.4