Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

The Physics of Nanoconfined DNA WALTER REISNER, Physics Department, Princeton University, KEITH MORTON, Department of Electrical Engineering, Princeton University, ROBERT RIEHN, Physics Department, Princeton University, YAN MEI WANG, Physics Department, Princeton University, ZHAONING YU, Department of Electrical Engineering, Princeton University, ERWIN FREY, Hahn-Meitner Institute, STEPHEN CHOU, Department of Electrical Engineering, Princeton University, ROBERT AUSTIN, Physics Department, Princeton University — Nanotechnology has the potential to revolutionize biology by making possible the construction of chip-based devices with nanoscale features that can not only detect and separate single DNA molecules by size but also–it is hoped in the future–actually sequence at the single molecule level. Understanding the physics of nanoconfined DNA is important for the future design of such devices. Here we present measurements of the static properties and Brownian dynamics of single DNA molecules confined in nanochannels using fluorescence microscopy techniques (end labeling and staining of the entire molecule using intercalating dyes). We study the effect of varying the degree of nanoconfinement, using nanochannels with widths ranging from 10 to 500nm. The nanochannels are fabricated using interference lithography and imprinting techniques. We also present scaling arguments and Monte Carlo simulations on the problem of confined semiflexible polymers and discuss how these results can be interpreted in the context of our experimental work.

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Date submitted: 29 Nov 2004 Electronic form version 1.4