

Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

The statistics of a single DNA capture by a solid-state nanopore
MIRNA MIHOVILOVIC, NICK HAGERTY, DEREK STEIN, Brown University,
Physics Department — We have investigated the statistics of DNA threading
through solid-state nanopores that are approximately 10 nm in diameter. Intense
electric fields are generated in the vicinity of the pore when a voltage is applied
across it in ionic solution. The electric forces experienced by a negatively charged
DNA molecule are sufficient to pull it through in a folded, “hairpin” configuration.
The ionic current blockade signal that results offers information about where along
the 16.5 micrometer-long DNA molecule the fold was induced. We have analyzed
the results of translocation experiments to build a probability distribution for the
DNA capture location. We propose a simple polymer scaling theory to explain the
results. Our model is based on the equilibrium distribution of polymer conforma-
tions in solution, and it predicts the observed bias for capturing molecules near the
ends.

Mirna Mihovilovic
Brown University, Physics Department

Date submitted: 08 Jan 2010

Electronic form version 1.4