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First-passage-time analysis of DNA translocation in solid-state nanopores[1] DANIEL LING, East Greenwich High School, Rhode Island, XINSHENG LING, Brown University — We report a DNA translocation experiment using solid-state nanopores and 48 kb lambda DNA samples. As reported previously, the DNA translocation dynamics in such standard solid-state nanopore experiments appear to be complex and multiple folded translocation pathways are observable. We use the translocation events with little or no detectable folded structures to construct a distribution function for the DNA translocation times. We find that the translocation time distribution can be fitted using the first-passage-time probability density function derived by Schrodinger for 1-D Brownian motion with a drift. The voltage dependence of the extracted DNA drift velocity shows excellent agreement with the Stokes' law at high voltages. Deviation from the Stokes' law is found at low voltages, but can be attributed to a systematic error in how different types of folded DNA translocations are sorted.

[1]The measurements were carried out by D.L. in the lab of Prof. Derek Stein at Brown University with the supervision of Jason Chan, and assistance by Karri DiPetrillo and Xu Liu.

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