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How deforming DNA conformations can yield better translocation statistics in the highly-driven limit. DAVID SEAN, University of Ottawa, HENDRICK W. DE HAAN, University of Ontario Institute of Technology, GARY W. SLATER, University of Ottawa — DNA translocation through solid-state nanopores typically occurs over a timescale much shorter than the DNA relaxation time: the process is highly out of equilibrium. Coarse-grained Langevin Dynamics simulations in such driving conditions demonstrate that the translocation times are significantly dependent upon the initial polymer conformations. In addition to thermal noise, the range of the initial polymer conformations contribute to the width of the translocation time distribution. By deforming the polymer prior toand duringthe translocation process, we study ways in which the range of initial conformations can be reduced as a means to produce translocation events with a tighter time distribution. To achieve this, we focus on using geometrical confinement as well as via the use of additional external forces applied on the polymer ends. We show how the translocation time distribution is affected by both the amplitude of thermal noise and the degree of polymer deformation when we apply external constraints. Different confining geometries can be chosen to achieve i) translocation events which take a longer time period; ii) translocation time distributions with a smaller variance; and/or iii) mean translocation rates that are much more constant throughout the process.

David Sean
University of Ottawa

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