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Anomalous scaling of nano-pore translocation times of structured biomolecules MALCOLM MCCAULEY, ROBERT FORTIES, Department of Physics, Ohio State University, ULRICH GERLAND, Arnold Sommerfeld Center for Theoretical Physics, University of Munich (LMU), RALF BUNDSCHUH, Department of Physics, Ohio State University — Translocation through a nano-pore is a new experimental technique to probe physical properties of biomolecules. A bulk of theoretical and computational work exists on how the main observable, the time to translocate a single molecule, depends on the length of the molecule for unstructured molecules. Here, we study the same problem but for RNA molecules for which the breaking of the secondary structure is the main barrier for translocation. To this end, we calculate the mean translocation time of single-stranded RNA through a nanopore of zero thickness and at zero voltage for many randomly chosen RNA sequences. We find the translocation time to depend on the length of the RNA molecule with a power law. The exponent changes as a function of temperature and exceeds the naively expected exponent of two for purely diffusive transport at all temperatures.

Malcolm McCauley
Department of Physics, Ohio State University

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