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Nonequilibrium thermodynamics of DNA nanopore unzipping

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We report on the systematic characterization of DNA unzipping via nanopore translocation. We show that at intermediate forces (20-60pN range) the unzipping process is drift-diffusive and can be modelled as a one-dimensional stochastic process in a tilted periodic potential. With a suitable and transferable theoretical analysis of the driven translocation trajectories we recover the effectuve potential and demonstrate that it corresponds to the free-energy landscape of the unzipping process. The results imply that the the DNA-unzipping thermodynamics can be recovered from out-of-equilibrium translocation trajectories, paving the way for broader uses of the method in single-molecule contexts.

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