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**Force-Driven Translocation of a Polymer through a Nanopore** PAYAM ROWGHANIAN, PhD student, ALEXANDER GROSBERG, Professor, NYU CSMR TEAM[1] — We study the far from equilibrium translocation of a DNA molecule through a nanopore. The pore is much narrower than the DNA, so the electrically driven DNA undergoes dramatic deformations during its passage. Using an idealized model in which the DNA is assumed to be a very long and flexible homopolymer driven by a force exerted only in the pore, we modify a previously developed method by introducing the concept of "iso-flux trumpet". We show that although the speed of the process is determined by the friction of the trailing part with the solvent, friction dissipates a small portion of the work performed by the electric field on the polymer, and the work is mostly dissipated by the irreversible stretching and destretching of the polymer squeezed into the small pore. Moreover, due to such stretches essentially caused by the membrane, a net heat transfer occurs during translocation from the post-translocation to the pre-translocation side of the membrane. The current theory can be improved by accounting for the nonzero field outside the pore and by considering the coupling between electric and hydrodynamic fields. The forces exerted by such fields on the DNA bulk not only alter the passage dynamics, but also introduce deformations on the initial conformation of the polymer.

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