



"Soft-Matter Seminar"

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The force on DNA in a solid-state nanopore

In this talk we will present measurements of voltage-driven translocation of DNA molecules through single solid-state nanopores. We compare data taken for various salt concentrations on freely moving DNA and DNA that is held by means of optical tweezers.

We will show that the presence of freely translocating DNA in a nanopore can decrease or increase the nanopore conductance depending on the salt concentration. The data are described with a model where current decreases result from the partial blocking of the pore and current increases are attributed to motion of the counter ions that screen the charge of the DNA backbone.

We then discuss measurements where the DNA translocation is stopped and the force on the molecule is measured by combining optical tweezers with ionic current detection. We studied the force on the DNA in a nanopore over a wide range of salt concentrations. Surprisingly, we find that the force does apparently neither depend on the ionic concentration (0.02M-1M KCl) nor the nanopore diameter (6-15nm) within the ranges studied here.

Finally, we compare our results for the freely moving DNA and the DNA arrested in the nanopore, and discuss the physics involved in the translocation process.

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