Polymer Translocation Driven by Asymmetry: Effects due to Differing Viscosities or Obstacle Arrangements on Either side of the Nanopore

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For both its biological relevance and nanotechnology applications, the translocation of a polymer through a nanopore has been the subject of intense study. On the theory side, there have been many simulation studies examining aspects of both biased and unbiased translocation. While the bias in the latter case most commonly arises from application of an external field, in this talk I will present results from two simulation studies in which we examine translocation as driven by asymmetry in the system. To begin, we consider translocation when “obstacles” (modeled by immobile spheres) are placed on both sides of the pore. When the concentration of obstacles is different across the pore, translocation preferentially occurs to the less dense side as expected. More interestingly, we also find that varying the arrangement of the obstacles can yield a preferential direction - even when there is an equal number of obstacles on either side of the pore. For the second example, we consider a system in which the viscosity of the fluid varies across the membrane. We find that, starting with the polymer half-way, translocation will increasingly occur preferentially to one side as the viscosity difference increases. Somewhat surprisingly, the direction of this preferential direction depends upon the simulation approach. For both the viscosity gradient and obstacle cases, simulation results estimating the magnitude of the effective driving force within the pore are presented.

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Time: 11:00 s. t.
Location: Seminarrom 1.079 (new ICP building at Allmandring 3)