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Backfolded Odijk regime for semiflexible polymers confined in nanochannels ABHIRAM MURALIDHAR, University of Minnesota, DOUGLAS TREE, University of California Santa Barbara, KEVIN DORFMAN, University of Minnesota — The description of properties of DNA confined in a nanochannel with size close to its persistence length has attracted significant attention recently due to its relevance to genome mapping technology. However, clear consensus between existing theories, simulations and experiments in this range of confinement is still lacking. In this talk, we show via Pruned-Enriched Rosebluth Method (PERM) simulations that Odijk's scaling theory based on hairpin formation describes the properties of confined wormlike chains when the confinement size is commensurate with the persistence length. This was made possible by our calculation of the global persistence length, which characterizes the length scale between hairpin bends in the confined molecule. We find that the range of this "backfolded" Odijk regime increases with the monomer anisotropy ratio l_{p}/w, where l_{p} and w are the persistence length and width of the molecule respectively. We are thus able to predict the experimental conditions under which one could observe these hairpins for various stiff molecules such as DNA and actin. This information can be used to engineer favorable conditions for genome mapping technology.

Abhiram Muralidhar
University of Minnesota

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