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On the crossover from Odijk to de Gennes in tube-confined semiflexible polymers DOUGLAS TREE, KEVIN DORFMAN, Univ of Minn - Minneapolis — The problem of a semiflexible polymer confined in a tube was considered solved almost 30 years ago. However, the need to manipulate single molecules of the semiflexible biopolymer DNA for emerging genomic mapping technologies led to measurements of the extension of DNA in nanochannels, which challenged the classic results of Odijk and de Gennes. We have investigated the behavior of semiflexible polymers using an off-lattice implementation of the pruned-enriched Rosenbluth method (PERM), enabling simulation of confined chains that are more than two orders of magnitude longer than chains used in conventional Metropolis methods. Our simulations suggest the presence of additional universal regimes, which arise due to the competing effects of stiffness and excluded volume for polymers in moderate confinement. We have also examined previous interpretations of these regimes in the light of recent results for both the mean polymer extension and extension fluctuations of very long chains.

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