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Polymer dynamics in a tight squeeze JEREMY SCHMIT, ERCAN KAMBER, JOSHUA KALB, BULBUL CHAKRABORTY, JANE' KONDEV, Brandeis University — Chromosomal DNA is confined to a space roughly an order of magnitude smaller than its natural radius of gyration due to the nuclear or cellular membrane. In addition to altering the observed static distributions of the chromosome, this confinement has the potential produce dynamics that differ from the Rouse/Zimm dynamics of the free chain. We propose a model for studying the dynamics of polymers under confinement that can be extended more generally to particle diffusion in a crowded environment. We find that as the size of the confining box is reduced, initially the relaxation times of the Rouse modes decrease due to the reduced phase space accessible to the polymer. However, in the strongly confined regime the relaxation times increase with decreasing box size due to jamming. We demonstrate this non-monotonic behavior using a lattice toy model as well as Monte Carlo simulations.

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