



سمینار هفتگی گروه ماده چگال نرم

## **Non-monotonic Velocity Dependence of DNA molecules on their lengths in passing through Micro-structures**

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The dependence of DNA mobility on their length in passing through microstructures is an important question for their separation which has, in turn, a critical importance in Genomic analysis. In recent years many conflicting results have been reported about the dependence of mobility on the DNA size in lattices. In the present study, it was found that the mobility is a non-monotonic function of their length; results also revealed that the size dependence of the DNA mobility depends on the applied electric field. These observations are explained in terms of the diffusion process inside the structure affected by the solvent which are modeled using the Langevin and its corresponding Fokker–Planck equations, and also considering the time delays for DNA molecules in passing through channels according to the Entropic Barrier model. The phenomenon is generalized under three regimes in a phase diagram relating the electric field and the DNA lengths. The model and the associated phase diagram described here provide an explanation for all the conflicting results reported by previous authors about the dependence of mobility on the DNA size in lattices near or below the radius of gyration. The physics of the three different regimes was also investigated.

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