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A Simple Model of Nucleosome Localization DAVID SCHWAB, ROBIJN BRUINSMA, UCLA — It has recently been shown that nucleosomes localize to preferred locations along DNA. This localization is a result of the sequence dependent bending stiffness of dsDNA, which must be wrapped around a histone protein to form a nucleosome. As a simple model of nucleosome localization, we study a one-dimensional hard-core gas in a random potential. We numerically solve for the density profile and other thermodynamic quantities using as input both randomly generated potential profiles and experimental energy landscapes. We compare with the annealed average, inspired by the Random Energy Model, and find that the quenched and annealed averages differ significantly above the localization temperature, implying sequence induced structural organization long before the system has frozen. Although information about the ground state is preserved at higher temperatures, there exist massive structural reorganizations at fixed temperature when the chemical potential is lowered. This offers another perspective on why different cells, with different chemical potentials, have different gene expression.

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