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Force-extension relation of DNA-histone complexes A.J. LEVINE, MARK L. HENLE, Department of Chemistry and Biochemistry, University of California, Los Angeles, TOM CHOU, Department of Biomathematics, University of California, Los Angeles — In eukaryotic cells, DNA is packaged inside the nucleus in the form of chromatin, a structure whose basic repeat unit, known as the nucleosome, consists of DNA wrapped around a cylindrical complex of histone proteins. In order for the cell to function properly, these nucleosome complexes must be stable at equilibrium. At the same time, the cell must be able to gain access to the genomic information contained within the DNA, which it can achieve by exerting forces on the nucleosomes that cause the DNA to unwrap from the histones. Single molecule mechanical manipulation techniques, in which DNA/histone complexes are disrupted by an external force, can provide information not only about the equilibrium structure of these complexes, but also about the forces and displacements required to access the DNA in the nucleosome. In this talk, we derive the force-extension relation for these complexes. We allow for the DNA to unwrap from the histones in both a continuous and discontinuous fashion; that is, we allow the histones to "pop" off of the DNA, releasing a large amount of DNA in the process. We also include the conformational fluctuations of the unwrapped portions of the DNA.

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