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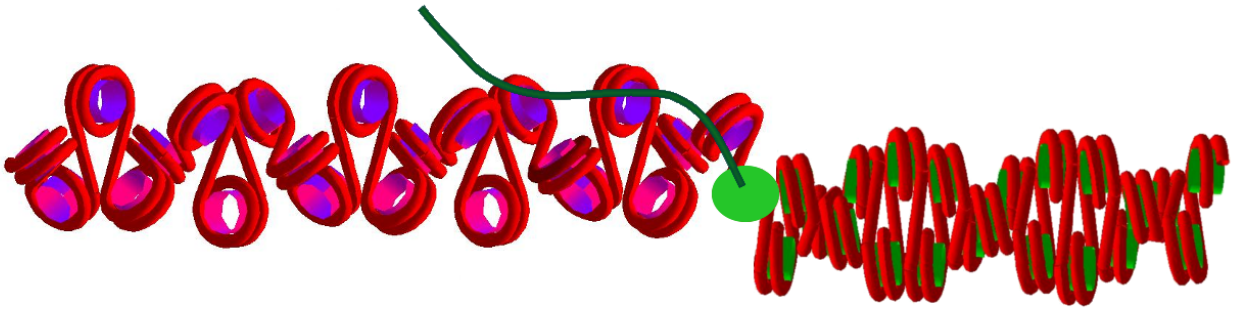
Modeling the hysteretic behavior of chromatin fibers under magnetic tweezers: *why are nucleosomes left handed?*

Magnetic tweezers micromanipulations of chromatin fibers reveal unexpected mechanical properties of these assemblies. After having studied the highly resilient behavior of fibers at low number of turns **[1]**, we now address the question of modeling the hysteretic behavior observed at higher torsion, which involves dramatic structural changes of the nucleosomes. The experimental results are interpreted indeed by assuming that the nucleosomes undergo a chiral transition into a metastable right-handed structure called reversome **[2]**. A combined approach involving 3D modeling, geometrical analysis, mechanics, statistical physics and kinetic processes allows to reproduce the observed behavior and fit the experimental curves. Some possible *in vivo* implications of these results will be discussed.



[1] Structural reorganization of single chromatin fibers revealed by torsional nanomanipulation A. Bancaud, N. Conde e Silva, M. Barbi, G. Wagner, J-F. Allemand, J. Mozziconacci, C. Lavelle, V. Croquette, J-M. Victor, A. Prunell, J-L. Viovy *Nature Structural and Molecular Biology 13, 444-450, (2006)*

[2] Torsional manipulation of single chromatin fibers reveals a highly flexible structure A. Bancaud, G. Wagner, N. Conde e Silva, C. Lavelle, H. Wong, J. Mozziconacci, M. Barbi, A. Sivolob, E. Le Cam, L. Mouawad, J-L. Viovy, J-M. Victor and A. Prunell *Molecular Cell 27, 135-147 (2007)*