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How to read and write mechanical information in DNA molecules

HELMUT SCHIESSEL, Lorentz Institute for Theoretical Physics, Leiden University, Leiden

In this talk I will show that DNA molecules contain another layer of information on top of the classical genetic information. This different type of information is of mechanical nature and guides the folding of DNA molecules inside cells. With the help of a new Monte Carlo technique, the Mutation Monte Carlo method ¹, we demonstrate that the two layers of information can be multiplexed (as one can have two phone conversations on the same wire). For instance, we can guide on top of genes with single base-pair precision the packaging of DNA into nucleosomes. Finally, we study the mechanical properties of DNA molecules belonging to organisms all across the tree of life. From this we learn that in multicellular organisms the stiffness of DNA around transcription start sites differs dramatically from that of unicellular life. The reason for this difference is surprising.

¹B. Eslami-Mossallam, R. D. Schram, M. Tompitak, J. van Noort, H. Schiessel, **PLoS ONE** 11, e0156905 (2016)