Dipartimento di Fisica e Astronomia Galileo Galilei

1222·2022 800 ANNI

Università degli Studi di Padova

Thursday, 22nd June 2023

09.30 – Room C. Voci

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Università degli Studi di Modena e Reggio Emilia

Unraveling single-stranded DNA secondary structure using single-molecule experiments

The folding of biological macromolecules is a fundamental process of which we lack complete comprehension. Force-spectroscopy techniques have been used to extract biological information from the folding/unfolding processes of mechanically denaturized proteins and nucleic acids. Here, I will present the experimental results obtained from pulling individual molecules of single-stranded DNA using Optical Tweezers. These results have been obtained by varying their sequences, lengths and salts concentrations, showing a vast and complex array of transitions, such as secondary structure formation and stacking, which can be measured with nanometric precision. I will also show how Ising-like models can reproduce the obtained force-extension curves. These allow us to derive quantitative information of the energies of the transitions between different states, predicting the structures involved in the absence of an external force applied and giving insight into their underlying structure.