

Abstract for an Invited Paper
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Electrostatic Rigidity of Biological Polyelectrolytes¹

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Electrostatic persistence length is one of the most controversial subjects in polymer physics. In this talk I will present an overview of the history of the problem and a new results showing that the bending rigidity of the biological polyelectrolytes (semiflexible charged polymers) is a multiscale process. The existence of the different length scales in the bending process is manifested in change of the form of the correlation function, describing bond-bond orientational correlations, with salt concentration. At high salt concentrations when the electrostatic interactions are significantly screened these correlations may be approximated by a single exponential function indicating the existence of a dominant length scale. However, when the Debye screening length exceeds a critical value the orientational correlations between chain's bond vectors undergo a qualitative change resulting in appearance of two different bending rigidities (persistence lengths). One increases quadratically and the other changes logarithmically with the Debye screening length. This transition occurs when the chain's bare persistence length becomes on the order of so-called OSF electrostatic persistence length. Simulation results and theoretical model demonstrate good qualitative agreement.

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