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Ion Competition in Ordered DNA arrays in the Attractive Regime XIANGYUN QIU, George Washington University, JOHN GIANNINI, KURT ANDRESEN, Gettysburg College — Quantitative knowledge of electrostatic interactions is of fundamental importance for many classes of biomolecules and biological processes. Acquiring such knowledge is challenged by inherent complexities such as the long-range nature of electrostatic forces, the non-linear screening of ubiquitous ions, and the involvement of a large number of solvent molecules. Here we report our recent work to address some of the key questions by interrogating electrostatics-governed ordered nucleic acids arrays and bringing together a set of quantitative tools to elucidate the role of each of the electrostatic factors: ion, water, and charged surface. Specifically, we will present measurements and modeling of the spacings between DNA strands and the numbers of interstitial competing ions in the attractive regime. Our results indicate a linear relation between the partition of interstitial ions and the magnitude of inter-DNA attraction, which will be discussed in the context of current theories of electrostatic interactions.

Xiangyun Qiu
George Washington University

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