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Measuring inter-nucleosome interactions and the roles of histone tails STEVEN HOWELL, George Washington University, KURT ANDRESEN, Gettysburg College, ISABEL JIMENEZ-USECHE, CHONGLI YUAN, Purdue University, XIANGYUN QIU, George Washington University — Nucleosome is the first level of genome organization and regulation in eukaryotes, where negatively charged DNA is wrapped around positively charged histone proteins. Being a DNA-protein complex of biological origin, nucleosome is also a model multi-phasic nanoparticle with heterogeneous charge distributions and brush-like flexible tails of the histone proteins. In solutions of nucleosomes, electrostatic forces dominate inter-nucleosome interactions at long range while specific contacts, in particular the flexible histone tails, guides short range interactions. We have thus quantified how the ions from salts (KCl, MgCl2) modulate the inter-nucleosome pair potential by modeling the total small angle x-ray scattering profiles. We additionally elucidated the individual role of the charged tails of histones H3 and H4. We found that measured effective changes at low salt concentrations are about 1/5th of theoretically predicted renormalized charges and that H4 tail deletion suppresses the attraction at high salt concentrations to a larger extent than H3 tail deletion.

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