

Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Molecular origins of DNA flexibility: Sequence effects on conformational and mechanical properties VANESSA ORTIZ, JUAN J. DE PABLO, University of Wisconsin-Madison — The bendedness (kinks) and bendability (flexibility) of DNA are believed to play a major role in the affinity of certain sequences for histone binding. Theoretical and experimental attempts to observe and quantify bendedness and bendability have been hindered by an inability to directly resolve DNA structure and dynamics at the base-pair level. We have developed a model of DNA that includes previously unavailable features that are crucial for understanding bendedness and bendability at the molecular and microscopic length-scales. These include hybridization, sequence-dependent deformability and electrostatic effects. The model reveals that sequence does influence bendedness through the creation of kinks that arise when certain motifs slide past others to form non-native contacts. Bendability is shown to be anisotropic, with a directionality that is encoded by sequence. These observations are shown to help explain the biologically observed preference of certain DNA sequences for histone binding.

Vanessa Ortiz
University of Wisconsin-Madison

Date submitted: 20 Nov 2009

Electronic form version 1.4