Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

**Sequence and Structure Dependent DNA-DNA Interactions** BENJAMIN KOPCHICK, XIANGYUN QIU, The George Washington University — Molecular forces between dsDNA strands are largely dominated by electrostatics and have been extensively studied. Quantitative knowledge has been accumulated on how DNA-DNA interactions are modulated by varied biological constituents such as ions, cationic ligands, and proteins. Despite its central role in biology, the sequence of DNA has not received substantial attention and "random" DNA sequences are typically used in biophysical studies. However, ˜50% of human genome is composed of non-random-sequence DNAs, particularly repetitive sequences. Furthermore, covalent modifications of DNA such as methylation play key roles in gene functions. Such DNAs with specific sequences or modifications often take on structures other than the canonical B-form. Here we present series of quantitative measurements of the DNA-DNA forces with the osmotic stress method on different DNA sequences, from short repeats to the most frequent sequences in genome, and to modifications such as bromination and methylation. We observe peculiar behaviors that appear to be strongly correlated with the incurred structural changes. We speculate the causalities in terms of the differences in hydration shell and DNA surface structures.

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Date submitted: 06 Nov 2015 Electronic form version 1.4