Abstract Submitted
for the DAMOP08 Meeting of
The American Physical Society

Strong Localization of Positive Charge in DNA DMITRY USKOV, ALEX BURIN, Tulane University — The positive charge transfer in a DNA molecule is determined by two main factors: the structure and composition of specific DNA strand, and interaction of a positive charge with the DNA environment. In this letter we present results of microscopic linear response theory for balance of charge transfer reaction in synthetic strands GAGG and GAGGG, where experimental data on the rates of electron hole migration has been reported by Lewis et al *Nature*, **406**, 51-53 (2000). Our theoretical predictions, based on experimental data for the ratio of reaction rates $G^+A(G)_n \leftrightarrow GA(G)_n^+$, $n = 2, 3$, suggest that charge in DNA is strongly localized within the single base pair because of the self-induced reorganization of classical environment. The onset of localization has a threshold behavior characteristic to quantum bistability. We also demonstrate that our conclusion does not depend on details of the model.

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Date submitted: 04 Feb 2008 Electronic form version 1.4