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Sequencing-Independent Delocalization in a DNA-Like Double Chain with Base Pairing[1] RODRIGO CAETANO, UNICAMP, PETER SCHULZ, UNICAMP — The question of whether DNA is intrinsically conducting or not is still a challenger. Experiments on DNA conductivity are very controversial: Metallic, semiconducting, insulating and even superconductor behaviors have been reported. The theoretical studies of the electronics properties of DNA range from strictly one-dimensional tight-binding chains, up to ab initio calculations. Ab initio calculations give useful insight on environment influence but have to be limited to a reduced number of model DNA molecules. On the other hand strictly one-dimensional calculations deal with effectives sites instead of a base pair structure, underestimating the paring effects. Here, we focus in that intrinsic factor to show that double chains with base pairing with DNA-like correlation leads to delocalized states. We use a double-chain nearest-neighbor hopping tight-binding model to describe the system. The double chains are constituted by four different sites, representing the nucleotides (A, C, G and T). The sites in the first chain are randomly assigned, while the sites in the second chain obey the DNA pairing. The main consequence of the correlation is a localization-delocalization transition. The present result suggest the DNA is intrinsically a promising electronic material and the hidrance to DNA nanoelectronics is solely of technological nature.

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