Abstract Submitted
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Is DNA a metal, semiconductor or insulator? A theoretical approach[1] RAFAEL REY-GONZALEZ, KAREN FONSECA-ROMERO, CARLOS PLAZAS, Universidad Nacional de Colombia, GRUPO DE PTICA E INFORMACIN CUNTICA TEAM — Over the last years, scientific interest for designing and making low dimensional electronic devices with traditional or novel materials has been increased. These experimental and theoretical researches in electronic properties at molecular scale are looking for developing efficient devices able to carry out tasks which are currently done by silicon transistors and devices. Among the new materials DNA strands are highlighted, but the experimental results have been contradictories pointing to behaviors as conductor, semiconductor or insulator. To contribute to the understanding of the origin of the disparity of the measurements, we perform a numerical calculation of the electrical conductance of DNA segments, modeled as 1D disordered finite chains. The system is described into a Tight binding model with nearest neighbor interactions and a s orbital per site. Hydration effects are included as random variations of self-energies. The electronic current as a function of applied bias is calculated using Launder formalism, where the transmission probability is determined into the transfer matrix formalism. We find a conductor-to-semiconductor-to-insulator transition as a function of the three effects taken into account: chain size, intrinsic disorder, and hydration

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