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Electron dynamic in DNA based nano wires

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Dynamical properties of electron motion in polynucleotide wire are considered. The charge motion is described in terms of quantum mechanics. Whereas, vibrational degrees of freedom are treated both classically and quantum mechanically. A typical charge transfer/transport pattern can physically be viewed as a polaron and/or soliton. A closed analytical expression for charge carrier velocity dependence on electric field has been derived and analyzed in detail. Special attention is given to: dynamical behavior of electrons in rigid chains, band structure of regular polynucleotide chains, dynamics of polaron states formation in Holstein chain, polaron motion in an electric field, the role of dispersion, Bloch oscillations and breather states.

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