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DNA based quantum bioinformatics

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The emergence, development and important role that informatics plays in modern science is due to the explosive development of computer technologies. A new and more general direction is to consider bioinformatics as informatics on the bases of nanobioelectronics and biocomputer technologies. DNA molecular is an important example of data storage and biocomputing. Performing millions of operations simultaneously DNA – biocomputer allows the performance rate to increase exponentially. The limitation problem is that each stage of paralleled operations takes a very long time. To overcome this problem can nanobioelectronics [1]-[5]. The new branch of nanobioelectronics based on quadruplex quantum calculations is discussed.

Such processes as DNA quantum cellular automata dynamics , DNA charge transport , Bloch oscillations, soliton evolution, polaron dynamics, breather creation and breather inspired charge transfer are discussed. The supercomputer simulation of charge dynamics at finite temperatures is presented. Different molecular devices based on DNA are considered. These make the solution of quantum bioinformatics problems based on DNA technologies.

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