

Implementation of quantum gates on quantum dot register

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Quantum walks are perspective instruments used to solve a wide range of problems: from the speed-up of Monte-Carlo methods [1] to modeling of quantum neural networks [2]. In our work we present the implementation of two-qubit quantum dot register with the usage of quantum walks on graphs of quantum dots, with each dot being connected to quantum point contact. One-qubit and two-qubit gates are implemented, and the influence of point contacts on the accuracy of the gates is estimated.

References

1. Montanaro A. Quantum speedup of Monte Carlo methods //Proceedings of the Royal Society A: Mathematical, Physical and Engineering Sciences. – 2015. – T. 471. – №. 2181. – C. 20150301.
2. Schuld M., Sinayskiy I., Petruccione F. Quantum walks on graphs representing the firing patterns of a quantum neural network //Physical Review A. – 2014. – T. 89. – №. 3. – C. 032333.