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A Quantum Computing Process Based on a Top-Down Methodology

Vladimir Voronov
Irkutsk National Research Technical University, 664074, Irkutsk, Russia

The research carried out so far related to the creation of a quantum computer is based on the search for suitable individual quantum objects (q-bits). We can talk about the use of bottom-up ideology. This paper discusses a fundamentally new option for creating a quantum processor based on a top-down approach*. Its meaning lies in the fact that a system of nanotriggers is associated with all possible quantum states of the q-bit system, which are essentially virtual. The purpose of this mapping is to visualize the states of qubits. Nanotriggers are made of graphene or another two-dimensional material. The nanotrigger is controlled by an element, which is a quantum dot with two states that are significantly different in terms of magnetic properties. Such a nanotrigger is essentially a quantum system. The paper discusses the possible application of the NMR phenomenon to solve problems related to the design of real quantum computers. It is proposed to do this using NMR signals transformed by the phenomenon of chemically induced dynamic polarization of nuclei. Such signals can be compared to the periodic remagnetization of a sample in which the This is a phenomenon, or with the periodically changing magnetic susceptibility of the sample substance. The specified periodically changing parameter is proposed to be used as a control signal that ensures the operation of the nanotrigger. A quantum dot-controlled nanotrigger is essentially an inverter capable of performing a logical NOT operation on its own.

*V.K. Voronov. International Journal of Theoretical Physics. 60 (2021) 924–928.

Biography:

Professor Vladimir Voronov's scientific interests are related to solving the problems of molecular spectroscopy and physical-organic chemistry by methods of high-resolution nuclear magnetic resonance and quantum chemistry. In addition, his research interests include research in the field of quantum information. He is the author or co-author of more than three hundred publications in domestic and foreign periodicals, including more than thirty books, including in English and Spanish. He received a number of awards established by the Russian Academy of Natural Sciences, including the Gold Medal "For Innovative Work in the Field of Higher Education".