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Quantum entanglement communications in photoactive synthetic bio-systems and in neural networks

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The self-assembly and biochemistry depend on quantum mechanics laws which induce hydrogen and Van der Waals bondings. Therefore, our work has been done through modelling based on quantum mechanical time dependent density functional theory, which also makes it possible to study quantum entanglement in such systems (TD-DFT). In the work presented here, quantum entanglement takes the form of a quantum superposition of the active components in synthesized self-assembled and self-replicating living systems. When a quantum calculation of an entangled biosystem is made that causes one protocell photoactive biomolecule of such an entangled pair to take on a definite value, the other protocell photoactive biomolecule of this pair will be found to have taken the appropriately correlated value. In our simulations, the starting separation distance of the supramolecular bio systems changed during geometry optimization procedures, taking on final values that mimic those associated with real-world intermolecular interaction processes. Furthermore, the modelling indicates that quantum entanglement occurs between the prebiotic subsystems which enhances the photosynthesis of the combined systems. The enhancement occurs because two additional quantum entangled excited states are created through the simultaneous excitation of the combined system's two prebiotic kernels or two protocells. The additional photosynthesis made possible by the quantum entanglement potentially provides a selective advantage through an enhancement of usable energy leading to faster growth and self-replication of minimal living cells, which in turn can lead to accelerated evolution. Our current research concerns implementation of liquid state quantum information processing based on spatially localized electronic spin in the neurotransmitter stable acetylcholine (ACh) neutral molecular radical. Using DFT quantum calculations we proved that this molecule possesses stable localized electron spin, which may represent a qubit in quantum information processing. The necessary operating conditions for ACh molecule are formulated in self- assembled dimer and more complex systems. The main quantum mechanical research result is that the neurotransmitter ACh systems, which were proposed, include the use of quantum molecular spintronics arrays to control the neurotransmission in neural networks.

Biography

Arvydas Tamulis is an Expert of European Commission, Brussels, Belgium. He has performed this present research work in Vilnius University Institute of Theoretical Physics and Astronomy, Vilnius, Lithuania as a Senior Researcher. He has 231 scientific publications. He is currently working in the fields of quantum entanglement and quantum information in nano-biology and molecular medicine.

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