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Spintronic characteristics of self-assembled acetylcholine molecular complexes

We are interested in quantum features of acetylcholine (ACh) and its complexes, because ACh is a prominent neurotransmitter of the peripheral and the central nervous system. The synaptic release of ACh, called cholinergic transmission, is widespread, occurring centrally, deep in the cortex, and in the distal periphery, where motoneurons contact muscles. The density functional theory (DFT) was used to investigate ACh molecule and its complexes in various charged and spin multiplicity states. We may expect that quantum effects can be observed in proposed complex systems of acetylcholine molecules, which are stochastically self-assembling in neural networks or brain, and once again hydrolyzing. During the short period of self-assembly ordered arrays of acetylcholine molecules we may expect the quantum information processing due to interaction of ordered spin dipoles.

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