

QUANTUM COMMUNICATION BY ELECTRON SPINS IN QUANTUM DOT – SUPERCONDUCTOR SYSTEM

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Project description:

In quantum computers, one can use of quantum-mechanical phenomena such as superposition and entanglement to perform computation. In the nineties, there were published first algorithms that are able to efficiently solve some important problems that are considered hard for classical computers. Since that for last three decades there are steady studies on theoretical background (quantum information theory) as well as on experimental realization of quantum computers. Academic and industrial research is concentrated on near-term intermediate-scale device and the demonstration of “quantum supremacy”, while large-scale universal quantum computers are likely decades away. The main applications are expected to be: quantum communication, quantum machine learning, and quantum chemistry simulation.

Aim of the project:

The important step required for the construction of a solid-state quantum computer is to get an entangled state of electrons. One of the proposals to obtain entangled pair of electrons is use of superconductors, which is a natural source of such pairs, so-called Cooper pairs, and separating them in a double quantum dot system. This type of system can be used in the manufacture of logic gates and spin quantum electronics.