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Summer placement at the University of Sheffield

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I spend 3 months from July to September as a “summer student” at the Low Dimensional Structures and Devices (LDSD) group at the University of Sheffield, UK (https://ldsd.group.shef.ac.uk/). The group works with nanoscale semiconductor and is split into subgroups focusing on a variety of research topics from novel lasers, 2D materials to devices for quantum computing. I joined the spin phenomena subgroup led by Dr. Chekhovich working towards realizing electron spin resonance (ESR) in semiconductor quantum dots.

A quantum dot (QD) is a type of semiconductor nanostructure with effectively zero-dimension in the context of quantum confinement. It is also known as an artificial atom as it can trap electrons analogous to an atom. An electron spin in QD can form the basis of a quantum bit (qubit) – in contrast with “bit” in a classical computer - which is the building block for quantum computing. For quantum computing, we need to be able to perform 3 essential operations on qubits, namely initialization, manipulation and readout. ESR is a promising method to manipulate the electron qubit in a QD.

I worked mostly on simulating the quantum mechanical model of the electron trapped in a QD as in an ESR experiment. I also had the opportunities to perform experiments in the lab, using semi-automated experimental setups consisting of cryostats, superconducting magnet, lasers and other sophisticated instruments.

I received good support from the group and was motivated on research throughout my time there. Overall the summer placement was a very refreshing experience working in a different environment.