

## Project 4.5 Quantum dynamics in novel chalcogenide materials and devices (experimental)

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**Institute:** IFPAN

**Unit:** ON5.2 and ON6.2

**www:** [http://info.ifpan.edu.pl/ON-5/low-dimnsional\\_crystalline\\_structures/](http://info.ifpan.edu.pl/ON-5/low-dimnsional_crystalline_structures/) and <https://magtop.ifpan.edu.pl/>

### Background:

Within the project, we will explore the potential application of a new family of materials, lead-tin chalcogenide semiconductors coupled to superconductors, in quantum information devices. We assume that their unique physical properties - strong spin-orbit interactions, high electron mobility and effective electrostatic control - will make it possible to reduce decoherence of qubits. Moreover, they can be used to study new quantum phenomena in nanoscale devices. We will investigate whether this material platform will enable the discovery of new ways to quantum control and improve the performance of quantum devices. An international team of theoretical physicists, experimentalists, and crystal growers will endeavor to develop materials, characterize them, build and analyze quantum devices and theoretically predict new quantum dynamics in these systems, working in a single and consistent feedback loop process.

The project is being carried out in cooperation with Ukraine (various institutions in Kharkov) and the USA (groups of Prof. D. Bondar at Tulane University and Prof. S. Frolov at the University of Pitzburg).

### Aim:

The person we are looking for will be responsible for low-temperature and high-field characterization of magnetotransport in grown IV-VI semiconductor-based nano-structures. Additionally, he/she will form semiconductor nanostructures using lithographic tools and deposition techniques. He/she will also be involved in the analysis of results and their discussion, participation in article writing and presentation of results at conferences.

### Requirements:

- Master Science in Physics, Material Science, or a related field;
- since the project is conducted in the international environment, good knowledge of English is required;
- previous experience in experimental work in the laboratory environment is a plus

### Funding:

Scholarship: grant funding of 5000 PLN per month, before subtracting obligatory employer and employee social security contributions (~15%), for 24 months. In years 3-4 (after passing mid-term exam Afterwards, standard Polish PhD scholarship (approx. 4735 PLN/month net).

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