

# Institute of Physics of the Polish Academy of Sciences

Job ID: #JOB 36/2024



## Job Description

**Job Title: Research assistant and extracurricular PhD student**



### Job Summary:

The winning candidate will work as a  $\frac{3}{4}$  full time research assistant at the [International Centre for Interfacing Magnetism and Superconductivity with Topological Matter - MagTop](#) of the Institute of Physics of the Polish Academy of Sciences and prepare a doctoral thesis in the extramural mode, attending lectures at the [Warsaw-4-PhD Doctoral School](#). The job is related to the study of quantum transport in topological superconductors (theory).

### Job Description:

**Background:** It is well established that topological effects are well-suited for metrology applications due to the high-accuracy of quantisation of physical observables and the robustness of the response so that the variations between devices are small. The quantum Hall effect has been widely used as a resistance standard and ac Josephson effect as a voltage standard. By exploring the magnetisation dynamics in ferromagnetic-semiconducting-superconducting hybrids, we have recently unraveled a novel quantised effect—the spin-pumping—which characterises the topology of the system similarly to the conductance in static cases [<https://doi.org/10.1103/PhysRevB.103.205410>, <https://doi.org/10.1103/PhysRevLett.130.237002>, <https://patents.google.com/patent/EP3975275A1/en>]. The study concerns quantum (spin) transport in topological superconductors harbouring Majorana zero modes (MZMs).

**Aim:** To extend our investigations to multi-band nanowires, and eventually to two-dimensional (2D) setups, and determine whether more complex devices still exhibit the quantised spin pumping effect. Initial calculations point towards a positive answer, but more work (in particular on InAs semiconducting slabs covered with 2D superconductors and ferromagnets, such Nb and EuS, respectively) is required in order to enhance these findings towards practical applications. Among those are the possibility to inject deterministically MZMs from the chiral edges into the insulating bulk by appropriately chosen magnetisation pulses. The PhD will employ both analytical and numerical tools in order to tackle such dynamical situations. The first will be based on the scattering matrix theory of adiabatic pumping for establishing the scalings, while we will use the [KWANT code](#) for simulating real experimental situations.

### Requirements:

- A Master's degree in Physics or in related fields, such as e.g. condensed matter physics (preferably theory) and, is required (or an equivalent that qualifies one for PhD studies in physics in the country of issue),

- Prior experience of working with Python and/or KWANT is highly desirable, but not required
- Very good knowledge of English is required.

**Main research field:** Physics

**Sub Research Field:** Condensed matter theory, quantum transport

**Career Stage:** Early stage researcher or 0-4 yrs. (Post-graduate)

**Research Profile (details):** First Stage Researcher (R1)

**Type of Contract:** Initial employment for a fixed term of 24 months, including a 3-month probationary period. Prolongation of employment for a further 24 months will be based on performance and successful completion of a mid-term evaluation performed at a level analogous to that in the PhD school.

**Status:** Part -time employee hired at  $\frac{3}{4}$  of full-time contract

**Salary:** The person will be employed as a research assistant in a  $\frac{3}{4}$  full time position for a period of maximum 4 years (with all employee benefits and an additional medical insurance package) with a gross salary of PLN 7 275 per month, which is approximately PLN 5 500 net/month. The MagTop project (FENG.02.01-IP.05-0028/23) is implemented as part of the MAB FENG action of the Foundation for Polish Science co-financed by the European Union from the 2nd Priority funds of the Programme European Funds for Smart Economy 2021-2027 (FENG).

### Contact

More information can be obtained from

dr Mircea Trif (e-mail: [mtrif@MagTop.ifpan.edu.pl](mailto:mtrif@MagTop.ifpan.edu.pl))

<https://magtop.ifpan.edu.pl/>

Please make contact.

### Application details

**Application deadline: 25.10.2024.** Later applications will not be considered.

#### Required materials:

- Scientific CV
- Cover letter
- Scan of MSc diploma or equivalent (or an explanation of when one is expected)
- Academic record (for finalized semesters)
- Recommended: A recommendation letter by an academic, or their contact email,
- **A statement by the candidate of consent to the processing of personal data for the purposes of recruitment (as below).**

All required materials for the position must be sent in electronic form to [open\\_positions@MagTop.ifpan.edu.pl](mailto:open_positions@MagTop.ifpan.edu.pl) and [rekrutacja@ifpan.edu.pl](mailto:rekrutacja@ifpan.edu.pl) with the Job ID# as a subject.

D

## Instytut Fizyki Polskiej Akademii Nauk

Under Art. 13 sections 1 and 2 of the Regulation of the European Parliament and of the Council (EU 2016/679 of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Resolution), EU OJ L 119 of 04.05.2016, page 1, as amended, hereinafter referred to as "GDPR", we hereby inform as follows:

1. The Data Controller of the provided personal data is the Institute of Physics of the Polish Academy of Sciences, Al. Lotników 32/46, 02-668 Warsaw, phone (22) 116-2111, e-mail [director@ifpan.edu.pl](mailto:director@ifpan.edu.pl).
2. Contact details to the Data Protection Officer are as follows: e-mail [iodo@ifpan.edu.pl](mailto:iodo@ifpan.edu.pl)
3. Your personal data shall be processed for the purpose of carrying out the recruitment process for the position of Research assistant
4. Processing of your personal data in scope of: full name, date of birth, correspondence address, information about education and course of past employment shall take place under Art. 22<sup>1</sup> § 1 of the Act of 26 June 1974 - Labour Code. In the scope in which you sent to us more personal data than indicated above, we process your data under the consent granted by you.
5. Your personal data shall be stored for 1 month from completion of the recruitment process. If you grant consent for processing of personal data for future recruitments, we shall process your data until withdrawal of the consent by you, however, no longer than for the period of 6 months from the day of submittal of the application by you.
6. Provision of the abovementioned data in the scope indicated above is a statutory requirement resulting from Art. 22<sup>1</sup> § 1 of the Act of 26 June 1974 - Labour Code, in the remaining scope it is voluntary. Failure to provide the data referred to in Art. 22<sup>1</sup> § 1 of the Act of 26 June 1974 - Labour Code precludes consideration of your candidacy for the offered position.
7. You have the right to access your personal data, to rectify them, erase them, restrict their processing.
8. You may submit a complaint to the Inspector General for the Protection of Personal Data.
9. You have the right to withdraw the consent to process your personal data in the scope in which they were provided at any time. Withdrawing the consent does not affect the lawfulness of processing carried out on the basis of consent before its withdrawal.

Consent content:

*I grant my consent to the Institute of Physics of the Polish Academy of Sciences to process my personal data contained in the sent recruitment documents for the purpose of carrying out the recruitment process for the position of Research assistant.*

If you want us to consider your candidacy also in the future recruitment processes, please grant the additional consent:

*I grant my consent to the Institute of Physics of the Polish Academy of Sciences to process my personal data contained in the sent recruitment documents in future recruitment processes taking place during 6 months from the day of appearance of this job advertisement.*