



Institute of Physics of the Polish Academy of Sciences



Job ID: #JOB 17/2024

Job Description

Job Title: Research assistant, Junior postdoctoral researcher.

Job Summary:

The winning candidate will work as a 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. The Centre and the junior postdoctoral researcher position are supported by the MagTop project (FENG.02.01-IP.05-0028/23) 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).

The job is related to the growth by molecular beam epitaxy (MBE) of optimized IV-VI/II-VI nanostructures for sensitive infrared detectors, as well as the growth of nanostructures from an optimal material system to be found that would exhibit a robust quantum anomalous Hall effect. Optimization of structure design and growth technology is to be carried out with artificial intelligence (AI) support.

Job Description:

Background: The quantum anomalous Hall effect (QAHE) is a relatively new quantum phenomenon first discovered in a special class of topological materials that are magnetic. As well as being fascinating from a fundamental science point of view, it holds the promise of building a new type of resistance standard that, unlike standards based on the quantum Hall effect, will not require high magnetic fields to operate. Moreover, for this reason, in the future it can also be used in tandem with a voltage standard based on the Josephson effect to build new quantum kilogram and ampere standards.

On the other hand, in today's world, there is a huge demand for sensitive and fast detectors operating in the mid- and long-wave region of the infrared spectrum, with applications covering all areas of life, from industry to environmental protection to medicine. [A new class of very promising detectors of this type, proposed by MagTop](#), is based on combining the advantages of two types of semiconductor compounds: II-VI and IV-VI, from which it is possible, using the MBE technique, to produce alternate layers, each several atomic layers thick, the so-called superlattices (SL). Moreover, detectors of this type can potentially be cooled, in order to increase their sensitivity, by thermoelectric coolers made of the same compounds, integrated with them into a monolithic device.

Aim: The aim of the project is to find the optimal material system and quantum structure design that would demonstrate robust QAHE and to design, fabricate and investigate detector nanostructures based on II-VI/IV-VI superlattices. To this end, the most precise



and purest of all growth techniques, the molecular beam epitaxy (MBE) technique will be used. The chosen researcher will work in a Lab equipped with [VEECO's world-class, multi-chamber MBE system](#). The optimization of structures design and growth parameters, in addition to the use of various characterization techniques ([SEM](#), SQUID, XRD, AFM), will be supported by the use of artificial intelligence (AI)-based software. This software will be created and developed at MagTop with major participation of the junior postdoctoral researcher, in parallel with the development of the QAHE and detector nanostructures fabrication technology. The main research technique of QAHE will be the [low-](#) and the ultra-low-temperature magnetotransport studies, involving the use of a [dilution refrigerator](#) and a [³He-based system](#). The main research technique for detector structures will be optical studies, involving the measurement of spectral sensitivity.

Requirements:

- A PhD degree in Physics or in related fields, such as e.g. materials engineering and electronics held for no longer than five years, is required,
- At least four years' "hands on" experience in molecular beam epitaxial growth of materials and quantum structures supported by publications is required,
- Experience in using a GENxplor MBE system (from VEECO) will be an asset,
- Experience in simulation of RHEED patterns will be an asset,
- Experience in the MBE growth of IV-VI and II-VI nanostructures and topological materials will be an important asset,
- At least four years' experience in studies of materials with various experimental techniques (such as e.g. SEM, EDS, XRD) is required,
- Experience in using various programming languages (especially Python, and e.g. C#, HTML, CSS, JavaScript, php, SQL) will be an asset,
- Knowledge of machine learning (ML) algorithms for image analysis will be a great asset,
- Very good knowledge of written and spoken English is required.

Main research field: Physics

Sub Research Field: Solid State Physics, Nanotechnology

Career Stage: Junior Postdoctoral Researcher – a person holding a doctoral degree for no longer than five years. The period of five years is counted from the year of obtaining the doctoral degree.

Research Profile ([details](#)): Recognized Researcher (R2)

Type of Contract: Initial employment for a fixed term of 24 months, including a 3-month probationary period. Prolongation of employment for a further 33 months will be based on performance and a successful completion of an evaluation.

Status: Full-time employee

Salary: The person will be employed as a full-time research assistant for a maximum period of 57 months (with all employee benefits and an additional medical insurance package) with a gross salary of PLN 11 200 per month, which is approximately PLN



8 300 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:

prof. dr hab. Tomasz Wojtowicz (e-mail: wojto@MagTop.ifpan.edu.pl) and prof. dr hab.

Tomasz Dietl (e-mail: dietl@MagTop.ifpan.edu.pl); and: <https://magtop.ifpan.edu.pl/>

Please make contact.

Application details

Application deadline: 10.07.2024. Later applications will not be considered.

Required materials:

- Detailed scientific CV (up to 3 pages),
- Scan of PhD diploma,
- Full list of publications,
- Cover/motivation letter, please mention earliest possible starting date (up to 1 page),
- Contact details for two researchers who can provide references.
- 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 to open_positions@MagTop.ifpan.edu.pl and rekrutacja@ifpan.edu.pl with the Job ID# as a subject.



DATA PROCESSING UNDER CONSENT FOR THE PURPOSES OF RECRUITMENT

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 Regulation), 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.
2. Contact details to the Data Protection Officer are as follows: e-mail 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 (Junior Postdoctoral Researcher)
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. 22¹ § 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. 22¹ § 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. 22¹ § 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 (Junior Postdoctoral Researcher).*

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.*