



# Institute of Physics of the Polish Academy of Sciences Scholarship for a PhD Student



**Job ID: #JOB 19/2022**

## Job Description

**Job Title:** PhD student – scholarship holder

**Job Summary:**

Ultra-cold atomic gases in optical lattices (theoretical)

**Job Description:**

The physics of ultra-cold atomic gases is a rapidly developing field mainly because of extraordinary control over the system parameters that are achieved experimentally. It is also a reason why this many-body quantum system is thought and applied as a very sensitive sensor in quantum metrology or quantum simulators. In particular, ultra-cold atoms loaded into a periodic optical lattice potential are very promising in practical applications. A great example are optical clocks that are now operating with extreme precision. It is now commonly understood that squeezed and some entangled states can enhance precision. Additionally, they are also useful for testing the basics of quantum mechanics, e.g. in quantum information. The motivation for the research proposed is the recent discovery of squeezed and entangled states in the system and weakness of the present-day description.

The project aims at performing a comprehensive theoretical study of the generation of squeezed and entangled states with fermions loaded into an optical lattice potential taking into account the spin-orbit coupling, the role of reduced spatial dimensions and decoherence. The project will be performed in close collaboration with the group of prof. G. Juzeliūnas from Vilnius University and other theoretical groups from IP PAS, Warsaw.

Requirements:

- Good knowledge of quantum physics, previous experience with ultra-cold gases or quantum optics will be an advantage
- Good numerical skills and willingness to learn new computational techniques
- Good spoken and written English
- Master's degree in physics (or an equivalent that qualifies one for PhD studies in physics in the country of issue).
- To be employed, the candidate must be accepted into the PhD school in which the Institute of Physics participates. Applications for the position are through recruitment to the School, online at [warsaw4phd.eu](http://warsaw4phd.eu).

**Main research field:** Physics

**Sub Research Field:** Theory of quantum gases, Bose-Einstein condensation, Quantum Mechanics

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

**Research Profile** ([details](#)): First Stage Researcher (R1)

**Type of Contract:** Fixed term (36 months)

**Status:** Full-time

**Salary:** grant funding of **5000** PLN per month, before subtracting obligatory employer and employee social security contributions (~15%).

## Contact

More information can be obtained from

Emilia Witkowska (e-mail: [ewitk@ifpan.edu.pl](mailto:ewitk@ifpan.edu.pl))

<https://sites.google.com/site/ewiitk/>

Please make contact.

## Application details

**Application deadline: 04.06.2022** 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.

All materials should be submitted in electronic form by application to the PhD school [warsaw4phd.eu](http://warsaw4phd.eu), choosing the project: "***Project 4.4. Ultra-cold atomic gases in optical lattices (theoretical)***". The application system will be active from May 21, 2022.

Results regarding the position will be made available in July 2022.