



Institute of Physics of the Polish Academy of Sciences

Scholarship for a PhD Student



Job ID: #JOB 14/2020

Job Description

Job Title: PhD student – scholarship holder

Job Summary:

Analytical and numerical study of topological insulators (semiconductors)

Job Description:

The student will join the group under the supervision of dr hab. Wojciech Brzezicki, working on the NCN funded project “Limitations for Protected Transport and Exotic Topological States in Topological Semiconductors”. In this project we will address four critical questions related to topological semiconductors:

(A) Lack of topological protection in HgTe/CdTe-type quantum wells. We will model transport in disordered topological multilayers and our aim is to show that the additional edge modes can be responsible for the lack of topological protection.

(B) Study of symmetry-protected topological invariants and symmetry-broken states for multilayer semiconductors, involving surface atomic steps and nanowires.

(C) Control of topological invariants, design of systems that exhibit QSH effect at a macroscopic scale. We will search for such a design of a quantum well that the additional edge modes are either absent or moved out of the gap.

(D) Non-hermitian topological systems, multilayer semiconductors in microcavities and beyond. Going beyond means implementing non-Hermitian Hamiltonians with non-trivial topology using chains of superconducting or optomechanical circuits.

Collaboration with the experimental groups at MagTop/IFPAN, <http://www.magtop.ifpan.edu.pl>

Requirements:

- Sufficient proficiency in English
- Some experience in programming (Mathematica/MatLab/Python or similar)
- Background in the theory of condensed matter systems
- Background in linear algebra
- Master's degree in physics or being close to it (at least fourth year of studies)
- 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 <http://warsaw4phd.eu>

Main research field: Physics

Sub Research Field: Topological condensed matter

Career Stage: Early stage researcher (no PhD degree)

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

Type of Contract: Fixed term (48 months)

Status: Full-time

Salary: 5000 PLN per month (grant funding, before obligatory employer and employee social security contributions).

Contact

More information can be obtained from

Wojciech Brzezicki (e-mail: brzezicki@magtop.ifpan.edu.pl)

<https://sites.google.com/view/wojciechbrzezicki-personalwebs/home>

Please make contact.

Application details

Application deadline: 19.06.2020 Later applications may be also 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 <http://warsaw4phd.eu>, choosing the project: "*Limitations for Protected Transport and Exotic Topological States in Topological Semiconductors*". (The application system will be active from 25 May 2020).

Results regarding the position will be made available by 17 July 2020.