



<https://ictqt.ug.edu.pl/job/phd-position-for-opus-21-project-js/>

## PhD Student position for the Opus 21 project – 2 positions

### Description

## PhD Student position for the Opus 21 project

### Project title: 'Categorical Foundations of the Non-Classicality of Nature'

[The project is financed by the National Science Centre (NCN)]

We are looking for two PhD students to work in the International Centre for Theory of Quantum Technologies (ICTQT), funded by the Foundation for Polish Science, and hosted by the University of Gdańsk (UG) – pioneering and leading center of quantum information research in Poland.

ICTQT aim is to find new solutions and protocols for basic aspects of fundamental quantum physics, from new non-classical phenomena, measures of non-classicality, structural aspects of quantum theory, theory of quantum measurement, up to theory of open systems and quantum thermodynamics, and bring them into quantum technologies.

The ICTQT activity is focused on the scientific research in quantum foundations, quantum communication, quantum information, and development of quantum technologies with an emphasis on quantum communication and new computing techniques.

The Centre consists of 6 groups: Multiphoton Quantum Optics for Quantum Information (leader Marek Żukowski); New Quantum Resources (leader Paweł Horodecki); Foundational Underpinnings of Quantum Technologies (leader Ana Belen Sainz); New Quantum Resources and Thermodynamics (leader Michał Horodecki); Quantum Cybersecurity and Communication (leader Marcin Pawłowski); Quantum Open Systems in Relation to Quantum Optics (leader Łukasz Rudnicki).

More about the research groups please find at: <https://ictqt.ug.edu.pl/>.

### About the OPUS 21 project

Broadly speaking, the project aims to deepen our understand of the nonclassicality of nature, via foundational research that is both conceptually well motivated and mathematically rigorous.

For more information about the research team see: [compositionalfoundations.eu](https://compositionalfoundations.eu) and for more information about the team leader see [johnhselby.co.uk](https://johnhselby.co.uk).

John Selby's team tightly cooperates with New Quantum Resources Group, Foundational Underpinnings of Quantum Technologies Group, and New Quantum Resources and Thermodynamics Group.

More specifically, the project aims to:

- substantially refine, develop, and extend existing notions of nonclassicality of

### Hiring organization

International Centre for Theory of Quantum Technologies

### Beginning of employment

October 1st, 2022 (for candidates who already have MSc degree and candidates who plan to defend their MSc thesis no later than July 31, 2022). For candidates who are already doctoral students the starting date is negotiable.

### Duration of employment

up to 38 months

### Industry

quantum physics

### Job Location

Jana Bażyńskiego 1A, 80-309, Gdańsk, Poland

### Base Salary

PLN 4500 (gross stipend, tax included)

### Date posted

2022-06-13

### Valid through

13.07.2022

nature (with a particular focus on generalised contextuality),

- discover entirely novel notions of nonclassicality (in particular, by considering symmetries and unspeakable information), and
- quantify these notions of nonclassicality as formal resource theories and investigate their role in quantum advantages.

The key tools we will use in this project come from process theories, generalized probabilistic theories, ontological models, resource theories, and categorical quantum mechanics. We welcome candidates who are not necessarily experts in these fields but do have an interest in learning about them. We also appreciate any other tools that the candidate brings with them to the team!

**The goal of the PhD student will be to tackle foundational problems in quantum theory preferably from a process-theoretic perspective.**

**Keywords:** process theories, resource theories, generalised probabilistic theories, contextuality, ontological models, categorical quantum mechanics, symmetries.

If you would like any further details about the project, the advertised positions, or life in Gdańsk then please feel free to get in contact ([john.selby@ug.edu.pl](mailto:john.selby@ug.edu.pl)) for a chat.

PhD students positions are offered by the International Centre for Theory of Quantum Technologies of the University of Gdansk within the implementation of the OPUS 21 project entitled "Categorical foundations of the non-classicality of nature (Polish: Kategoryczne podstawy nieklasyczności natury)". The project is financed by the National Science Centre (NCN).

## Responsibilities

1. Active scientific research.
2. Discussion and presentation of ideas and results with a diverse audience at ICTQT and at external events.
3. Participation in seminars, group meetings, and other activities of scientific exchange.
4. Participation in activities organized by ICTQT.

## Qualifications

1. The candidate should hold a MSc degree in physics, computer science or mathematics.
2. The candidate should be interested in mathematical and conceptual foundations of quantum mechanics and quantum information, and related topics, especially those which are within the research agenda of ICTQT (visit <https://ictqt.ug.edu.pl/>).
3. The candidate should be committed to working collaboratively within an inclusive and diverse environment.
4. Basic knowledge of quantum theory is appreciated.

## Job Benefits

1. Scholarship monthly 4500 PLN (gross stipend, tax included, stipend paid from the OPUS 21 project and UG funds) until 28.02.2026.
2. Work in a rapidly developing, world-class research centre.
3. Scientific and organizational support.
4. Basic equipment and core facilities.
5. Friendly, inspiring, interdisciplinary environment, including "entanglement" with National Centre for Quantum Information (KCIK) and Institute for Theoretical Physics and Astrophysics (IFTiA) at UG.

## Required documents

1. filled-in [recruitment form](#);
2. curriculum vitae;
3. motivation letter (including statement of current scientific interests) – up to 2 pages;
4. Optional: a research resume with a list of research projects in which the candidate took part (with specification of the role); PDF files of publications; list of talks at conferences and workshops, list of prizes and awards;
5. documents confirming scientific degrees (copy of diploma);
6. name and contact details (e-mail addresses) to two researchers who may provide reference for the candidate (the candidate is expected to contact the referees and ask them to send reference letters directly to [ictqt@ug.edu.pl](mailto:ictqt@ug.edu.pl). The letters must be sent before the deadline). ICTQT may also contact the referees directly to request the letters or to send reminders.

## Recruitment process

### General rules of the recruitment process:

1. The recruitment procedure has three stages:
  - o Pre-selection candidates by the Selection Commission (SC), based on sent documents;
  - o Interview of pre-selected candidates by SC;
  - o Recruitment to the UG Doctoral School of Natural Sciences (a formal UG procedure).
2. PhD student positions are offered to candidates who have received a MSc degree (or equivalent) or who are already PhD students at other Universities/Institutions.
3. PhD student positions are also offered to candidates who plan to defend their MSc thesis no later than July 2022.
4. The decision will be made by the SC within 3 months from the date of recruitment completion.
5. SC reserves the right to invite for the interview only pre-selected candidates.
6. SC's decision is final and is not subject to appeal.
7. In the event of resignation from accepting the position of the selected candidate, the SC has the right to send the offer to the person placed on the reserve list, and in the absence of such a list, the SC has the right to reconsider the applications submitted to the competition and to indicate a new candidate.
8. SC reserves the right to close the competition without selecting the candidate.

## Contacts

Please submit the documents via email to [ictqt@ug.edu.pl](mailto:ictqt@ug.edu.pl).

Job entry on Euraxess: <https://euraxess.ec.europa.eu/jobs/798572>.