



<https://ictqt.ug.edu.pl/job/postdoctoral-researcher-3/>

## Postdoctoral Researcher in Quantum Open Systems in Relation to Quantum Optics Group

### Results

competition results

### Description

## Postdoctoral Researcher for Application-ready superresolution in space and frequency

We are looking for an enthusiastic and motivated Postdoctoral Researchers to work in the Quantum Open Systems in Relation to Quantum Optics Group.

ICTQT was created in 2018 within the International Research Agendas Programme of the Foundation for Polish Science co-financed by the European Union from the funds of the Smart Growth Operational Programme, axis IV: Increasing the research potential (Measure 4.3). The founders of ICTQT are Marek Żukowski (the director) and Paweł Horodecki (the research group leader). The Centre's official partner is IQOQI-Vienna of the Austrian Academy of Sciences.

The broad aim of the [Quantum Open Systems in Relation to Quantum Optics Group](#) is to build up understanding of the (quantum) thermodynamic properties of laser beams. The research will focus on analogies between open system dynamics and transmission of optical beams, and the thermodynamic context of indefinite causal order implemented in interferometric setups. Additionally, the group will study gate set tomography and quantum random walks, as well as will coordinate the QuantERA project ApresSF – Application-ready superresolution in space and frequency – devoted to quantum metrology and light.

Specific goals of the group include:

- To study macroscopic models of evolution for laser beams, with special emphasis put on polarization, orbital angular momentum and spatial degrees of freedom.
- To study thermodynamic characterization of the optical beams.
- To reconsider known quantum thermodynamic models by adding the feature of indefinite causal order.
- To optimize metrological protocols leading to superresolution in spatial, spectral and temporal separation measurements.
- To improve the protocol of gate set tomography with regards to its intrinsic symmetries (so called gauge).

## Application-ready superresolution in space and frequency project

### Hiring organization

International Centre for Theory of Quantum Technologies

### Employment Type

Full-time

### Beginning of employment

December 1st, 2021

### Duration of employment

6 months

### Industry

quantum physics

### Job Location

Wita Stwosza 63, 80-308, Gdańsk, Poland

### Date posted

2021-10-27

### Valid through

12.11.2021

For the resolution of two sub-Rayleigh sources, such as stars or microscopic fluorophores, novel methods have very recently been theoretically and experimentally shown to outperform direct imaging, reaching the true quantum limits. Further efforts to generalize the theory for arbitrary sources suggest that, despite the existence of harsh quantum limits, the quantum-inspired methods can still offer significant improvements over direct imaging, potentially rendering more applications in astronomy, as well as in fluorescence microscopy. Such protocols for quantum-enhanced parameter estimation can also be applied to measure time or frequency with very high accuracy.

*The goal of the post-doctoral researcher will be to use expertise from the field of quantum optics and quantum information in order to advance on the research problems delineated in this description.*

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Funding

## **QuantERA ERA-NET Cofund in Quantum Technologies**

QuantERA is a network of 32 organisations from 27 countries, coordinated by the National Science Centre, Poland, supporting international research projects in the field of Quantum Technologies (QT).

QuantERA answers the growing need for collaborative endeavours and common funding scheme within QT research, which due to its highly interdisciplinary nature cannot be confined to an individual institution or state. Through coordination of national and regional research funding programmes QuantERA avoids the problem of fragmentation of national efforts, encouraging transnational collaborations and leveraging Europe's competitive advantage. Join call for proposals for international research groups operating in QuantERA partner countries will become the first step to further integration.

### **Responsibilities**

- Active scientific research.
- Presentation and discussion of ideas and results with a diverse audience at the ICTQT and at the external events.
- Participation in mentoring of PhD and MSc students.
- Participation in activities organized by the ICTQT.
- Active participation in seminars, group meetings, etc.

### **Qualifications**

- PhD degree in physics, mathematics, computer science or philosophy
- Interest in quantum information and quantum optics.
- Some experience in collaboration with experimental groups is welcome.
- Excellent communication skills.
- Ability to work effectively with people from diverse cultural backgrounds.

### **Job Benefits**

- Full-time employment in a rapidly developing unit, the International Centre for Theory of Quantum Technologies at the University of Gdansk.
- Scientific and organizational support.

- Basic equipment and core facilities.
- Friendly, inspiring, interdisciplinary environment, which features close connections to the National Centre for Quantum Information (KCIK) and the Institute for Theoretical Physics and Astrophysics (IFTiA) at UG.

## Required documents

1. Application form: <https://forms.office.com/r/AV1LHyGyaX>
2. Curriculum vitae.
3. A research resume with a list of publications, and a list of research projects (esp. those in which the candidate was the principal investigator); PDF files of three most important papers by the candidate (or just web links, in the case of open access publications); a list of invited talks at conferences and workshops, and a list of academic prizes and awards.
4. Motivation letter (including statement of current scientific interests) – up to 2 pages.
5. Documents confirming scientific degrees (copy of PhD diploma, or equivalent).
6. Name and contact details (e-mail addresses) to two senior 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

1. Candidates may run simultaneously for other postdoctoral positions offered by other groups.
2. The final choice of the research group may be made in the course of negotiations between the leaders and the candidates.
3. An interview is expected.
4. ICTQT Selecting Commission (SC) reserves the right to invite for the interview only pre-selected candidates.
5. SC's decision is final and is not subject to appeal.
6. SC reserves the right to close the competition without selecting a candidate.
7. In the event of the candidate's resignation from accepting the offer, SC has the right to reconsider the applications and select another candidate.
8. The decision will be made by SC within 1 months from the date of recruitment completion.

## 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/node/701758/>