



JOB OFFER

Position in the project:	Post-doctoral Researcher
Scientific discipline:	quantum information
Job type (employment contract/stipend):	employment contract (full-time employment, subject to periodical evaluations)
Number of positions offered:	1
Remuneration/stipend amount/month:	gross monthly salary up to 7 500 PLN, depending on experience (based on research resume and publication record)
Position starts on:	01.03.2021
Maximum period of contract/stipend agreement:	24 months (can be extended up to 30 months).
Institution:	International Centre for Theory of Quantum Technologies, University of Gdansk, Poland
Project leader:	Łukasz Rudnicki
Project title:	Application-ready superresolution in space and frequency (in Polish: Kwantowa super-rozdzielczość w pomiarach przestrzennych i częstotliwościowych)
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.
Project description:	<u>About ICTQT</u> We are looking for the Post-doctoral Researcher to work in <u>Quantum Open Systems in Relation to Quantum Optics Group</u> at the newly created International Centre for Theory of Quantum Technologies (ICTQT), funded by the Foundation for Polish Science, and hosted by the University of Gdansk. The founders of ICTQT are Marek Żukowski as the director, and Paweł Horodecki as a co- applicant. The Centre's official foreign partner is IQOQI-Vienna of the Austrian Academy of Sciences. Gdansk is the pioneering and leading center of quantum information research in Poland. Gdansk, and the whole Tri-City, is one of the most beautifully located urban areas in Poland, with sandy sea beaches, lakes, and woods within in it and in the nearby area. It is the birthplace of Polish jazz and rock festivals, and vibrant in many fields. <u>About the group</u> 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:



	<ul style="list-style-type: none">- 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). <p><u>About the “Application-ready superresolution in space and frequency“ project</u></p> <p>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.</p> <p><u>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.</u></p> <p><u>Keywords:</u> quantum metrology, superresolution, quantum optics, quantum information.</p>
Key responsibilities include:	<ol style="list-style-type: none">1. Active scientific research.2. Presentation of project results to internal and external parties.3. Active procurement of new research grants from external sources.4. Participation in mentoring of PhD and Master students.5. Participation in organizational activity of ICTQT.6. Active involvement in seminars, group meetings etc.
Profile of candidates/requirements:	<ol style="list-style-type: none">1. PhD degree in physics, mathematics or computer science or philosophy2. Interest in quantum information and quantum optics.3. Some experience in collaboration with experimental groups is welcome.4. Written and oral communication skills.5. Ability to work effectively with people from diverse cultural backgrounds.
We offer:	<ol style="list-style-type: none">1. Full-time employment in a rapidly developing unit, the International Centre for Theory of Quantum Technologies at the University of Gdansk.2. Scientific and organizational support.3. Basic equipment and core facilities.4. 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:	<ol style="list-style-type: none">1. Curriculum vitae;2. 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;3. Motivation letter (including statement of current scientific interests)– up to 2 pages;4. Documents confirming scientific degrees (copy of PhD diploma, or equivalent);5. 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. The letters must be sent before the deadline.). ICTQT may also contact the referees directly, to request the letters, or to send reminders.
General rules of the recruitment process:	<ol style="list-style-type: none">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.



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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. The decision will be made by SC within 1 months from the date of recruitment completion.

Please submit the documents to:

ictqt@ug.edu.pl

Application deadline:

22.01.2021
