UNIWERSYTET WARSZAWSKI

CeNT CENTRUM NOWYCH TECHNOLOGII

CeNT-45-2024

Director of the Centre of New Technologies of the University of Warsaw, with the Project Leader, announces the opening of the competition for the position of PhD Student in the Laboratory of Quantum Optical Technologies– Centre of New Technologies of the University of Warsaw.

JOB OFFER

Position in the project:	PhD Student
Laboratory:	Quantum Optical Technologies
Scientific discipline:	Physics
Keywords:	Quantum information, quantum optics
Job type (employment contract/stipend):	Stipend
Part-time/full-time:	Full-time
Number of job offers:	1
Remuneration/stipend amount/month:	5000 PLN gross gross per month
Position starts on:	1.02.2025
Maximum period of contract/stipend agreement:	24 months, with the possibility of extension for another 15 months
Institution:	Centre of New Technologies, University of Warsaw
Project leader:	dr Marcin Jarzyna
Project title:	Quantum limits in coherent combination of optical signals
NCN programme:	SONATA 19
Project description:	The aim of the project is to identify the ways in which the efficiency of beam combination may be increased. A crucial step is to find upper bounds on the efficiency and practical ways to approach them, taking into account various noise types relevant for the problem. Such theoretical limits are expected to arise similarly as in the context of quantum metrology where it is known that the ultimate precision of phase estimation depends on the number of photons, type of noise and quantum state of light. The bounds would serve as a benchmark against which the efficiency of various phase correction protocols can be compared. Of particular interest are the questions of whether there is a limit on the intensity below which it is impossible to efficiently combine light beams and if nonclassical strategies, involving more general quantum states and detection techniques, allow to improve the combination performance. This requires considering the few-photon regime in which quantum mechanical effects start playing an important role.

Key responsibilities include:	Derivation of the theoretical results, running numerical simulations, writing publications and presenting results at conferences. Finding ways to approach the obtained theoretical bounds on beam combination efficiency and look for possible quantum enhancement due to nonclassical states of light or detectors.
Profile of candidates/requirements:	The competition is open for persons who meet the conditions specified in the regulations on the allocation of resources for the implementation of tasks financed by the National Science Centre for SONATA 19 grant. MSc degree in physics or related discipline. The MSc degree should be obtained before the date of employment in the project. - Confirmed status of a PhD student (on the date of starting work in the project at the latest). - Knowledge of quantum mechanics/quantum information/quantum optics. - Numerical skills in conducting simulations (e.g. knowledge of Wolfram Mathematica, Python or equivalent programming languages). - Good knowledge of English.
Required documents:	1. Cover letter 2. Current curriculum vitae with list of scientific achievements (publications, realised projects, attended conferences, scholarships etc.) 3. Copy of MSc certificate (or, if the MSc certificate has not been obtained yet, a certificate/document about the date of MSc defense); 4. Document confirming the status of PhD Student (to be provided before starting work in the project); 5. Contact information (e-mail address) to a scientist who is familiar with the candidate's work and can provide recommendation. 5. Signed information on the personal data processing. Before entering the competition, candidates are obliged to familiarise themselves with Internal Reporting Procedure.
We offer:	● Work on an ambitious project aimed at practical applications of quantum technologies ● Authorship of papers in top scientific journals ● Possibility to attend international scientific conferences ● Possibility to learn many advanced methods of quantum information/quantum optics ● Friendly work environment ● Opportunities for collaborations in Poland and abroad.
Please submit the following documents to:	m.jarzyna@cent.uw.edu.pl
Application deadline:	30.01.2025
Date of announcing the results:	31.01.2025
Method of notification about the results:	e-mail, CeNT website: https://cent.uw.edu.pl/en/career/