



CeNT-13-2024

*Director of Centre of New Technologies of the University of Warsaw, with the Project Leader, announce opening of the competition for 3 positions of PhD Student in the Laboratory of Quantum Information and Inference (QI<sup>2</sup>-lab). – Centre of New Technologies of the University of Warsaw.*

## JOB OFFER

Position in the project:	PhD Student
Laboratory:	Quantum Information and Inference (QI <sup>2</sup> -lab).
Scientific discipline:	Physical sciences. Theoretical quantum optics and quantum information science.
Keywords:	Quantum metrology and sensing.
Job type (employment contract/stipend):	Stipend
Part-time/full-time:	Full-time
Number of job offers:	3
Remuneration/stipend amount/month:	5000 PLN gross gross
Position starts on:	1 May 2024 or later
Maximum period of contract/stipend agreement:	36 months with the possibility of extension
Institution:	Centre of New Technologies, University of Warsaw
Project leader:	Dr Jan Kołodzyński
Project title:	Quantum sensors operated in extreme scenarios: novel applications of statistical inference, machine learning and control theory methods.
NCN programme:	SONATA BIS-13
Project description:	<p>Successful candidate will work on the following or akin research topics depending on their inclination towards analytic or numerical theoretical physics; software-development experience, interests and profile:</p> <ul style="list-style-type: none"><li>• fundamental theory of quantum metrology for real-time sensing with quantum sensors operated in extreme scenarios;</li><li>• quantum dynamical models of atomic, optomechanical and solid-state sensors probed in real time;</li><li>• numerical simulations (quantum trajectories, Monte-Carlo, semi-definite programming) of quantum sensors operated in networks;</li><li>• development of software involving signal-processing tools (statistical inference, machine learning and control theory) for them to be compatible with extreme quantum sensing tasks;</li></ul> <p>Informal inquiries may be addressed to Dr Jan Kolodynski by email: <a href="mailto:jan.kolodynski@cent.uw.edu.pl">jan.kolodynski@cent.uw.edu.pl</a>.</p>



Key responsibilities include:	<ol style="list-style-type: none"><li>1. Identification of ultimate quantum bounds as benchmarks for sensors operated in networks and in real time.</li><li>2. Design of dynamical models describing atomic, optomechanical and solid-state quantum sensors that incorporate real-time measurements and feedback (measurement-based/coherent).</li><li>3. Development of signal-processing and numerical tools tailored to quantum sensing experiments.</li><li>4. Preparation of simulations, providing theoretical support, as well as frequent academic exchanges with collaborating experimental groups.</li></ol>
Profile of candidates/requirements:	<p>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 the SONATA BIS-13 grant. In particular:</p> <ul style="list-style-type: none"><li>-MSc degree in Physics or related discipline. The MSc degree should be obtained before the date of starting work in the project.</li><li>- Confirmed status of a PhD student (on the date of starting work in the project at the latest).</li><li>-Experience in research, e.g. MSc thesis, on topics of quantum optics, atomic physics or quantum information processing, in general.</li></ul>
Required documents:	<ol style="list-style-type: none"><li>1. Up-to-date Curriculum Vitae of the candidate.</li><li>2. Copy of MSc certificate (or, if the MSc certificate has not been obtained yet, a certificate/document about the date of MSc defense).</li><li>3. Document confirming the status of a PhD Student (to be provided before starting work in the project).</li><li>4. Signed <a href="#">information on the personal data processing</a>.</li><li>5. Solutions prepared by the candidate to the following set of three problems on quantum atomic sensors and interpretation of their data. Please go to the following link to access the three tasks: <a href="https://drive.google.com/file/d/19MRSnrb9-hp3eJ5i5xW3aBydOGauqTh/view">https://drive.google.com/file/d/19MRSnrb9-hp3eJ5i5xW3aBydOGauqTh/view</a></li></ol>
We offer:	<p><i>Quantum Information and Inference Lab (QI<sup>2</sup>-lab)</i> offers this graduate scholarship within the project SONATA BIS-13.</p> <p>The PhD student will work under the supervision of <a href="#">dr Jan Kolodynski</a> on projects developed in collaboration with experimental groups.</p> <p>QI<sup>2</sup>-lab forms a part of the <a href="#">Centre of New Technologies</a> (CeNT) at the University of Warsaw, which assures a friendly work environment with different facilities available, being an interdisciplinary research institute gathering international researchers of different backgrounds and experience in biological, chemical and physical sciences.</p>
Please submit the following documents to:	<a href="mailto:jan.kolodynski@cent.uw.edu.pl">jan.kolodynski@cent.uw.edu.pl</a>
Application deadline:	28.04.2024
Date of announcing the results:	Not earlier than 29.04.2024
Method of notification about the results:	Email, CeNT website: <a href="https://cent.uw.edu.pl/en/career/">https://cent.uw.edu.pl/en/career/</a>