



Center for Theoretical Physics

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HR EXCELLENCE IN RESEARCH

Warsaw, 2025-05-08

Two PhD Student fellowship positions at Center for Theoretical Physics PAS

The Director of the Center for Theoretical Physics PAS invites applications for **2 PhD Student fellowships** at the CTP PAS, financed from the project OPUS 27 *“Real-world statistics of ultracold gases and their consequences”* funded by the National Science Center (grant agreement number: UMO-2024/53/B/ST2/02161).

The PI of the project is dr hab. Krzysztof Pawłowski, Prof. of CTP PAS.

The aim of the project is to verify the hypothesis of the equivalence of statistical ensembles in the case of interacting systems.

Tasks of the first PhD student who wins this competition:

- Study of the (non-)equivalence of statistical ensembles in the case of interacting systems.
- Analysis of a 1-dimensional system in the Lieb-Liniger and Yang-Yang models.
- Application of mathematical physics methods dedicated to the Lieb-Liniger model.
- Calculation of Bose-Einstein condensate fluctuations.
- Design of quantum "engines".

Tasks of the second PhD student who wins this competition:

- Conduct research within the framework of quantum mechanics of open systems.
- Create a realistic model of gas cooling at ultra-low temperatures.
- Compare with experimental results.
- Collaborate with the experimental group of Jan Arlt.
- Perform numerical calculations, including comparison of correlation functions of a thermal gas modeled within different statistical ensembles.
- Consequences of statistics on quantum interferometry.

The scope of work of the first successful Candidate within the project will include:

developing further the analysis of ensembles and relations between them using ready software available in the group. Analytical calculations (1D case) for the distributions, for the correlation functions and finally on the general metrological scheme.



Documents should be submitted electronically via the recruitment system on the website www.war-saw4phd.eu from **19.05.2025** to **01.06.2025**.



Additional questions can be sent to: pawlowski@cft.edu.pl

