Center for Theoretical Physics
Polish Academy of Sciences
Aleja Lotników 32/46, 02-668 Warsaw
Tel. +48 573 823 493
E-mail: cft@cft.edu.pl, NIP: 525-000-92-81, REGON: 000844815

HR EXCELLENCE IN RESEARCH

PLB/33/2025

FORM FOR EMPLOYERS

INSTITUTION: **Center for Theoretical Physics, Polish Academy of Sciences**
CITY: **Warsaw**
POSITION: **PhD-scholar**
DISCIPLINE: **physics**
POSTED: **2025-12-08**
EXPIRES: **2026-01-06**
WEBSITE: **https://www.cft.edu.pl**
KEY WORDS: **thermodynamics, information theory, quantum mechanics, computation, quantum entanglement**

The Director of the Center for Theoretical Physics PAS announces a competition for one Scholar-PhD Student position at the CTP PAS, within the research project SONATA „Thermodynamics of Information Processing: From Theory to Applications", financed by the National Science Center (GA no. UMO-2023/51/D/ST2/02309). The project's leader is dr Patryk Lipka-Bartosik.

The Center for Theoretical Physics of the Polish Academy of Sciences (CTP PAS) is a research institute focused on the study of theoretical physics. The CTP is located in Warsaw, Poland, and was founded in 1980.
The CTP PAS conducts research in various fields of physics, including quantum information, space and gravity research, semiconductors, and atomic gases. The Institute's strategy is to employ the strongest scientists, giving them the freedom to conduct their research. This has resulted in the CTP's high standing in Poland, world-class publications (in Nature and Science), a large number of grants (approximately 30 projects), and participation in international consortia. In terms of citations per researcher, CTP PAS ranks among the leading institutions in Polish physics.
The CTP PAS also hosts a number of scientific events, including seminars, workshops, and conferences, which are open to the public. The Institute also creates educational content accessible on its official YouTube channel.

This project links foundational theory to practical applications in **information thermodynamics** — an interdisciplinary field spanning information theory, stochastic thermodynamics, and quantum physics — and will explore several research directions:

- **Thermodynamic computing:** Developing physics-inspired models of computation that aim to lower energy consumption for machine-learning and information processing tasks (see, e.g., arXiv:2308.15905).

- **Quantum phenomena in information processing:** Investigating how genuine quantum effects can be harnessed to process information with improved energetic efficiency (see, e.g., arXiv:2408:06418).
- **Optimization of thermodynamic protocols**: Design thermal machines that exploit collective quantum phenomena to reach higher performance or lower dissipation (see, e.g., arXiv:2411.00944).

Project details are available at: https://warsaw4phd.eu/en/candidates-2/research-projects/ in the Center for Theoretical Physics PAS section.

The project is primarily theoretical, but establishing connections to experiments will be prioritized, with the goal of translating the project's findings into real applications. The PhD student will work on at least one of these topics and will be strongly supported to propose and develop independent research directions. Emphasis will be put on developing international collaborations with both theoretical and experimental research groups.

The scope of work of the successful Candidates within the project will be

- Performing analytical calculations,
- Designing and running numerical simulations,
- Writing and publishing research papers,
- Presenting results at conferences,
- Preparing literature reviews.

We expect the Candidates to have:

- Strong motivation,
- Ability and enthusiasm to work in an interdisciplinary team,
- Good written and oral communication skills in English,
- Programming skills (e.g., Python, Julia, MATLAB or similar),
- Master's degree (or equivalent) in Physics, Computer Science or a related discipline.

The application must include:

1. The scientific CV, including the progress in the university studies and transcript of records with grades, scientific achievements (publications, participation in research projects and conferences), with the clause „I agree to the processing of my personal data contained in the application documents for the purposes necessary for the implementation of the process recruitment by the W4PhD Doctoral School".
2. Cover letter (1 page).
3. A copy of the Master's degree diploma.
4. Copies of documents confirming scientific or professional achievements.
5. At least one letter of recommendation from a researcher with at least a PhD degree, concerning the candidate and his/her current scientific activity.
6. Signed Data Privacy Statement (*EN + PL - GDPR clause).*

Center for Theoretical Physics
Polish Academy of Sciences
Aleja Lotników 32/46, 02-668 Warsaw
Tel. +48 573 823 493
E-mail: cft@cft.edu.pl, NIP: 525-000-92-81, REGON: 000844815

HR EXCELLENCE IN RESEARCH

Applications should be submitted electronically through the recruitment system available at http://www.warsaw4phd.eu by **January 6, 2026**. Selected candidates will be invited for an interview. For any questions, please contact us by email at rekrutacja@cft.edu.pl

The **scholarship** will be awarded in accordance with the applicable laws in Poland and in accordance with the Resolution of the NCN Council no. 124/2022 of December 1, 2022, regarding the Regulations for the Awarding of NCN Scientific Scholarships in Research Projects Funded by the National Science Center, in the amount of **5.200 PLN net (4035,66 PLN from the project and 1164,34 PLN bonus from the means of CTP PAS)** for a period of four years, with the first 36 months, being funded as part of the research project SONATA „Thermodynamics of Information Processing: From Theory to Applications", financed by the National Science Center based on the grant agreement no. UMO-2023/51/D/ST2/02309, and the subsequent 12 months, being funded from other sources.

The scholarship can be topped up with additional activities, e.g. assisting in maintaining a group website, organizing seminars or others (financed from overheads).

The position comes with the budget for computer equipment and business trips.

The competition will be settled by **8th February 2026**. Selected candidates will be invited for an interview. Candidates will be informed electronically on the results of the competition.

Admission to the W4PhD Doctoral School and the beginning of the scholarship are scheduled for **1st March 2026** (earliest starting date) but no later than **1st May 2026**.

If you have any questions, please send an e-mail to: lbartosik@cft.edu.pl

We carefully review every submitted application. Those whose experience and competencies align with our needs and requirements are invited to an interview (usually held online).

We stay in touch with candidates throughout the entire process, ensuring that interviews take place in a friendly atmosphere, and providing feedback after the interviews. We approach each candidate individually, also considering the needs of people with disabilities.

We appreciate all feedback received after the recruitment process. It motivates us to improve our recruitment efforts.

The CTP PAS operates in an all-inclusive environment irrespective of personal, physical, or social characteristics. Teamwork is highly valued, individual strengths are recognised and appreciated, and we are committed to advancing the careers of everyone.

Equality, respect, and openness are fundamental values in an academic environment, where diversity is essential. We strive to provide a safe and inclusive space for everyone who is part of our scientific community.

The CTP PAS has regulations for reporting violations of law and protection of whistleblowers.