



**Institute of Molecular Physics**  
**Polish Academy of Sciences**  
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**Director of the Institute of Molecular Physics of the Polish Academy of Sciences**  
announces a competition for a post-doc position in the SONATA-19 Research Project

**Institution:** Institute of Molecular Physics Polish Academy of Sciences (IMP PAS)  
[PL: Instytut Fizyki Molekularnej Polskiej Akademii Nauk (IFM PAN)]  
**City:** Poznań, Poland  
**Position:** Post-doc  
**Scientific discipline:** physical sciences (or related)  
**Opening date:** 28 October 2024  
**Application deadline:** 18 November 2024; 15:00 CET  
**Website:** <https://www.ifmpan.poznan.pl/en/>

**Keywords:** statistical physics, computational physics, nonequilibrium thermodynamics,  
open quantum systems, complex systems

## **I. Offer description:**

### **Title of the scientific project:**

Nonequilibrium phase transitions, synchronization and chaos in thermodynamically consistent models

**Principal investigator:** Dr. Eng. Krzysztof Ptasiński

### **Description of the project:**

The subject of research in the project is phase transitions in open classical and quantum systems that occur away from thermodynamic equilibrium. In contrast to their equilibrium counterparts, such transitions are determined not only by thermodynamic potentials of the system (e.g., the free energy potential), but also by details of the microscopic dynamics. This leads to new physical phenomena, unobserved at equilibrium, such as the presence of long-lived coherent oscillations (limit cycles) or the chaotic dynamics. In particular, the project will investigate the role of rare classical and quantum fluctuations in such processes.

### **Research objectives:**

The project will study nonequilibrium phase transitions using theoretical methods and numerical simulations. As a main theoretical approach it will employ the large deviation theory that describes fluctuations at the macroscopic scale. In particular, large deviation theory will be used to characterize the rare fluctuations that determine, e.g., the positions of discontinuous phase transitions or lifetimes of metastable states. The results obtained using this method will be compared with numerical simulations for finite system sizes.

### **Research tasks:**

- numerical integration of nonlinear equations of motions;

- solution of classical and quantum master equations using spectral methods;
- computer simulations of classical and quantum stochastic dynamics;
- determination of instanton trajectories of Hamilton-Jacobi equations;
- co-authorship of scientific publications.

## **II. Requirements for candidates:**

### **1. Research career stage:**

R2: Recognised Researcher (PhD holders or equivalent who are not yet fully independent).

More information on career stages: <https://www.more-4.eu/indicator-tool/career-stages-r1-to-r4>

### **2. Required education:** PhD in physics (or related) granted not earlier than 7 years\* before the year of employment.

### **3. Required qualifications and skills:**

- advanced programming skills in Python, Julia, or other programming language relevant for the tasks planned in the project;
- experience in computer simulations of physical processes;
- documented scientific achievements (publications, talks, etc.).

### **4. Specific requirements:**

The candidate must meet the conditions described in point 2.1.1 Annex to NCN Council Resolution No 95/2020 of 14 September 2020 about the regulations on awarding funding for research tasks funded by the National Science Centre as regards research projects.

### **5. Knowledge of English:** good knowledge of English allowing for efficient communication and preparation of scientific publications.

### **6. Scientific experience required:**

- in the discipline of physical sciences (or related);
- on the topic of: computational physics.

## **III. Duration of the employment:** 12 months (with the possibility of extension to 24 months)

## **IV. Type of contract:** full-time job, employment contract

## **V. Expected date of employment start:** 03 February 2025

## **VI. Employment type:** contract covered by the NCN SONATA-19 project No. 2023/51/D/ST3/01203

## **VII. Salary:** an average of approximately 11 670 PLN per month (total employer cost) [approximately eleven thousand six hundred and seventy]

## **VIII. Number of positions available:** 1

## **IX. Job benefits:** access to modern scientific software, international cooperation, possibility of participation in international scientific conferences, possibility of hybrid work.

## **X. Required documents:**

1. Application;
2. CV including information on education and the course of scientific careers, internships and scientific training, conference presentations and seminars, prizes and awards, participation in research projects, acquired funds, organizational achievements, etc.;

3. list of scientific publications;
4. a scan or photocopy of the PhD degree;
5. consent to the processing of personal data for recruitment purposes – Appendix No. 1;
6. statement that if the contest is won, Institute of Molecular Physics Polish Academy of Sciences will be the primary place of work within the meaning of the Act of 20 July 2018 Law on Higher Education and Science (Journal of Laws of 2018, item 1668, as amended) – Appendix No. 2;
7. supervisor's opinion or other recommendations are optional.

**Documents in languages other than Polish or English must be translated to Polish or English.**

**XI. Method of submitting offers:**

Applications with the annotation „**Competition for the post-doc position – SONATA-19 – ZN2 – nr 03/2024**” should be delivered to the Institute's address or sent to the e-mail address:

[director@ifmpan.poznan.pl](mailto:director@ifmpan.poznan.pl)

**Contact person:**

Principal investigator: Dr. Eng. Krzysztof Ptaszyński

e-mail: [krzysztof.ptaszynski@ifmpan.poznan.pl](mailto:krzysztof.ptaszynski@ifmpan.poznan.pl)

Department of Theory of Nanostructures and Quantum Materials (ZN2)

**XII. Qualification criteria:**

- 1) Scientific achievements in the field of computer simulations of physical processes;
- 2) Knowledge of numerical methods and programming languages.

**XIII. Qualification process:**

- 1) Job application competition;
- 2) Possible interview (on-site or video conference) with the best candidates.

The evaluation and selection will be conducted by a recruitment committee appointed by the Director of the Institute of Molecular Physics of the Polish Academy of Sciences following "Regulations on awarding funding for research tasks funded by the National Science Centre as regards research projects" constituting an annex to the resolution of the NCN Council No. 95/2020 of September 14, 2020.

A candidate who receives a negative opinion from the recruitment committee has the right to appeal against the evaluation results to the Director of the Institute within 7 days from the date of receiving the opinion.

**XIV. Expected date of the results announcement:** November-December 2024

**XV. Additional information:** IMP PAS does not provide accommodation.

*\* Period may be extended by a time of long-term (in excess of 90 days) documented sick leaves or rehabilitation leaves granted on account of being unfit to work. In addition, the period may be extended by the number of months of a childcare leave granted pursuant to the Labour Code and in the case of women, by 18 months for every child born or adopted, whichever manner of accounting for career breaks is preferable.*



**DISCLAIMER:**

According to art. 13 1 and 2 of Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of individuals with regard to the processing of personal data and on the free movement of such data and repealing Directive 95/46/EC (Journal of Laws UE L 119/1 of 4.5.2016), hereinafter referred to as GDPR, we inform that:

1. The administrator of your personal data is the Institute of Molecular Physics Polish Academy of Sciences in Poznań, ul. Mariana Smoluchowskiego 17.
2. Your personal data will be processed for the duration of the recruitment process.
3. You have the right to request from the administrator access to personal data, the right to correct them, delete or limit processing, the right to object to the processing of personal data, as well as the right to transfer data.
4. You have the right to withdraw your consent at any time. The above does not affect the compliance with the law, which was made on the basis of your consent before it was withdrawn.
5. It is possible to lodge a complaint with the supervisory body - the President of the Office for Personal Data Protection.
6. Providing personal data is voluntary.
7. Your data will not be shared with entities other than entities authorized on the basis of applicable law.
8. The administrator will not transfer your personal data to recipients in third countries and international organizations.

**Consent for the processing of personal data for recruitment purposes**

I agree to the processing of personal data provided in this document for realising the recruitment process pursuant to the Personal Data Protection Act of 10 May 2018 (Journal of Laws 2018, item 1000) and in agreement with Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation).

.....  
Name

.....  
Date and signature

**DECLARATION**

I declare that if I win the Contest the Institute of Molecular Physics of the Polish Academy of Sciences will become my primary place of work within the meaning of the Act of 20 July 2018, Law on Higher Education and Science (Journal of Laws of 2018, item 1668, as amended).

.....  
Name

.....  
Date and signature