



**Open competition for the Assistant-PhD Student position in the National Science  
Centre funded project:  
Cell-to-cell heterogeneity of cross-wired cytokine signaling: filling the gaps  
between molecular origins and translational implications**

**Project information:**

Project leader: **dr. hab Michał Komorowski**, associate professor

Source of funding: **National Science Centre OPUS 20**

Implementing institution: **Institute of Fundamental Technological Research Polish  
Academy of Sciences**

Position: **PhD Student**

Project duration: **48 months**

Deadline for applications: **25 June 2021**

**Project description:**

In multicellular organisms like the human body, trillions of cells of multiple different cell types communicate with each other by releasing a thousand types of molecules. However, the functioning of biochemical signaling does not seem to comply with the principles of communication engineering. An engineer designing a system would linearly connect sensors with receivers ensuring reproducible transmission. Cells, however, have many cross-wired signaling pathways (one sensor connected to many receivers and one receiver connected to many sensors) that produce highly variable signals.

**How can cells function reliably with highly variable signaling?**

**What are the implications of variable cross-wired signaling for health and disease?**

**What is the explanation for such a “messy” architecture?**

We are using a variety of experimental (e.g., high-throughput immunostaining and smRNA FISH, live microscopy imaging) and theoretical approaches (e.g., data analysis techniques and information theory) to address the above questions. Currently, we are seeking a highly motivated PhD student with a background in mathematics, statistics, engineering, computer science, or related field to help us on the way.

For more information

- (i) visit our website [sysbiosig.org](http://sysbiosig.org),
- (ii) see our recent publications

- Nienaltowski et al., Fractional response analysis reveals logarithmic cytokine responses in cellular populations, Nat Commun (in press); <https://www.biorxiv.org/content/10.1101/2020.12.08.413468v1>
- Jetka et al., An information-theoretic framework for deciphering pleiotropic and noisy biochemical signaling, Nat Commun, 2019;
- Komorowski & Tawfik, The Limited Information Capacity of Cross-Reactive Sensors Drives the Evolutionary Expansion of Signaling, Cell systems 2018;

or

(iii) email the group leader, Michał Komorowski ([m.komorowski@sysbiosig.org](mailto:m.komorowski@sysbiosig.org)).

### **Expected qualifications:**

- high motivation for scientific work at the interface between mathematics and cell biology
- MSc in mathematics, statistics, engineering, computer sciences or related field
- programming skills (particularly Python, R, Matlab and/or C++)
- fluent English
- ability to work in a team

### **We offer:**

- exciting research tasks
- support in developing new skills
- PhD studentship of approximately 4000 PLN net per month for 3 years
- participation in international conferences and workshops
- support in application for additional funding and scholarships
- highly creative, innovative and friendly work environment
- international collaborations

### **Responsibilities:**

- development of statistical tools directly for handling and analysis of large data sets
- development of statistical models of cellular signalling
- close collaboration with experimental biologists

### **How to apply?**

Email CV including MSc track record, a letter of motivation and two contacts for references.

Please include in your CV the following clause: "I agree to the processing of personal data contained in my job offer for the needs necessary to carry out the recruitment process conducted by IPPT PAN with headquarters in Warsaw, ul. A. Pawińskiego 5B, according to art. 13 para. 1 and 2 of Regulation (EU) 2016/679 of the Parliament and of the Council of 27 April 2016 on the protection of individuals with regard to the

processing of personal data and the free movement of such data and the repeal of Directive 95/46 / EC (RODO).

**Contact:** Dr Michał Komorowski ([m.komorowski@sysbiosig.org](mailto:m.komorowski@sysbiosig.org))

**Deadline:** 25 June 2021