



**Warsaw-4-PhD**  
Warsaw Doctoral School  
in Natural and Biomedical Sciences



POLISH NATIONAL AGENCY  
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**IChF**

Institute of Physical Chemistry PAS

Warsaw Doctoral School in Natural and Biomedical Sciences and the Institute of Physical Chemistry PAS cordially invites you to an **ADVANCED LECTURE SERIES – BIO-INSPIRED CHEMISTRY** talk.

## ***Could an active cellular metabolism stir up the cytoplasm?***

*given by*

**Prof. Matthias Heinemann**  
Department of Molecular Systems Biology  
at the University of Groningen

on 9<sup>th</sup> November 2023, 10:00 at IChF Aula  
Duration: 60 min + question time

***Highly recommended to all Warsaw-4-Phd students!***

### Talk abstract:

Cellular metabolism is a network of more than 1000 different chemical reactions, which altogether provide cells with chemical energy and building blocks for new cells. How cells direct molecules through this network is still an open question. To this end, we have found that apparently cells use this network such that their growth rate is maximized, but at the same time would not exceed a certain Gibbs energy dissipation rate. While in analogy to man-made machines, a maximal dissipation rate limit makes intuitively sense, yet the question is why and how -on the molecular level of a cell- a (too) high Gibbs energy dissipation rate could be harmful. We hypothesized that increasing Gibbs energy dissipation rate would lead to increased motion of molecules inside cells, which could be detrimental for biomolecules and their interactions. Thus, to test this, we had to start measuring motion inside cells. From here, unfortunately, things get complicated and it might still take us a few more years until we have a clear picture. Yet, within this seminar, I still wanted to show some exciting findings on our way to understand how an active cellular metabolism could stir up the cytoplasm, hoping for a good discussion with the audience.

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