

Establishing a framework of concepts and mechanisms in intracellular organisation

Cells are complex living systems, performing multiple tasks and consisting of thousands of chemical components that react and move through the cell. Although the third law of thermodynamics states that a systems' entropy naturally increases, cells are intracellularly structured and ordered.

The phrase "intracellular organisation" is often linked other phrases – spatiotemporal organisation, self-organisation, pattern formation, and polarity establishment. Although these phenomena can result in a similar observation – the emergence of order – they are conceptually viewed in a different way the various scientific fields. In a bio-chemical context, they are often explained in regards to the underlying mechanism of their emergence (e.g. active transport along actin cables or microtubules, reaction-diffusion driven processes). On the other hand, in a more physical context, concepts as symmetry breaking or dynamic instability are widely used.

The classical scientific fields of Biology, Chemistry, Physics and Mathematics have grown strongly towards each other and interdisciplinary approaches are indispensable, especially in such multi-layered topics as intracellular organisation. However, the lack of a precise terminological framework and a clear understanding of the different concepts of each scientific field hinders combined efforts.

This project aims to investigate the different approaches and concepts used in the scientific communities working on intracellular organisation and to communicate them in a clear and accessible way. In this way we aim to establish a basis for interdisciplinary research and improve the communication between the participating parties.

Interested students should have these skills & interests:

- High proficiency in written and spoken English.
- Enjoyment of reading and writing.
- Interest in science communication, in the investigation of a topic from the perspectives of the different fields (Biology, Physics, Chemistry) in order to connect the used concepts.
- Analytical and abstract thinking.
- Open mindedness (interdisciplinary work).

If you are interested in being part of this project, send an e-mail to [s.tschirpke\[at\]tudelft.nl](mailto:s.tschirpke[at]tudelft.nl).