Physikalisches Kolloquium

Monday, 24 October 2022

ROOM CHANGE: Lecture Hall N24/H13, at 16:15 hrs
Coffee and cookies will be served in front of the lecture hall from 16:00 hrs

Biophysics of retinal organoids

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The bottom-up assembly of complex systems often enables researchers to study those at a fundamental level. For the brain or the retina, however, this assembly still is beyond our experimental reach. In recent years, researchers have engineered multi-cellular 3D systems, retinal organoids, which share the same cell types and tissue organization as their in vivo counterparts. In the near future, those in vitro models provide an opportunity to glimpse at how biology self-assembles neuronal networks and how mechanics guides the formation of their shape, structure and function.

In this seminar, I will present the current and future research of our ERC-funded group. We will explore how tissue mechanics controls retina organoid growth and neuronal function. For this, we build on our expertise in mechanics measurements\textsuperscript{1,2} and retina organoid technology\textsuperscript{3}.

Quantifying the mechanics of neuronal systems might promote a biophysical understanding how neuronal networks are formed and how their function might be tuned via physical cues.

\textsuperscript{1} Serwane F. et al., In vivo quantification of spatially-varying mechanical properties in developing tissues, Nature Methods, 14, 181-186, 2017
\textsuperscript{2} Mongera A., et al., A fluid-to-solid jamming transition underlies vertebrate body axis elongation, Nature, 561, 401-405, 2018
\textsuperscript{3} Zhang H., et al. Together is better: mRNA co-encapsulation in lipoplexes is required to obtain ratiometric co-delivery and protein expression on the single cell level, Adv. Sci. 2102072, 2021
\textsuperscript{4} Wysmolek et al., bioarxiv A minimal-complexity light-sheet microscope maps network activity in 3D neuronal systems, bioarxiv 2022.06.20.496852