

Seminar über Biomedizinische Photonik

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Titel: Patterning, waves and synchronization in arrays of cilia

Living organisms rely on flows to perform essential functions that range from swimming and feeding in unicellular organisms to mucus clearance in humans. These large-scale flows are generated by the integrated activity of thousands of microscopic beating filaments attached to cell surfaces (cilia). In cells, collections of cilia exhibit highly coordinated temporal patterns known as metachronal waves. While patterns of cilia temporal coordination have been observed for decades, the mechanisms underlying their formation and their contribution to flow generation remain unclear. The lack of measurements of the geometric and dynamic properties of cilia arrays has limited our ability to understand the mechanisms of pattern formation. In my talk I will discuss the advantages of ciliated swimmers as experimental model systems where such measurements can be readily performed. Performing precise measurements and perturbations of temporal patterning in cilia arrays will enable the identification of the physical mechanisms underlying the emergence of collective behavior. Beyond their biological significance, arrays of cilia provide an accessible experimental platform to explore the physics of multi-scale pattern formation.

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