

Großes Physikalisches Kolloquium an der Universität zu Köln



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Dresden

Dynamic Organization of Biological Cells

13.01.2026
16³⁰ Uhr
HS III

Living matter is highly dynamic and organizes into complex patterns and spatial structures. Cells and tissues are maintained far from thermodynamic equilibrium by a continuous supply of chemical energy through metabolic processes. I will discuss how active processes drive cells away from equilibrium and present general concepts from irreversible thermodynamics that capture the physics of such activity. Fluid flows generated by contraction through active stresses provide a general mechanism for the establishment of cell polarity. Phase-separated droplets create compartments in cells that organize biochemistry. These biological condensates motivate the study of chemically active droplets that can mimic cell-like behaviors such as spontaneous division. Active droplets also serve as physical models of protocells. At larger scales, many cells organize collectively during the morphogenesis of organisms. These examples show that living matter is a form of active matter governed by nonequilibrium physics.

