

# GRK 2516 Soft Matter Seminar

Jan. 19, 2023 at 2:30 p.m.  
Minkowski Room, 05-119, Staudingerweg 7

Research seminar of the DFG Research Training Group GRK 2516 (<https://grk2516.uni-mainz.de>).

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## Anomalous Diffusion in Biomolecular Condensates

Liquid-liquid phase separation (LLPS) has been identified as a key mechanism regulating the formation of membraneless organelles inside cells. These membraneless organelles, typically composed of DNA, RNA, protein, etc., are involved in many cellular reaction networks by forming micro-sized reactors to locally concentrate specific species or signal molecules, facilitating metabolic reactions, and thus maintaining the functionality of cells. Herein, building on an established model DNA-condensate system, we report an anomalous diffusion process of short oligonucleotide during their uptake by large DNA-condensates driven by specific binding interaction. We show that the interior dynamics of DNA-condensates can be tuned by orders of magnitude at varied salinity, while the diffusional mechanism of signal uptake simultaneously adapts from non-Fickian to Fickian type diffusion. With systematical study on such anomalous diffusion process, we have found pathway to control the velocity of the diffusional process and established a generic mechanism explaining it based on an old polymer physics concept.