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Peter Debye Lecture

Friday, July 5, 2019 at 14:00

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Time-dependent mechanics of biopolymer materials – from protein condensates to the actin cytoskeleton

Biopolymer materials serve in many biological contexts as generators of shape stability and mechanical integrity while still giving the option of long-term plastic deformation under the action of forces. This seeming contradiction is achieved by viscoelastic and thus time-dependent mechanical properties which are rooted in the structure of molecular constituents and their mutual interactions. Understanding how biopolymer materials tune their material properties does not only reveal how biopolymers function in cells but also stimulates ideas for biomimetic materials. In my talk, I will present data on the time-dependent mechanical properties of i) liquid–liquid phase-separated protein condensates which have been suggested to scaffold membrane-free organelles in cells and ii) the actin cytoskeleton which is a polymer network in the cell that acts as a major regulator of cell shape and tissue morphogenesis. I will discuss characteristic time scales of the measured mechanical properties that mark the transition from solid-like to liquid-like mechanical properties and define a finite shape memory of the material under consideration.

Venue: Lecture Hall for Theoretical Physics, Faculty of Physics and Earth Sciences, Linnéstraße 5, 04103 Leipzig