# DY 37: Invited Talk David Zwicker

Time: Thursday 9:30–10:00 Location: H20

**Invited Talk** DY 37.1 Thu 9:30 H20

**Controlled and robust phase separation in cells** — •David Zwicker — MPI for Dynamics and Self-Organization, Göttingen, Germany

Phase separation is a key process for the spatiotemporal organization of biomolecules in cells. In particular, phase separation explains how droplets can form spontaneously to create subcellular compartments. However, traditional theories of phase separation cannot explain how cells control these droplets robustly. To elucidate this, I will discuss how droplets interact with the elastic cellular environment and how cells use driven chemical reactions to control droplets. First, I will show how monodisperse emulsions form when droplets grow in a mesh that can break and re-arrange. We demonstrate that stiffness gradients cause elastic ripening, which biases droplets toward softer regions. These processes quantitatively explain experiments where oil droplets form in PDMS gels. The same physics applies to droplets interacting with the cytoskeleton in cells. In the second part, I will show how driven reactions control droplet size and position so that multiple droplets can coexist. Taken together, our models identify key physical processes that allow cells to control the phase separation of biomolecules.