

BP 42: Closing Talk (joint session BP/DY/ CPP)

Time: Friday 12:30–13:15

Location: HSZ 02

Invited Talk

BP 42.1 Fri 12:30 HSZ 02

Physics of active droplets — ●FRANK JÜLICHER — Max Planck Institute for the Physics of Complex Systems, Dresden

Phase separation provides a general physical mechanism for the spatial organization of cells and for the compartmentalization of chemical processes. Proteins together with other molecules can condense to form liquid-like droplets that provide localized chemical environments and that can serve as micro-reactors for biochemical reactions without an enclosing membrane. The cell cytoplasm can thus be viewed as an

emulsion, where phase-separated compartments organize biochemical processes in space. Droplets that carry chemical activity are active systems that maintained away from thermodynamic equilibrium by chemical energy input. I will discuss the physics of such active droplets and active emulsions and show that they exhibit unusual properties and behaviors. Examples are the arrest of coarsening and the suppression of Ostwald ripening, spontaneous droplet division and droplet positioning by concentration gradients. The physics of active droplets could play important roles in fundamental cellular processes of many organisms and could have emerged early in the evolution of life.