LadHyX Seminar – September 24th, 10:45 am

Hugo Lachuer
(Institut Jacques Monod)

Intercellular adhesion triggers a mechanical transition in the actin cortex

How do cells mechanically adapt when they establish physical connections with their neighbors? In animal cells, intercellular adhesion is coupled to the actin cortex, a thin layer of filamentous polymers underlying the cellular membrane. While the cortex is a major determinant of cell mechanical properties, how its structure and mechanics are remodeled upon intercellular adhesion contact remains poorly understood.

Combining mechanical probing with magnetic pinchers and high-resolution, polarization-resolved fluorescence microscopy, my work demonstrate that the cortex undergoes a striking mechanical transition upon intercellular adhesion: it becomes approximately two times thinner and three times stiffer than the cortex at contact-free cell surfaces. Surprisingly, cortical thinning is not driven by increased actin turnover. Instead, the same amount of actin becomes concentrated into a smaller volume, resulting in a denser and stiffer network. This densification is accompanied by a reorganization of the actin architecture, with filaments becoming less ordered and less parallel to the cellular membrane.

These results reveal how the actin cortex remodels its architecture to accommodate intercellular adhesion and illustrate how molecular organization at the cell surface can control the emergent mechanical properties of multicellular tissues.