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16:30 - 17:30 Auditorium C1F

### Controlling contractile instabilities in the actomyosin cortex

#### Summary

Cells and tissues represent active materials that generate stresses for driving morphogenesis. A fundamental challenge is to understand how spatiotemporal patterns arise in such active biological materials, driven by the interplay of active mechanical processes and regulation by signaling pathways. I will discuss the mechanism of spatiotemporal pattern formation in the highly contractile actomyosin cortical layer, where transient accumulations of myosin motor proteins tend to form pulsatile networks to drive morphogenetic events. Using a novel image analysis technique (COMoving Mass Balance Imaging, COMBI) we have determined the kinetic diagram of myosin activation by RhoA in the cell cortex of the polarizing one-cell stage *Caenorhabditis elegans* embryo. We found that the complete system of myosin activation by RhoA, active stress generation by myosin, and RhoA advection by actomyosin gel flow is unstable. Notably, the dynamic pattern in the unstable regime appears to be under separate regulatory control, and I will discuss general means of how introducing regulatory processes to active materials gives rise to novel pattern forming states.



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