Seminar/Talk

A few bets from molecular scales to tissue scales: from emergence and resurgence in elementary contractile unit to electric field induced proliferation and lumen formation

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Host: Edouard Hannezo

After introducing the main features characterizing an elementary contractile unit in cells, I will recall theoretical results concerning motor collections obtained over the years. In particular I will show how a symmetry breaking transition, emergent feature of a large number of molecular motors, underpins a number of biological functions based on muscle oscillations. I will then show how a simple modification of the theoretical framework allows to understand all experimental observations on elementary contractile unit including force build-up followed by a relaxation and the existence of half integer steps in the contraction/relaxation curve, which is a resurgence of a nanoscopic scale in a mesoscopic system. I will then change gear completely, and propose a description of polar tissues in a planar and spherical geometry. In particular, I will show that, in the planar geometry, flow and electric fields can induce either proliferation or death of thick epithelia, and that in a spherical geometry a lumen can be formed. Ref:Myosin filaments reversibly generate large forces in cellsJ Lohner, JF Rupprecht, et al Nature Physics 2019 Field induced cell proliferation and death in a thick epitheliumN Sarkar, J Prost, F Jlicher New J. Phys 2019Fluid pumping and active flexoelectricity can promote lumen nucleation in cell assembliesC Duclut, N Sarkar, J Prost, F Julicher, PNAS, 2019

Tuesday, September 10, 2019 11:00am - 12:15pm
Mondi Seminar Room 2, Central Building

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