LadHyX Seminar – May 27th, 10:45

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Flow Patterning in Growing Tissues: From Tip-Growing Plant Cells to pEMT Monolayers

Biological tissues are active materials: they grow, exert forces, and rearrange themselves in response to internal and external signals. In this talk, I will present two systems where such activity gives rise to striking, organized flow patterns: tip-growing plant cells and partial EMT (pEMT) cell monolayers undergoing wound closure. In pEMT, cells remain associated with their neighbors but with weaker adhesion than in fully epithelial tissues.

In plant cells, local wall softening and pressure-driven extension lead to persistent, polarized tip growth. In pEMT monolayers, collective cell divisions and rearrangements generate large-scale, quasi-circular flows during tissue closure. Both cases raise a common question: how are local shape and size changes patterned to produce global flow, particularly under geometric constraints?

I will begin with experimental observations and physical intuition for these flows, highlighting characteristic symmetries and boundary behaviors. Then I will present modeling efforts that connect local growth and remodeling to global outcomes. Finally, I will show how these models can be used to infer local extension activities from global cell wall shape data in tip-growing plant cells, and to infer isochoric remodeling rates from kinematic data in pEMT monolayers.

This talk is intended for a broad audience with limited background in biology. The first half will focus on experimental visuals and conceptual entry points.