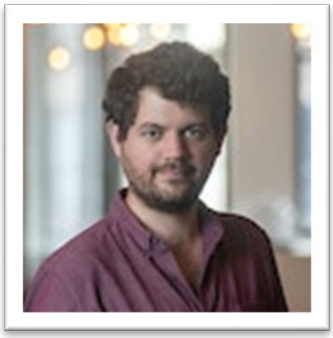
PHYSICAL MATH SEMINAR

Morphogens enable interacting supracellular phases that generate organ architecture



PEARSON MILLER
(Flatiron Institute)

ABSTRACT:

During vertebrate organogenesis, increases in morphological complexity are tightly coupled to morphogen expression. In this work, we studied how morphogens influence self-organizing processes at the collective or "supra"-cellular scale in avian skin. We made physical measurements across length scales, which revealed morphogen-enabled material property differences that were amplified at supracellular scales in comparison to cellular scales. At the supracellular scale, we found that fibroblast growth factor (FGF) promoted "solidification" of tissues, whereas bone morphogenetic protein (BMP) promoted fluidity and enhanced mechanical activity. Together, these effects created basement membrane–less compartments within mesenchymal tissue that were mechanically primed to drive avian skin tissue budding. Understanding this multiscale process requires the ability to distinguish between proximal effects of morphogens that occur at the cellular scale and their functional effects, which emerge at the supracellular scale.

TUESDAY, NOVEMBER 28, 2023
2:30 PM – 3:30 PM
Building 2, Room 449

https://math.mit.edu/pms/

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