PHYSICAL MATH SEMINAR

Learning dynamics from single cell snapshots: lessons from physics

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ABSTRACT:

High-dimensional snapshots of populations in motion can reveal key aspects of their underlying dynamics. In biology, profiling of single cell molecular states has been used to order events in cell differentiation, cell cycle, and perturbation response by methods that fit cell states to a curve or a tree. A more important goal still is to predict future behavior from cell state, in order to identify regulators of behavior. I will discuss our work predict differentiation fates from single cell molecular profiles, using ideas from physics: (1) Fokker-Planck equations and their implementation on graph representations of single cell data, (2) identifying hidden information in dynamic processes, and (3) detecting convergent (non-tree-like) cellular dynamics through conformal symmetry violations in lineage-tracing data. We apply these approach to bone marrow hematopoiesis.

TUESDAY, DECEMBER 12, 2023
2:30 PM – 3:30 PM
Building 2, Room 449

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

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