PHYSICAL MATHEMATICS SEMINAR

Data-driven discovery of parameterized pattern-forming dynamics and emergent quantum mechanics

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ABSTRACT:

Pattern-forming systems can exhibit a baffling array of complex behaviors as external parameters vary, enabling a variety of useful functions in natural and engineered systems alike. Classical pattern-forming systems can even give rise to effective quantum mechanics, and the question of the universality of this emergent behavior has been underexplored. First-principle derivations such as bifurcation analyses can be carried out in well-characterized model systems, but data-driven methods for more complicated and realistic systems have only recently matured. In this talk, I will describe a novel system identification algorithm to discover parameterized dynamics for systems with adjustable control parameters and demonstrate its ability to extrapolate system behavior beyond the parameter regime of the input data. I will then discuss a potential application to connect phase space quantum mechanics to the coarse-grained kinetics of classical topological defects.

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2:30 PM – 3:30 PM
Building 2, Room 449

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