



**Special Center for Soft Matter and
Biological Physics Seminar**

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“Physical System Evolving on Time-Dependent Domains”

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2:00pm – 3:30pm

221 Kelly Hall

Despite the ubiquity of physical systems evolving on time-dependent spatial domains ranging from transport-reaction processes—crystal growth, metal casting, gas-liquid, and gas-solid reaction systems—to quantum particles in an expanding potential and formation of galaxies agglomeration in the expanding Universe, to name a few—understanding of their dynamical properties is still in a quite rudimentary state. In this talk, I will present a summary of my research focused on physical systems evolving on time-dependent domains. Using the synergy of our experimental and theoretical studies, the key differences in the dynamics between extended systems on time-fixed and time-dependent spatial domains will be explored. As a paradigm we have chosen to study Faraday patterns—standing waves formed when a fluid layer is vibrated vertically—on time-varying domain leading to a number of intriguing results. First, the observation of a transverse instability—namely, when a two-dimensional pattern experiences an instability in the direction orthogonal to the direction of the domain deformation—provides a new facet to the stability picture compared to the one-dimensional systems. Second, the domain deformation is not only able to transform the chaotic state of two competing modes into a regular (periodic) one, but also to isolate one of the competing modes in the regime. The latter navigated us to the discovery of controlling chaos using the spatial domain size.