
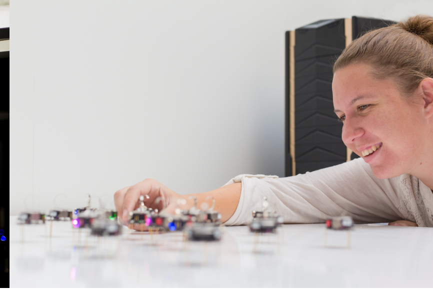


Physics colloquium

Emergent Dynamics in Classical Many-Body Systems

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Date: **11/30/18**
Time: **10:30 AM**
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Abstract: Systems driven far from equilibrium exhibit a diverse range of collective phenomena. Recently, studies of "active matter" have been of interest where individual particles input energy into the system and control the dynamics. Alternatively, many-body systems can be driven by external, active fields which couples to the constituents in some nonlinear way. Although no universal framework exists for describing nonequilibrium systems, in many cases a steady state is reached where some aspects of equilibrium theories can be applied. However, nonequilibrium systems often never reach a steady state, and constantly switch behavior. In this talk I will present experimental evidence that bistable elements are not required for the global bistability of a system. In our experiments, we observe temporal switching between a crystalline, condensed state and a gaslike, excited state in a spatially-extended, quasi-two-dimensional system of charged microparticles. Accompanying numerical simulations show that conservative forces, damping, and stochastic noise are sufficient to prevent steady-state equilibrium, leading to switching between the two states over a range of emergent time scales, from seconds to hours. I will also discuss how this system can serve as a simple model for intermittent dynamics and energy cascades in other complex systems.

Bio: Dr. Justin Burton is a professor of physics at Emory University in Atlanta, Georgia, USA. He received his Ph.D. in physics from the University of California, Irvine in 2006. His lab studies the physics of complex systems, from the molecular to the geophysical scale, including soft materials, fluid mechanics, and natural systems. In 2015 he received a CAREER award from the National Science Foundation for his work on nonlinear dynamics in amorphous materials. Dr. Burton's lab also studies the physics of glaciers and the boundary between the ice and the ocean. He is particularly passionate about climate change research and education.