



Day 1. Thursday, August 27th

All times in EST

Session 1. Contributed Talks (12:55 - 3:00 PM) <https://emory.zoom.us/j/96498228736>

12:55 PM - Introductory Remarks

1:00 PM - **Gabi Steinbach** Active matter physics of biofilms with life and death events

1:20 PM - **Ellio Challita** Superpropulsion of liquid droplets in sharpshooter insects

1:40 PM - **Alisina Bazrafshan** Optimization of DNA nanomotor performance by studying structure function relationships at the nanoscale

2:00 PM - **Mary Catherine Adams** Structural Comparison of Gold-binding DNA Aptamer Candidates

2:20 PM - **Nasreen Khan** Polyelectrolyte Complex Coacervate Assembly with Cellulose Nanofibers

2:40 PM - **Thomas Day** Early Multicellular Organisms Co-opt Cell-Level Characteristics into Group-Level Properties via the Principle of Maximum Entropy

1-hour break 3:00 - 4:00 PM

Session 2. Poster Session (4:00-5:30PM) <https://emory.zoom.us/j/99812269807>

with virtual beverages

Day 2. Friday, August 28th

Session 3. Contributed Talks (11:00 AM - 1:00 PM) <https://emory.zoom.us/j/97341972785>

11:00 AM - **Michael Czajkowski** Exotic Soft Modes in 2D Mechanical Metamaterials Yield Powerful New Control Methods for Nonlinear Deformation

11:20 PM - **Jiehao Chen** A new photo-responsive hydrogel with photo-rewritable shape-morphing and phototunable conductivity

12:40 PM - **Yixuan (Louis) Han** Ellipsometry Modeling of Inhomogeneous Film Structure Decoupled from Dynamics behind Unrealistic Increase in Density and Refractive Index in Thin Polymer Films

12:00 PM - **Dana Harvey** Leidenfrost Temperature Hysteresis and Hydrodynamic Collapse

12:20 PM - **Shengkai Li** Use lattice algorithm to interpret and control clustering dynamics

12:40 PM - **Dylan R Dautel** Protein Vesicles Self-Assembled from Functional Globular Proteins with Different Charge and Size

Session 4. Invited Keynote Speaker (2:00 - 3:00PM) <https://emory.zoom.us/j/97831686530>

2:00 PM - **Nick Gravish** The Hard Parts of Soft Robots: Tunable Mechanical Contact Generates Novel Robot Materials and Collective Behaviors

Abstract: The principles of soft matter physics are found in many areas of robotics. In this talk I will present two examples from our lab's research: 1) rigid materials with soft deformation modes that enable new robot capabilities, and 2) robot collectives that display emergent modes of coordination. In the first part of this talk I will present new methods for controlling the mechanical properties of robot mechanisms through rearrangement and confinement of rigid constituent materials. We will demonstrate how modulation of mechanical properties in robots can enable adaptive behaviors for locomotion in complex environments. In the second part of this talk I will present work on the mechanical interactions between robot groups. Most mobile robots and motile organisms use body oscillations to generate propulsion. We will demonstrate in experiment, simulation, and theory, that motile oscillatory robots are driven to stable collective states through intermittent contact. The collective dynamics of these systems depend on density, actuation mode, and body shape; and we will present design "rules" for achieving desired group states. In summary, these two examples embody a governing principle of soft-matter physics: small modulation of mechanical interactions between constituents can generate large changes in material and collective behaviors. Robotics is a highly interdisciplinary field with many exciting opportunities for the physics community to make an impact. I will conclude this talk with my perspectives on how students from physics can participate in robotics research.

Session 5. Career and Networking Event (3:00 - 3:55 PM) <https://emory.zoom.us/j/97831686530>

with virtual beverages

Closing Remarks @ 3:55