



# Soft Living Active and Adaptive Matter



## Fracture, instability, and phase transitions via constrained expansion

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### Abstract:

Consider an elastic material that increases in size due to growth or swelling. If the material is unable to expand freely, stresses develop. In this talk, I will present two systems in which stresses due to constrained expansion can generate dramatic and complex responses. First, I will describe how hydrogels, polymer networks that imbibe large amounts of water, behave when forced to swell around rigid obstacles. We identify a regime in which stresses due to obstacles cause swelling hydrogels to fracture, tearing themselves apart as they expand. Second, I will discuss the mechanics of thin sheets that have been locally dilated at a periodic array of sites. When the dilations are sufficiently large, the affected sites buckle either above or below their surroundings. These bistable dilations form a programmable metamaterial, and their behavior can be understood through an analogy to the Ising model.

Date:  
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Time:  
9:00 AM-10:15 AM (PT)

### About the speaker:

Abigail Plummer is a postdoctoral fellow at the Princeton Center for Complex Materials, working with Andrej Košmrlj. She completed her PhD in physics at Harvard University in 2021 advised by David R. Nelson. She is interested in a wide range of questions related to growth and restructuring in complex environments.



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