ST. OLAF PHYSICS DEPARTMENT

COLLOQUIUM SERIES

Between a droplet and a soft place: The extreme mechanics of thin sheets

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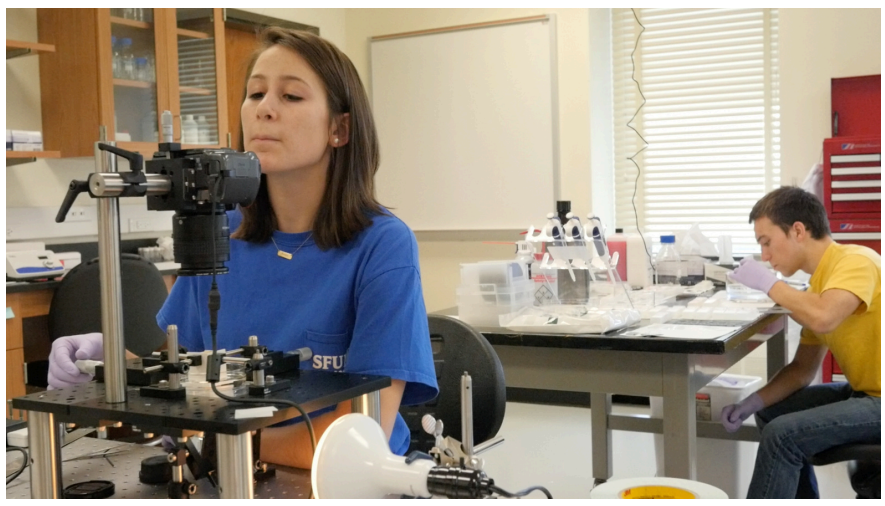

Perhaps because we handle so many thin materials in our lives, we may forget to notice the complexity that emerges when crumpling a sheet of paper into a ball. Studying these “extreme” large-amplitude deformations of thin materials offers a bridge from esoteric questions (“what are the possible embeddings of a two-dimensional manifold in three-dimensional Euclidean space?”) to important practical issues (“how can a plastic film made by roll-to-roll manufacturing be bonded to a curved device without tearing or creasing it?”). I will discuss work by my group at Syracuse University over the last 9 years to understand the response of thin solids when they are bent, crushed, or twisted far from their original shape. Undergraduate researchers have been central to this endeavor, from Jessica Stelzel’s three-dimensional scans of wrinkled balloons, to Graham Leggat and Alex Hartwell’s curved polymer shells floating on water, to Emily Vieru’s fractured floating films.