



# THE UNIVERSITY OF CHICAGO

## COMPUTATIONAL AND APPLIED MATHEMATICS STUDENT SEMINAR

---

**\*\* PLEASE NOTE DIFFERENT LOCATION \*\***

**COLIN SCHEIBNER**

Department of Physics  
University of Chicago

Odd Elasticity

THURSDAY, April 18, 2019, at 1:00 PM  
**Jones 304**, 5747 South Ellis Avenue

### ABSTRACT

In physics, Hooke's law states that the forces or stresses experienced by an elastic object are proportional to the applied deformations or strains. Normally, the number of coefficients of proportionality between stress and strain, i.e., the elastic moduli, is constrained by energy conservation. In my talk, I will discuss what happens when we relax this restriction and generalize linear elasticity to active media with non-conservative microscopic interactions. This generalized framework, which we dub odd elasticity, reveals that two additional moduli can exist in a two-dimensional isotropic solid with active bonds. Such an odd-elastic solid can be regarded as a distributed engine: work is locally extracted, or injected, during quasi-static cycles of deformation. Using continuum equations, coarse-grained microscopic models, and numerical simulations, we uncover phenomena ranging from activity-induced auxetic behavior to wave propagation powered by self-sustained active elastic cycles. Besides providing insights beyond existing hydrodynamic theories of active solids, odd elasticity suggests design principles for emergent autonomous materials.