

# PHYSICAL MATHEMATICS SEMINAR

## What do guitar strings and balloons have in common with biological networks and tissues?

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### ABSTRACT:

Both guitar strings and balloons are floppy unless rigidified by geometrically induced prestresses. The same kind of prestress-induced rigidity transition in under-constrained materials has more recently been discussed in the context of disordered biopolymer networks and models for biological tissues. Here, we propose a general approach to quantitatively describe such transitions. Based on a minimal length function, which scales linearly with intrinsic fluctuations in the system and quadratically with shear strain, we make concrete predictions about the elastic response of these materials, which we verify numerically and which are consistent with previous experiments. Finally, our approach may provide a gateway towards connecting macroscopic elastic properties of disordered materials to their microscopic structure.

**TUESDAY, SEPTEMBER 25, 2018**

**2:30 pm**

**Building 2, Room 136**

*Reception following in Building 2, Room 290  
(Math Dept. Common Room)*

<http://math.mit.edu/seminars/pms/>