

TUFTS UNIVERSITY
SPECIAL
PHYSICS AND ASTRONOMY COLLOQUIUM

**“How Does Surface Tension Emerge
From Structure in Biological Tissues?”**

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Biological tissues often behave like elastic solids on short time scales and fluids on long time scales. Different tissue types exhibit different characteristic macroscopic mechanical properties such as surface tension and viscosity, and cell rearrangements in developing animal tissues closely resemble the behavior of immiscible liquids governed by their surface tensions. But individual cells are not equivalent to molecules in a fluid; cells resist shape changes and modulate adhesive contacts with neighbors in tightly packed, disordered structures. I will discuss a minimal model, based on feedback between mechanical energy and cellular structure, that successfully explains past experimental data and makes novel predictions about the shapes of cells at the tissue surface, which we verify in zebrafish embryonic tissues. This model specifies how the collective property of surface tension emerges from properties of individual cells such as cell-cell adhesion and "cortical tension". I will discuss the implications of this model for tissue organization, and highlight open questions about the relationship between local structure and cell rearrangements in these disordered, active materials. I will also briefly discuss related work which provides insight into the basic physics of flow in disordered non-biological materials.

Friday, January 28, 2011

3:00 pm

Robinson 253*

Refreshments served in Robinson 251 at 2:30 pm

****Please note room change***