Fall 2018 Joint Colloquium
Materials Department & Materials Research Laboratory

Professor Cristina Marchetti
Physics Department
University of California, Santa Barbara

Friday, November 30th, 2018
11:00 am, ESB 1001

Active Matter: From Colloids to Living Cells

Collections of self-propelled entities, from living cells to engineered microswimmers, organize in a rich variety of active fluid and solid states, with unusual properties. For instance, active fluids can flow with no externally applied driving forces and active gases do not fill their container. In this talk I will describe the behavior of such "active materials" and highlight two examples of active phase transitions. The first is the formation of cohesive matter with no cohesive forces in collections of purely repulsive active colloids. The second is a new density-independent solid-liquid transition in epithelial tissues controlled by cell motility and a cell-shape parameter measuring the interplay ofcortical tension and cell-cell adhesion. An important insight of this work is that cell shape correlates with the mechanical properties of living tissues.

Bio

Cristina Marchetti was born in Italy, received her Laurea in Physics from the University of Pavia and a Ph.D. from the University of Florida. She recently joined the physics faculty at the University of California Santa Barbara, after three decades as a member of the faculty at Syracuse University. Marchetti was trained in nonequilibrium statistical physics. Her research over the years has focused on collective phenomena in physics and biology. Her current focus is on the emergent behavior of active matter. Her contributions to this field have included minimal models of spontaneous aggregation of active colloids and of the dynamics of topological defects in active liquid crystals, and the description of living tissues as active materials. Marchetti is currently serving as co-Lead Editor of Physical Review X and of the Annual Reviews of Condensed Matter Physics. She is a Fellow of the American Physical Society and of the American Association for the Advancement of Science, and a member of the American Academy of Arts and Sciences. She is the 2019 recipient of the Leo P. Kadanoff Prize of the American Physical Society.

http://soft-living-matter.syr.edu/marchetti-group/

Hosted by Phil Pincus.