Boulder School for Condensed Matter and Materials Physics

Self-Organizing Matter: From Inanimate to the Animate

July 1-26, 2024

Living systems exhibit remarkable self-organization and dynamics at all length scales and requires matter that is both active and adaptable. Within a cell, biomolecules actively convert energy to collectively self-organize into dynamic assemblies that enable a cell to move, divide, organize into functional compartments, undergo shape changes, and adapt to changing environment. Understanding how to rationally design such active and adaptable matter will revolutionize materials science, enabling us to design materials capable of moving, processing information, sensing, and adapting its mechanical properties. This summer school will bring together physicists, biologists and material scientists to cover a wide range of topics in the physics of self-organized matter, from inanimate to the animate. The lectures will focus on understanding collective and programmable effects in nature and in engineered systems, such as smart metamaterials, synthetic active matter, cytoskeleton, cells, and tissues.

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I. Cohen (Cornell)
M. Das (Rochester)
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D. Durian (UPenn)
E. Hannnezo (IST Austria)
T. Lecuit (Aix-Marseille)
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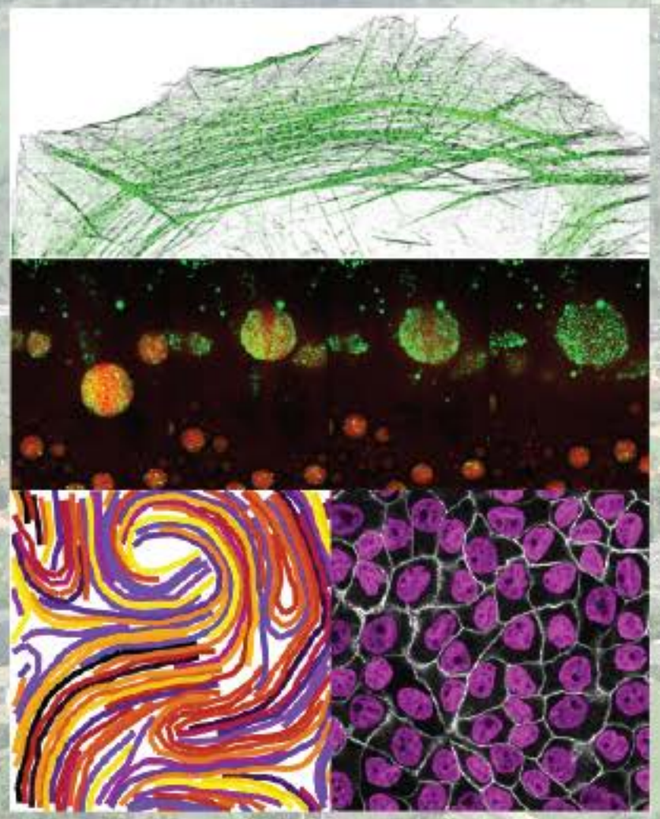
Y. Mao (UCL)
C. Marchetti (UCSB)
E. Matsumoto (Georgia Tech)
M. Murrell (Yale)
R. Pappu (WashU)
M. Prakash (Stanford)
U. Schwarz (Heidelberg)
V. Vitelli (Chicago)
K. Wan (Exeter)
J. Yeomans (Oxford)
D. Zwicker (MPI-DS)



Top panel: Actin filaments (black) and myosin-II motors (green) build network of bundles at the leading edge of a migrating cell. (Credit: Wen-hung Chou, Gardel Lab).

Middle panel: Motility and dissolution of a biomolecular condensate. (Credit: Etienne Jambon-Puillet, Dufresne Lab).

Bottom Left: Active nematic state of a simulated network of actin filaments. (Credit: Banerjee group).
Bottom Right: Organization of the membrane (white) and nucleus (purple) of epithelial cells within a confluent sheet (credit: John Devany, Gardel Lab)

Scientific Organizers:
Shiladitya Banerjee (Carnegie Mellon)
Andela Saric (IST Austria)
Eric R. Dufresne (Cornell)
Margaret L. Gardel (Chicago)
Director: Leo Radzihovsky (CU Boulder)

The school will pay for most local expenses, and there are travel grants available for participants from U.S. universities. Students and postdocs interested in participating should submit an electronic application by the January 15 deadline. The application form, and detailed information regarding housing, travel and financial support are available at

http://boulderschool.yale.edu/

The Boulder School in Condensed Matter and Materials Physics provides expert training, not usually available within the traditional system of graduate and post-graduate education, for advanced graduate students and postdoctoral researchers working in condensed matter physics, materials science and related fields. The School is supported by the National Science Foundation and meets annually during July in Boulder, Colorado.