MICHIGAN STATE UNIVERSITY

Computational Mathematics, Science and Engineering
Colleges of Engineering and Natural Science

Colloquium by Michael Shelley

Courant Institute of Mathematical Sciences
New York University

May 2, 2016, 4:00 PM; C405 Wells Hall

"Self-assembly and collective behavior in active matter systems"

Collective behavior and self-assembly are hallmarks of living systems, being central to biological organization down to the single cell level, as seen in the assembly of intracellular organelles from relatively simple parts, and as also demonstrated by the cooperative actions of many individuals in creating assemblies such as flocks and schools of birds and fish. This general area has come to be known as active matter, which emphasizes that these are self-driven systems whose constituents consume energy in order to create and sustain coherent structures. I'll give a somewhat personal review colored by my fluid dynamics background, and discuss phenomena and models of both biologic and synthetic active matter systems.

Michael Shelley holds a BA in Mathematics from the University of Colorado and a PhD in Applied Mathematics from the University of Arizona. He was a postdoctoral researcher at Princeton University and a member of the faculty of mathematics at the University of Chicago before joining the Courant Institute of Mathematical Sciences at NYU. At NYU he is the Lillian and George Lyttle Professor of Applied Mathematics, Professor of Neural Science and Mechanical Engineering, and the co-founder and co-director of Courant's Applied Mathematics Laboratory. Dr. Shelley also holds the title of Group Leader for Biophysical Modeling within the Simons Center for Data Analysis at the Simons Foundation where he is developing a research program in the modeling of biophysical systems. As an applied mathematician, Dr. Shelley works on the modeling and simulation of complex systems arising in physics and biology. His current research interests are in understanding complex phenomena arising in active matter, biophysics, and complex fluids, as well as in intricate fluid-structure problems that arise in understanding swimming and flying.