

Physics Colloquium

Dr. Michael Shelley
Center for Computational Biology
Flatiron Institute

“Active Matter and Transport in Living Cells”

The organized movement of intracellular material is part of the functioning of cells and the development of organisms. These flows can arise from the action of molecular machines on the flexible, and often transitory, scaffoldings of the cell. Understanding phenomena in this realm has necessitated the development of new simulation tools, and of new coarse-grained mathematical models to analyze and simulate. In that context, I'll discuss how a symmetry-breaking "swirling" instability of a motor-laden cytoskeleton may be an important part of the development of an oocyte, modeling active material in the spindle, and what models of active, immersed polymers tell us about chromatin dynamics in the nucleus.

Michael J. Shelley is an American applied mathematician who works on the modeling and simulation of complex systems arising in physics and biology. This has included free-boundary problems in fluids and materials science, singularity formation in partial differential equations, modeling visual perception in the primary visual cortex, dynamics of complex and active fluids, cellular biophysics, and fluid-structure interaction problems such as the flapping of flags, stream-lining in nature, and flapping flight. He is also the co-founder and co-director of the Courant Institute's Applied Mathematics Lab.

Shelley was born in La Junta, Colorado (USA). He holds a BA in Mathematics from the University of Colorado (1981) and a PhD in Applied Mathematics from the University of Arizona (1985). He was a postdoctoral researcher at Princeton University, and then joined the faculty of mathematics at the University of Chicago. In 1992 he joined the Courant Institute of Mathematical Sciences at New York University where he is the George and Lilian Lyttle Professor of Applied Mathematics as well as Professor of Neuroscience (NYU) and Professor of Mechanical Engineering (NYU-Tandon). In 2016 he also became a senior research scientist and group leader in biophysical modeling at the Center for Computational Biology (CCB) of the Flatiron Institute, a division of the Simons Foundation. In 2019 he was appointed Director of CCB.

Thursday, November 11, in LL 316 at 4:25 PM
For Zoom participation, please see information below:
Meeting ID: 972 1274 7894
Passcode: 631869