



The NSF-CREST Center for Cellular and Biomolecular Machines (CCBM) was established with a \$5 million Centers of Research Excellence in Science and Technology (CREST) grant in 2016 from the National Science Foundation (NSF). The CCBM brings together ~30 faculty members from multiple units across campus, including bioengineering, physics, chemistry and chemical biology, biomaterials science and engineering, cell and molecular biology, and applied mathematics. The center received an additional \$5 million in 2021 for another 5 years of funding. Researchers are studying how biological matter like proteins or cells come together to perform specific tasks, in hopes of eventually being able to engineer and develop innovations ranging from designer cells and tissue to novel diagnostic and therapeutic devices. The CCBM also hosts an integrated, interdisciplinary training program for graduate students that emphasizes physical and biological components, research and training experiences for undergraduate and high school students to enhance recruitment into STEM research, and outreach experiences for the local community and beyond.

Science for Humanity Series / COSMOS Distinguished Speaker Series

What Cell “Flocks” Can Teach Us About Health and Disease

Ajay Gopinathan, Ph.D.
University of California, Merced
Wednesday, July 8, 2026 | 2:00-3:30 pm
UC Merced Conference Center



Flocks of birds and schools of fish show us something remarkable. Individuals with only limited information can move together as an organized group. Similar kinds of collective motion happen inside our bodies, but at a much smaller scale. Groups of cells move together during important processes such as embryo development, wound healing, immune defense, and, in harmful cases, the spread of cancer. In this talk, I will describe how ideas from physics and computer modeling can help us understand how cancer cells move as groups. A single cell may behave one way, but a cluster of cells can behave very differently because cells push, pull, sense signals, and respond to their neighbors. Our research asks how such interactions between cells can lead to new patterns of motion that provide benefits to clusters. Understanding how cancer cell clusters move is important because many cancers become dangerous when cells leave their original location and spread through the body. By learning the basic rules that allow groups of cells to migrate, stay together, change size, or respond to chemical signals, we may eventually help identify new ways to predict or interfere with cancer spread. More broadly, this work shows how physics, biology, and computation can come together to address questions with direct relevance to human health.

About the speaker:

Ajay Gopinathan is a Professor of Physics at the University of California, Merced, where he uses physics, mathematics, and computer simulations to understand how living systems organize and move. His research explores questions such as how materials move inside cells, how viruses assemble, how cells control their shape, and how groups of cells migrate together during processes such as development, healing, and cancer spread. He serves as a Director of the NIH Interdisciplinary Biological Science and Technology Graduate Training Program and Co-Director of the NSF-CREST Center for Cellular and Biomolecular Machines at UC Merced. He previously served as Chair of the Division of Biological Physics of the American Physical Society. Gopinathan received his Integrated M.Sc. from the Indian Institute of Technology Kanpur and his Ph.D. from the University of Chicago, followed by postdoctoral research at UCLA and UC Santa Barbara. He joined UC Merced in 2006 as one of the first Physics faculty members. His honors include a 21st Century Science Initiative Scholar Award from the James S. McDonnell Foundation and election as a Fellow of the American Physical Society.

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