Sessions at the Joint Mathematics Meetings (JMM 2024)

January 3–6, 2024 • San Francisco, California

SIAM Coordinating Committee for the Joint Mathematics Meetings

Suzanne Shontz (Chair)
University of Kansas

Lorena Bociu
North Carolina State University

Ernesto Prudencio
Sandia National Laboratories

SIAM Invited Address

Topological Considerations in Genome Biology

Mariel Vazquez, *University of California, Davis*

Friday, January 5, 2024, 11:00 a.m.–12:00 p.m.

Room 207, The Moscone Center

ABSTRACT

Living organisms and some viruses carry their genetic code in very long, tightly packaged, DNA molecules. Understanding the geometry and topology of DNA is key to understanding the mechanisms of viral infection and the inner workings of a cell. We study the changes in DNA topology mediated by essential processes such as DNA packing and transcription of DNA into RNA. These processes are highly regulated, and even small structural changes can lead to catastrophic effects. We use a variety of techniques from knot theory and low-dimensional topology, aided by discrete methods and computational tools, to analyze molecular biology data produced by us and by our collaborators. In this lecture I discuss DNA packaging in viruses and the formation and entanglement of DNA:RNA hybrids that arise during transcription. The presentation is accessible to students and suitable for a diverse interdisciplinary audience.

Mariel Vazquez' research focuses on the application of topological, discrete and computational methods in molecular biology, with an emphasis on DNA packing, topological changes induced by DNA replication and transcription, and the molecular evolution of coronaviruses. Vazquez is Fellow of the American Mathematical Society and of the Association for Women in Mathematics. She received the Blackwell-Tapia Prize, the U.S. Presidential Early Career Award for Scientists and Engineers (PECASE), and the NSF CAREER Award. She has given a wide variety of invited research lectures nationally and internationally, as well as public lectures and other discrimination efforts. Vazquez' service to the mathematics profession is extensive.

Vazquez obtained a B.Sc. in Mathematics from the National University of Mexico (UNAM) and a Ph.D. from Florida State University, where she worked with De Witt Sumners and was supported by fellowships from DGAPA UNAM and the Program for Mathematics and Molecular Biology/Burroughs Wellcome Fund. After receiving her doctorate, she held appointments as a Postdoctoral Fellow/Visiting Assistant Professor at UC Berkeley working with Rainer Sachs. While at Berkeley, Vazquez received the Project NExT Fellowship. She joined the faculty at San Francisco State University in 2005, and the UC Davis faculty in July 2014. From 2019 to 2023 she served as faculty director of CAMPOS, a center dedicated to supporting a diverse group of early career STEM faculty.

Special Events

SIAM Panel on Business-Industry-Government Careers for Mathematicians

Organizer: **Nessy Tania**, *Pfizer* • **Stefan Wild,** *Lawrence Berkeley National Lab*

Thursday, January 4, 2024, 8:30 a.m.–10:00 a.m. • Room 304, The Moscone Center

Curious about careers outside of academia? Come get an insider's view about BIG, exciting, impactful careers. This discussion will feature panelists who will share their experiences and insights working as applied mathematicians in a variety of BIG careers.

SIAM Reception on Industrial Math Modeling

Thursday, January 4, 2024, 7:00 p.m.–9:00 p.m. • Foothill C, Marriott Marquis San Francisco

A big part of SIAM's mission is to build community around the application of mathematical modeling, analysis, and computation to real-world problems. Join us in celebrating the many ways that mathematical modeling has improved our lives, and learn more about SIAM's collaborative efforts to build a workforce dedicated to mathematical modeling in industry, including programs such as the MathWorks Math Modeling (M3) Challenge, Preparation for Industrial Careers in Mathematical Sciences (PIC Math, in collaboration with MAA), Graduate Student Mathematical Modeling Camp (GSMMC), Mathematical Problems in Industry (MPI) Workshop, Math Modeling Hub (in collaboration with COMAP and NCTM), and BIG Math Network.

SIAM Minisymposia and Joint Session details on reverse.

Society for Industrial and Applied Mathematics (SIAM) is a Level A Partner of the JMM. SIAM sponsors several events including an invited speaker, several minisymposia, and a reception. The program for this meeting will occur in Pacific Standard Time (PST).

Sessions at the
Joint Mathematics Meetings (JMM 2024)

SIAM Minisymposia

SIAM-USNCTAM Minisymposium on
Mathematical Modeling of Complex Materials Systems
Organizers: Maria G. Emelianenko, *George Mason University*
Dmitry Golovaty, *The University of Akron*
Thursday, January 4, 2024, 9:00 a.m.–12:00 p.m.
Room 211, The Moscone Center

SIAM Minisymposium on
Mathematics of Bacterial Viruses: From Virus Discovery to Mathematical Principles
Organizers: Javier Arsuaga, *University of California, Davis*
Carme Calderer, *University of Minnesota*
Ami Bhatt, *Stanford University*
Thursday, January 4, 2024, 1:00 p.m.–6:00 p.m.
Room 211, The Moscone Center

SIAM Minisymposium on
Computational Mathematics and the Power Grid
Organizer: Todd Munson, *Argonne National Laboratory*
Friday, January 5, 2024, 8:30 a.m.–11:30 a.m.
Room 211, The Moscone Center

SIAM Minisymposium on
Mathematical Methods in Computer Vision and Image Analysis
Organizer: Andreas Mang, *University of Houston*
Friday, January 5, 2024, 1:00 a.m.–6:00 p.m.
Room 211, The Moscone Center

SIAM Minisymposium on
Artificial Intelligence and its Uses in Mathematical Education, Research, and Automation in the Industry
Organizers: Alvaro Alfredo Ortiz Lugo, *University of Cincinnati*
Kathleen Kavanagh, *Clarkson University*
Sergio Molina, *University of Cincinnati*
Saturday, January 6, 2024, 8:00 a.m.–12:00 p.m.
Room 210, The Moscone Center

SIAM Minisymposium on
Recent Developments in the Analysis and Control of Partial Differential Equations Arising in Fluid and Fluid-Structure Interactive Dynamics
Organizers: George Avalos, *University of Nebraska-Lincoln*
Pelin Guven Geredeli, *Clemson University*
Saturday, January 6, 2024, 8:00 a.m.–12:00 p.m.
Room 211, The Moscone Center

SIAM Minisymposium on
Scientific Machine Learning to Advance Modeling and Decision Support, I
Organizers: Erin Acquesta, *Sandia National Laboratories*
Timo Bremer, *Lawrence Livermore National Laboratories*
Joseph Hart, *Sandia National Laboratories*
Saturday, January 6, 2024, 9:30 a.m.–11:30 a.m.
Room 307, The Moscone Center

SIAM Minisymposium on
Scientific Machine Learning to Advance Modeling and Decision Support, II
Organizers: Timo Bremer, *Lawrence Livermore National Laboratories*
Joseph Hart, *Sandia National Laboratories*
Erin Acquesta, *Sandia National Laboratories*
Saturday, January 6, 2024, 1:00 p.m.–3:00 p.m.
(followed by panel ending at 4:30 p.m.)
Room 307, The Moscone Center

SIAM Minisymposia (continued)

SIAM Minisymposium on
Current Advances in Modeling and Simulation to Uncover the Complexity of Disease Dynamics
Organizers: Naveen K. Vaidya, *San Diego State University*
Elissa Schwartz, *Washington State University*
Saturday, January 6, 2024, 1:00 p.m.–6:00 p.m.
Room 211, The Moscone Center

Joint Sessions

NAM-SIAM-AMS
Special Session on Quantitative Justice
Organizers: Ron Buckmire, *Occidental College*
Omayra Ortega, *Sonoma State University*
Robin Wilson, *California State Polytechnic University, Pomona*
Wednesday, January 3, 2024, 1:00 p.m.–5:00 p.m.
Room 203, The Moscone Center

MAA-AMS-SIAM
Gerald and Judith Porter Public Lecture
Speaker: Maria Chudnovsky, *Princeton University*
Saturday, January 6, 2024, 3:30 p.m.–4:35 p.m.
Room 207, The Moscone Center


Photo by Lindsey Bannister

MAA-SIAM-AMS
Hrabowski-Gates-Tapia-McBay Lecture
Speaker: Kamuela E. Yong, *University of Hawaii West Oahu*
Friday, January 5, 2024, 9:00 a.m.–9:50 a.m.
(followed by panel ending at 10:30 a.m.)
Room 207, The Moscone Center

AMS-SIAM
Special Session on Research in Mathematics by Undergraduates and Students in Post-Baccalaureate Programs
Organizers: Darren A. Narayan, *Rochester Institute of Technology*
John C. Wierman, *Johns Hopkins University*
Mark Daniel Ward, *Purdue University*
Khang Duc Tran, *California State University, Fresno*
Christopher O'Neil, *San Diego State University*
Session I: Thursday, January 4, 2024, 8:00 a.m.–12:00 p.m.
Session II: Thursday, January 4, 2024, 1:00 p.m.–5:00 p.m.
Session III: Saturday, January 6, 2024: 8:00 a.m.–12:00 p.m.
Session IV: Saturday, January 6, 2024: 1:00 p.m.–5:00 p.m.
Room 203, The Moscone Center

JPBM
Communications Award Lecture
Speaker: Natalie E. Dean, *Emory University*
Saturday, January 6, 2024, 11:00 a.m.–12:05 p.m.
Room 207, The Moscone Center

The program for these meetings will occur in Pacific Standard Time (PST).