NCCAT SINGLE-PARTICLE ANALYSIS SHORT COURSE MARCH 16-20, 2026 NEW YORK, USA

INSTRUCTOR BIOS

OLI CLARKE (COLUMBIA UNIVERSITY)

The ultimate goal of our research is a structural understanding of how the voltage gated Ca2+ channels on the plasma membrane mechanically couple to the ryanodine receptor and directly control gating of the receptor, and how adjacent RyRs in the paracrystalline arrays that have been observed at the terminal cisternae interact with one another and signal cooperatively. Intracellular calcium signaling, mediated by release of calcium from intracellular stores, is involved in many fundamental biological processes, amongst which perhaps most prominent is the coupling of nervous excitation to muscle contraction (E-C coupling). A key goal of the laboratory is to understand the mechanism by which intracellular calcium release is triggered, modulated and terminated. We use X-ray crystallography and cryoelectron microscopy (CryoEM) to investigate the structure and dynamics of the molecular machines involved in such process, including amongst others the ryanodine receptor (RyR), which mediates intracellular Ca2+ release during E-C coupling.

ANTHONY FITZPATRICK (COLUMBIA UNIVERSITY)

Trained as a biophysicist by Prof. Sir Christopher M. Dobson, F.R.S., at the University of Cambridge, Prof. Fitzpatrick balanced protein misfolding research with playing semi-professional rugby (Cambridge “Blue” ’07) to earn a Ph.D. in the structure and biophysics of protein aggregates, solving the first atomic structure of an amyloid fibril (in close collaboration with Prof. Helen R. Saibil, F.R.S., at Birkbeck College, and Prof. Robert G. Griffin, at MIT). As an outgoing international Marie Curie Fellow at CalTech, he and Prof. Ahmed H. Zewail, Nobel Laureate, pioneered ultrafast time-resolved cryo-electron crystallography of proteins by combining electron and laser optics. During the Marie Curie incoming phase, he worked with Profs. Sjors Scheres, F.R.S., and Michel Goedert, F.R.S., at the MRC Laboratory of Molecular Biology during the tremendously exciting early days of the cryo-electron microscopy “resolution revolution.” With improvements in cryo-electron microscopy, Prof. Fitzpatrick and colleagues solved the first ex vivo atomic models of Alzheimer’s disease-related tau filaments, paving the way for the investigation of these previously intractable and important structures in a range of neurodegenerative diseases. The Fitzpatrick lab continues to solve brain-derived filaments implicated in neurodegeneration. In addition, his lab has assembled a cryo-electron tomography pipeline to explore the effects of amyloid formation in neurons and glia, and is currently developing the world’s first ultrafast pulsed laser phase plate as a way to enhance contrast in cryo-electron tomograms.

JUSTIN FLATT (RCSB PDB, RUTGERS UNIVERSITY)

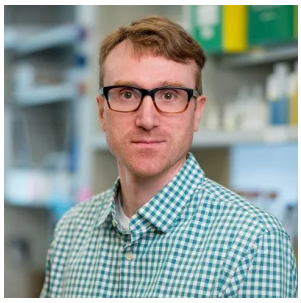
Justin is a Biocurator at the RCSB Protein Data Bank at Rutgers, The State University of New Jersey. The Protein Data Bank (PDB) was established in 1971 as the first open-access digital data resource in biology with just seven X-ray crystallographic structures of proteins. Today, the single global PDB archive houses more than 200,000 experimentally determined three-dimensional (3D) structures of biological macromolecules that are made freely available to millions of users worldwide with no limitations on usage. This information facilitates basic and applied research and education across the sciences, impacting fundamental biology, biomedicine, biotechnology, bioengineering, and energy sciences. The Worldwide Protein Data Bank (wwPDB, wwpdb.org) consists of organizations (RCSB PDB, PDBe, PDBj, BMRB, and EMDB) that jointly manages the PDB, EMDB, and BMRB Core Archives and is committed to making data Findable, Accessible, Interoperable, and Reusable (FAIR).

JOACHIM FRANK (COLUMBIA UNIVERSITY)

Joachim Frank is a Professor of Biochemistry and Molecular Biophysics and of Biological Sciences at Columbia University, and Distinguished Professor of the State University of New York at Albany. Born and educated in Germany, he received his Diplom in physics from the University of Munich. In his doctoral research, conducted at the Max Planck Institute for Biochemistry, Martinsried, and at the Technical University of Munich, he developed methods of digital image analysis as applied to electron microscopy. In his postdoctoral research, in the United States and at the Cavendish Laboratory in Cambridge, U.K., he worked on problems of electron optics and image processing. In 1975 Dr. Frank joined the Wadsworth Center in Albany, New York, as a senior research scientist, where he developed the single-particle reconstruction approach and applied it to the ribosome. He moved in 2008 to take on his current position at Columbia University. Dr. Frank shared the Elizabeth Robert Cole Award of the Biophysics Society with David DeRosier for developing methods of three-dimensional reconstruction of biological macromolecules. He is a Fellow of the American Association for the Advancement of Science and the Biophysical Society, and was invited by the Biophysical Society to give the National Lecture in 2005. In 2006 he was elected to the National Academy of Sciences, the American Academy of Arts and Sciences, and the American Academy for Microbiology. He was honored for his contributions to the development of cryogenic electron microscopy of biological molecules and the study of protein synthesis with the 2014 Franklin Medal in Life Science. In 2017 he shared the Wily Prize in Biomedical Sciences with Richard Henderson and Marin van Heel, and the Nobel Prize in Chemistry with Richard Henderson and Jacques Dubochet.

https://joachimfranklab.org/

RICH HITE (MEMORIAL SLOAN KETTERING CANCER CENTER)



Richard Hite is a Member in the Structural Biology Program at Memorial Sloan Kettering Cancer Center. Richard received his Ph.D. from Harvard Medical school working in the laboratory of Thomas Walz in 2010 and performed his postdoctoral studies at Rockefeller University in the laboratory of Roderick MacKinnon.

His research group has two primary focuses. One part of the lab focuses on determining the mechanisms of intracellular ion and metabolite transport, while the second studies protein nucleic acid interactions that are critical for maintaining genomic integrity. The Hite lab studies these fundamental processes using a variety of cell biological, biochemical, structural and biophysical tools including cryo-electron microscopy and electrophysiology.

DAVID JERUZALMI (CITY COLLEGE OF NEW YORK)

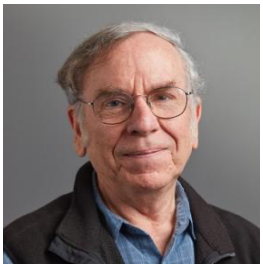
David Jeruzalmi is a Professor in the Department of Chemistry and Biochemistry at the City College of New York (CCNY) at the City University of New York (CUNY). The faithful transmission of genetic information is an important biological imperative. To carry out this function, organisms have evolved processes to replicate their genomes and defend them from attack. David studies two important mechanisms associated with these processes, DNA replication and nucleotide excision repair. His lab applies X-ray crystallography, supplemented with electron microscopy, to understand these long-standing problems in DNA biology. The Jeruzalmi lab also use biochemical studies to inform these approaches and follow up on the resulting insights.

ANDRES LESCHZINER (WEILL CORNELL MEDICINE)

Andres E. Leschziner is interested in understanding the role of macromolecular dynamics in biological function. His research group uses cryo-electron microscopy (cryo-EM) to obtain structures of macromolecules and biophysical, biochemical and cell biological techniques to test structure-based hypotheses about their functions. The group focuses on cytoskeletal motors, ATP-dependent nucleosome remodeling complexes and the Parkinson's Disease-related protein LRRK2.

Andres was born and raised in Buenos Aires, Argentina. He moved to Canada during college, where he received a BSc in biology from McGill University. He obtained a PhD in Molecular Biophysics & Biochemistry from Yale University, working in the labs of Nigel Grindley and Tom Steitz. After a post-doctoral fellowship with Eva Nogales at the University of California, Berkeley, Andres joined the Department of Molecular and Cellular Biology at Harvard University, where he was assistant and associate professor. In 2015, Dr. Leschziner joined UC San Diego and in 2025 joined Weill Cornell Medicine.

FRED SIGWORTH (YALE UNIVERSITY)



Fred Sigworth studied applied physics at Caltech and was a graduate student at Yale, working in the neuroscience laboratory of Charles F. Stevens. He received the PhD in physiology from Yale in 1979 and was a postdoc in the laboratory of Erwin Neher in Göttingen, Germany where he was a co-developer of patch-clamp techniques for single-channel electrophysiology. He returned to Yale as a faculty member at Yale in 1984. His current research is in the structural biology of ion-channel proteins, making use of novel cryo-EM methods. "How do I see the scientific enterprise? An old book puts it this way: one generation commends God's works to another. It is a great privilege to unravel the workings of ion channels, and to pass on the excitement about these molecular machines to students, colleagues and anyone else who will listen!"

ORGANIZERS AND CENTER STAFF

ED ENG (NCCAT/NEW YORK STRUCTURAL BIOLOGY CENTER)

Ed leads the operations team at the Simons Electron Microscopy Center, a world leading cryoEM facility, and is the manager and co-director of NCCAT, a NIH cryoEM service center. The national service center program allows him to engage with scientists in an open and collaborative forum to advance biomedical research. By bringing the best practices in the field to assist researchers he acts as a champion of cryoEM. His mission is to lower the barriers of access to the cryoEM technology and cross-train researchers to have accelerated impact at their home institutions.

https://nccat.nysbc.org

CHRISTINA ZIMANYI (NCCAT/NEW YORK STRUCTURAL BIOLOGY CENTER)

Christina is NCCAT's embedded scientist liaison, which serves as a main point of contact for our visiting embedded trainees and cross-training programs, ensuring they meet their cross-training goals during their time at NCCAT. With over a decade of experience as a structural biologist, Christina is excited to further the mission of training researchers to be independent users of EM techniques, with broad impact in the biomedical sciences.

https://cryoemcenters.org

MAHIRA ARAGON (NCCAT/NEW YORK STRUCTURAL BIOLOGY CENTER)

Mahira is NCCAT's research associate and lead teaching assistant (TA) for our embedded cross-training programs. For our instrumentation access she assists with our General User Proposal programs which includes Krios data collection access and staff-assisted use of Chameleon, a blot-free sample preparation device. Her experience with taking user projects from its initial stages to cryo data collection allows her to instruct users in the best practices in the field. As one of our lead TAs for the short course she will be on hand to ensure all our trainees are always supported in their journey into the art and science of cryoEM.

MICHAEL ALINK (SEMC/NEW YORK STRUCTURAL BIOLOGY CENTER)

Michael Alink is the chief engineer at the Simons Electron Microscopy Center. His mission as a lead engineer is to be a technical professional who provides engineering leadership to a team of engineers and guidance to junior engineers. He contributes to the design and ease of use of new applications and features. In addition, he ensures that service protocols are followed and product quality is maintained resulting in high-resolution structures up to atomic resolution. His interests include geometric structures, dad jokes and squash.

CATHLEEN CASTELLO (NCCAT/NEW YORK STRUCTURAL BIOLOGY CENTER)

Cathleen is NCCAT's project coordinator and is the principal lead of the NCCAT User Office (NUO). The User Office ensures that users have all the information they need to access the Center (either in person or remotely), and follows up with users to gather feedback and address any issues. As part of the responsibilities she communicates with users, sets schedules, and ensures that quality objectives are met in terms of both service and data.

DIANNE CARPEN (NCCAT/NEW YORK STRUCTURAL BIOLOGY CENTER)

Dianne is a member of the NCCAT User Office (NUO). As a part of the NUO she ensures that your queries are responded to promptly, and that you have all the information you need to make your experience with NCCAT go as smoothly as possible. She chiefly corresponds with users about on-site session logistics, ensures that you have a home base in the national center open office area, and the background work such that upon arrival you can focus on your scientific experiments.