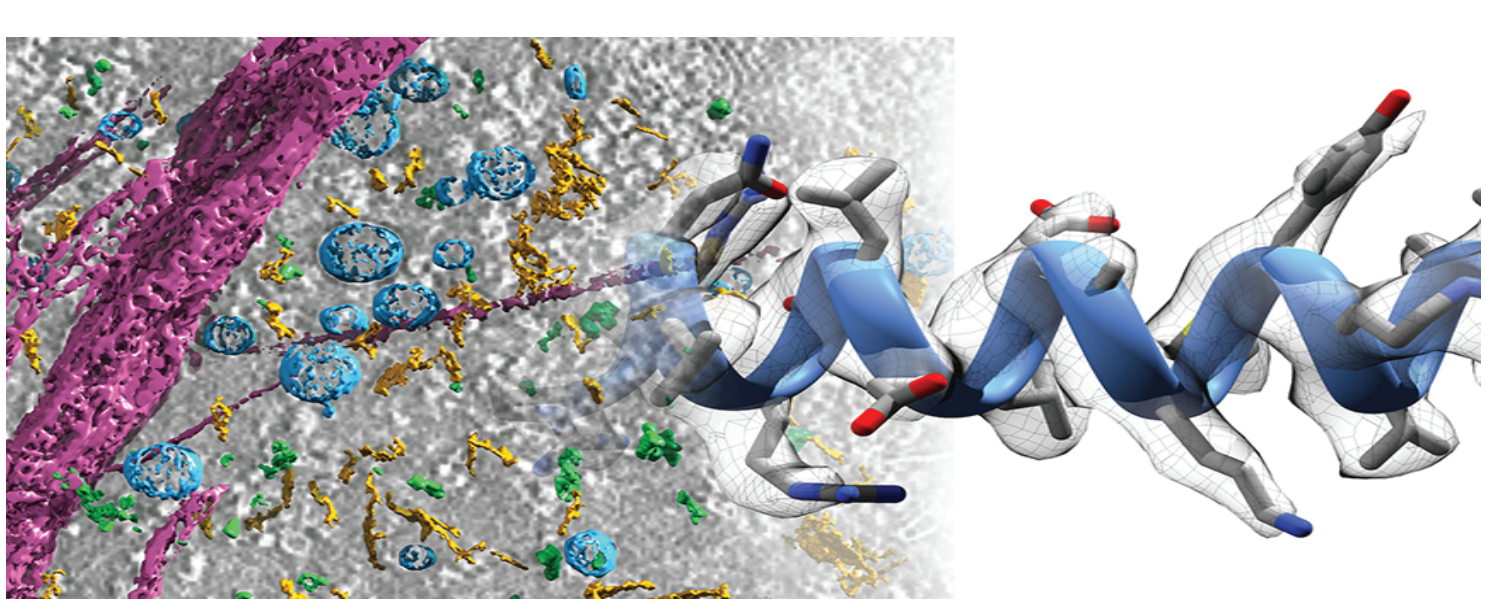
Wah Chiu

Electron Cryo-Microscopy of Molecular Machines

Electron cryo-microscopy (cryoEM) is in the midst of a revolutionary advance in resolving the biological structures of molecular machines at atomic resolutions previously either difficult or impossible to attain. We owe this achievement partly to direct electron detectors capable of recording electron images of frozen, hydrated molecular machines with enhanced signal-to-noise ratio at a full range of spatial frequencies. In addition, the availability of many different image processing software packages for 3D reconstruction contributed freely from many academic labs has facilitated structure solution. In our Center, we have been involved in hardware characterization and software developments. Collaborating with colleagues around the globe, we solved cryoEM structures of molecular machines, including viruses, chaperonins, protein complexes, and ion channels where either partial or full-atom models of the protein components can be derived from the cryoEM maps. Biological examples of this unique imaging methodology will be presented.

Wah Chiu received his B.A. in Physics (1969) and Ph.D. in Biophysics (1975) from the University of California, Berkeley. He is the Alvin Romansky Professor of Biochemistry and Director of the National Center for Macromolecular Imaging at Baylor College of Medicine. He is a pioneer in methodology development for electron cryo-microscopy. His work has made a transformational contribution toward developing the use of single-particle electron cryo-microscopy as a routine tool for the structural determination of molecular machines at atomic resolution. His NIH-funded 3DEM Resource Center has solved structures of viruses, chaperonins, ion channel proteins, molecular pumps, cytoskeleton bundles, and nuclear receptor complexes in collaboration with many scientists around the world. His active involvement in the establishment of the educational and research training infrastructure of the Gulf Coast Consortia involving seven institutions in the Houston Area has created a unique and valuable environment for cross-disciplinary collaboration and training among faculty from multiple academic departments and institutions. His research has been recognized by many honors including an elected member of Academia Sinica, Taiwan in 2008; the United States National Academy of Sciences in 2012; and the Distinguished Science Award from the Microscopy Society of America in 2014.



Wednesday, January 6, 2016 | 3:00 p.m.

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