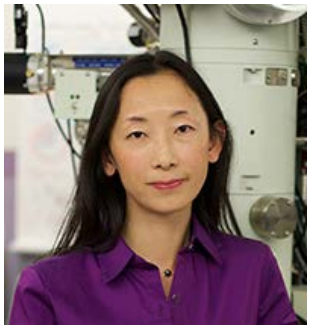
Proteomics/BioMaPS &
Department of Cell Biology and Neuroscience

Joint Seminar



Dr. Wei Dai

National Center for Macromolecular Imaging (NCMI)
Baylor College of Medicine

Visualizing Molecular Assemblies inside Cells by Cryo-electron Tomography

Date: Monday, March 16th
Time: 12 pm NOON
Location: Proteomics, Room 120

My research focuses on charactering the structures of macromolecular machinery in their cellular context using three-dimensional (3D) cryo-electron tomography (cryoET) and correlative light and electron microscopy. The structures of these intracellular macromolecular complexes are usually heterogeneous and dynamic, relying largely on interactions with other cellular components. Using cryoET to determine the structure of cellular machinery inside the cell avoids damage to the complexes during purification, captures snapshots of the complex while in action, and provides information on cross-talking of the complexes with their cellular partners during biological processes. Correlative light and electron microscopy allows us to target specific cellular components for cryoET imaging, and validates the identity of the complexes in the crowded environment of intact cells. My current research interest includes:

1. Structures of phage progeny during maturation. Using Zernike Phase Contrast technology, which dramatically increases image contrast, I visualized multiple structural states of cyanobacterial phages inside their host bacteria at different stages of infection. These 3D structures represent assembly intermediates during the phage maturation process, seen in situ, and provide insights into the coordination between protein shell assembly and genome packaging.

2. Characterization of the structure and organization of protein aggregates in Huntington's disease (HD), and elucidating the 3D architecture of the diseased cells under misfolded protein aggregation stress. Tomograms of the mutant huntingtin (mHTT) aggregates derived from cells display more structural heterogeneity than the species previously observed in studies using synthetic polyQ peptides alone. Mutant HTT assemblies are known to interact with several cellular organelles and protein complexes in neurons. Using imaging techniques to directly visualize these interactions will provide insights to potential therapeutic targets to HD, and in general to neurodegenerative diseases.

Seminar Hosts:
Proteomics/BioMaPS and Department of Cell Biology and Neuroscience

Center for Integrative PROTEOMICS Research

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