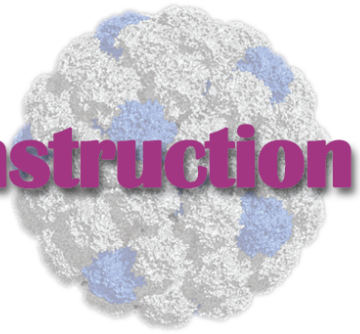
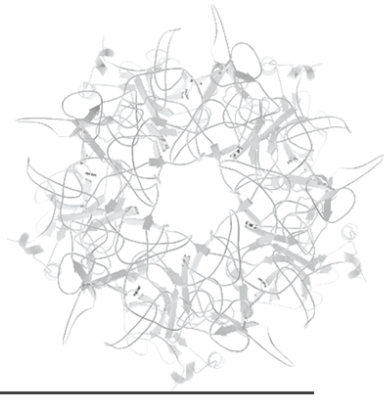
# Electron Cryo-Microscopy and 3D Image Reconstruction of Viral Nano-Machines





**Monday, October 22th, 2012**

**9:30 - 11:00 am**

**地点：厦门大学翔安校区生命科学科研平台楼**
**国家传染病诊断试剂与疫苗工程技术研究中心 402会议室**

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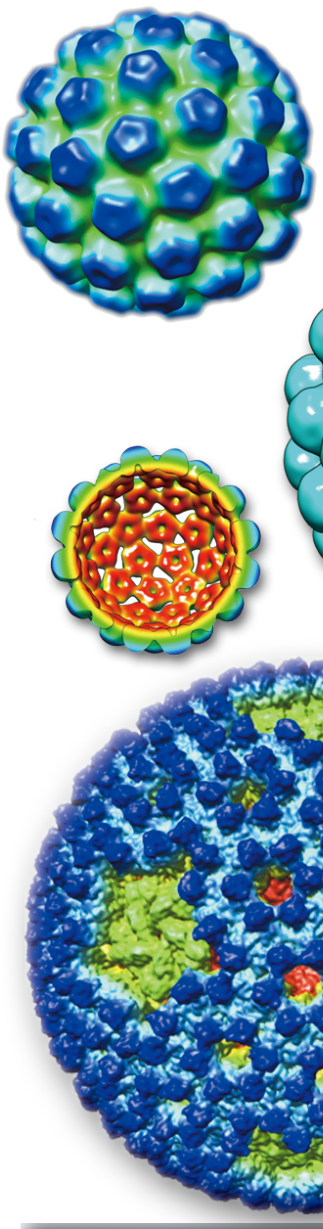

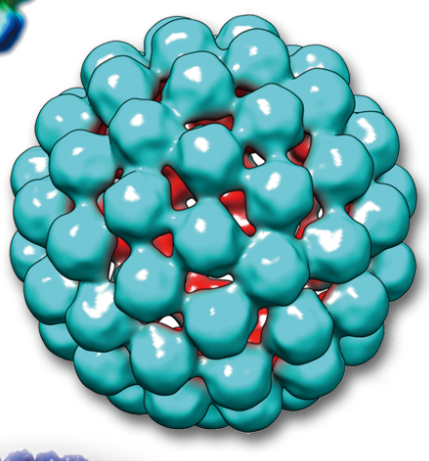






## Speaker: Timothy S. Baker, Ph.D.

**Professor** of Chemistry & Biochemistry and Molecular Biology,
Univ. of California-San Diego (UCSD)

## Honors：

NIH NIGMS Method to Extend Research In Time (MERIT) award (2004-2014)

Distinguished Scientist Award for Biological Sciences, Microscopy Society of America (2012)

## Personal Statement:

We use cryo-electron microscopy and three-dimensional (3D) image-reconstruction techniques to visualize the structures of viruses and determine how they interact with their hosts, replicate, and mature. Recent technological advances have led to an explosive growth in this field and have allowed researchers to observe macromolecules and molecular interactions at sub-nanometer and sometimes near-atomic resolutions. This enables us to trace protein chains, visualize protein-nucleic acid interactions, and study how lipids play a major role in some viruses. The main benefit of cryo-electron microscopy is that it permits the structures of biological samples to be preserved in a near native state. Images of specimens maintained at liquid nitrogen or lower temperatures are recorded in a transmission electron microscope. Cryo-reconstruction techniques are being developed to more effectively and efficiently extract usable information from the noisy image data.

Many of our computer algorithms exploit the icosahedral symmetry inherent in a large number of the viruses we study, but newer programs are being developed to handle images of viruses that do not exhibit such symmetry (e.g. tailed bacteriophage). We have developed a system, AUTO3DEM, that automates much of the tedious steps in the 3D reconstruction process and, in favorable instances, enables us to obtain sub-nanometer reconstructions in a manner of hours after images have been recorded.