



Transformative High-Resolution Cryo-Electron Microscopy (CryoEM)

Helping to Increase Access to CryoEM Technologies

What Is CryoEM?

Cryo-Electron microscopy (CryoEM) is a method used to obtain detailed images of biological molecules in their native state. Such cryoEM images can provide fundamental insights into mechanisms of action and guide scientists in identifying potential new therapeutic targets for vaccines and drugs to combat diseases. Recent advances in cryoEM technology enable users to determine structures at unprecedented detail. However, many labs have limited expertise and lack access to the necessary high-end microscopes, slowing adoption of these powerful cryoEM technologies and progress in a range of biomedical fields.

Why the NIH Common Fund CryoEM Program?

To address this issue, the NIH Common Fund, which supports trans-NIH programs that focus on major biomedical challenges and emerging opportunities, is seeking to improve the availability and utility of cryoEM by establishing three National Service Centers and four curriculum development efforts through the Transformative High-Resolution Cryo-Electron Microscopy program. The Centers' mission is to make cryoEM accessible by offering access to instrumentation, and training to increase the number of independent cryoEM laboratories. The CryoEM Centers (see below) are constructing new facilities with state-of-the-art microscopes. These centers are not yet fully established but are planning to provide user access as indicated and on-site training (see other side) by late 2019. The four curriculum development efforts (see other side) are focusing on online approaches to maximize outreach and broaden impact.

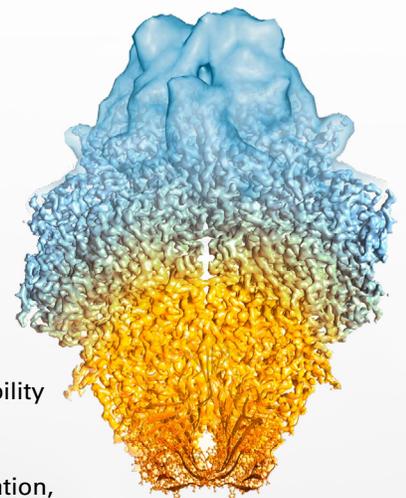


Photo Credit: Veronica Falconieri, Sriram Subramaniam, National Cancer Institute, National Institutes of Health

Find out more here: <https://commonfund.nih.gov/CryoEM>

CryoEM National Service Centers

S²C² | Stanford-SLAC Cryo-EM Center

- Located at the SLAC National Accelerator Lab, Menlo Park, CA
- Two new high-end instruments (**Titan Krios**) installed by fall 2019.
- User proposals are being accepted for limited access to currently available high-end instruments: Titan Krios and Talos Arctica.

<https://cryoem.slac.stanford.edu/s2c2/>



National Center for CryoEM Access and Training

- Located at the New York Structural Biology Center, New York, NY
- User proposals are being accepted for access to existing **Titan Krios** and **Chameleon** specimen preparation device.
- Three new high-end instruments (**Krios Cryo-TEMs**) will be available in fall 2019.

<http://nccat.nysbc.org/>

PACIFIC NORTHWEST Cryo-EM Center

- Run by Oregon Health and Science University and Pacific Northwest National Laboratory, Portland, OR
- Open for user proposals for use of a **Talos Arctica**.
- Three new high-end microscopes (**Titan Krios**) installed by summer 2019.

<https://pncc.labworks.org/>



National Centers' Onsite Training Activities

Stanford-SLAC CryoEM Center

Although the advanced facility is in development, the hosting center is offering training. While Short-Format Training is planned, the In-Residence Training applications are currently being accepted. Investigators, staff, postdocs or students are eligible. Applications will be competitively considered for available positions.

National Center for CryoEM Access & Training

Training applications can also be submitted for NCCAT's two available training programs. The Embedded Training, a 3-month immersion experience or The Facility Manager Training, open to individuals who will have amplified impact, responsible for managing, leading or training other researchers at facilities.

Pacific Northwest CryoEM Center

The training programs at this center are in development. Several types of training and cryoEM educational events are planned, including an Annual Symposium, Intensive Workshops, Personal Trainer Sessions, and 1–3 month Apprenticeships.

CryoEM Online Educational Resources

Online Curriculum: Getting Started in CryoEM Video Lectures

This comprehensive online cryoEM curriculum, being developed at the California Institute of Technology, covers theory and practice of major cryoEM modalities. The curriculum targets: expert users, including PIs teaching cryoEM in courses, and naïve users. The course will provide additional resources, including exam questions, review slides, and more.

Find out more here: <http://cryoem-course.caltech.edu/>

Online Curriculum: CryoEM 101

This online course, currently in development at the University of Utah, will have a media-rich curriculum to supplement users' own hands-on cryoEM training. The material will contain videos, animation, and interactive simulations, covering the major components of cryoEM workflow, from sample purification to image processing.

Find more info here: <https://cryoem101.org/>

Virtual Reality Augmented Hands-On CryoEM Training

CryoVR, being developed at Purdue University, will provide virtual self-paced hands-on training to help interested users overcome constraining training barriers, such as staff time, high cost, and limited access.

Find out more here: <https://www.purdue.edu/cryovr/>

Principles of CryoEM Structure Determination

This curriculum, being developed at Yale University, will provide video, software, and an e-book to provide the foundations for understanding cryoEM image processing and reconstruction.

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General Information

