Training Initiatives at Stanford SLAC Cryo-EM Center [S^2C^2]

Moving Ahead during the COVID-19 Crisis

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Remote Access Working Group
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WHO WE ARE

SLAC

S^2C^2 | Stanford-SLAC Cryo-EM Center

Supported by the NIH Common Fund Transformative High Resolution Cryo-Electron Microscopy Program

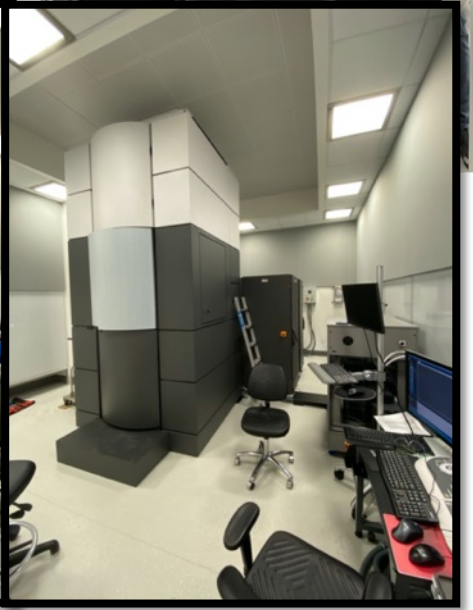
The missions of the Stanford-SLAC Cryo-EM Center (S^2C^2) are:

- to provide access to state-of-the-art cryo-EM instruments for data collection towards atomic resolution structure determination of biochemically purified single particles
- to enable scientists across the nation to become independent cryo-EM investigators

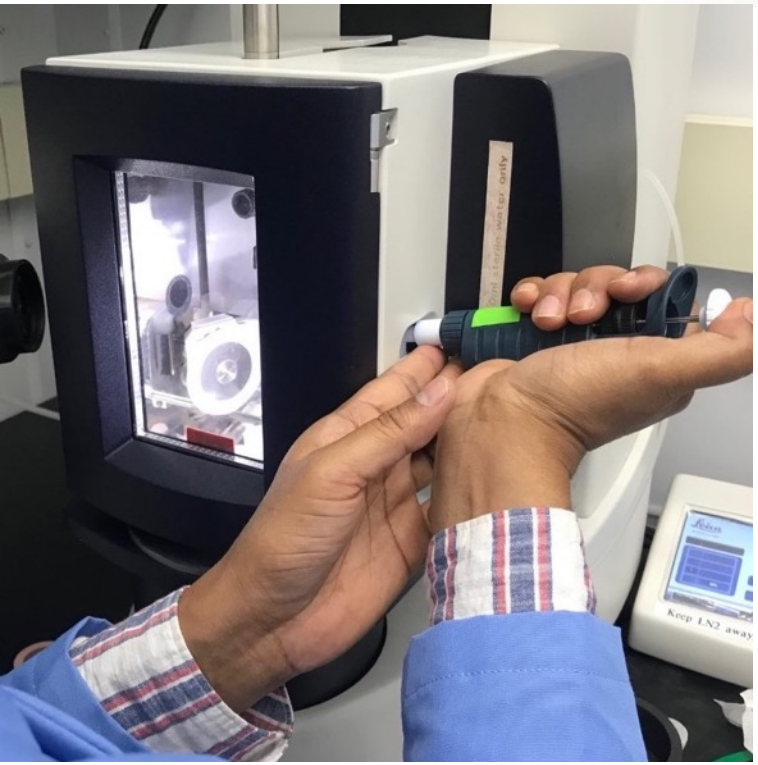
Wah Chiu (PI), Britt Hedman (M-PI), Michael Schmid (M-PI) with 5 cryo-EM specialists

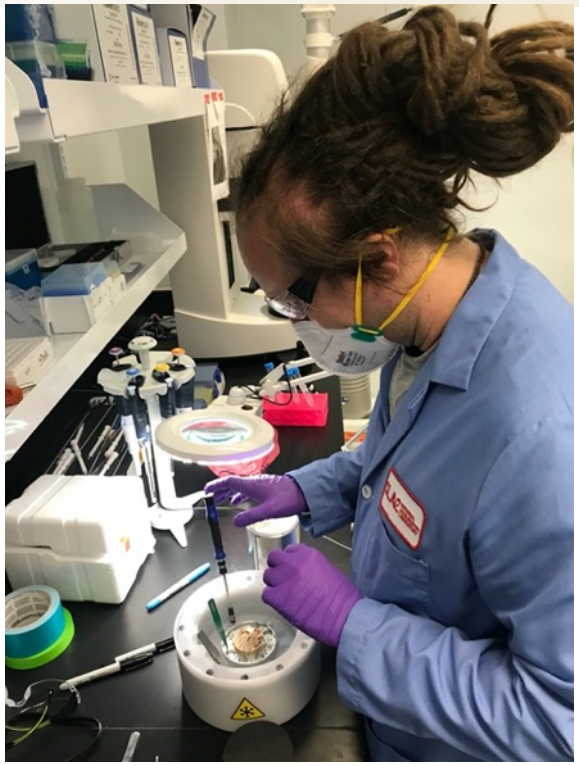
NIH U24GM129564

Our instrumentation build-out during the pandemic



Training: Sample Preparation and Challenges



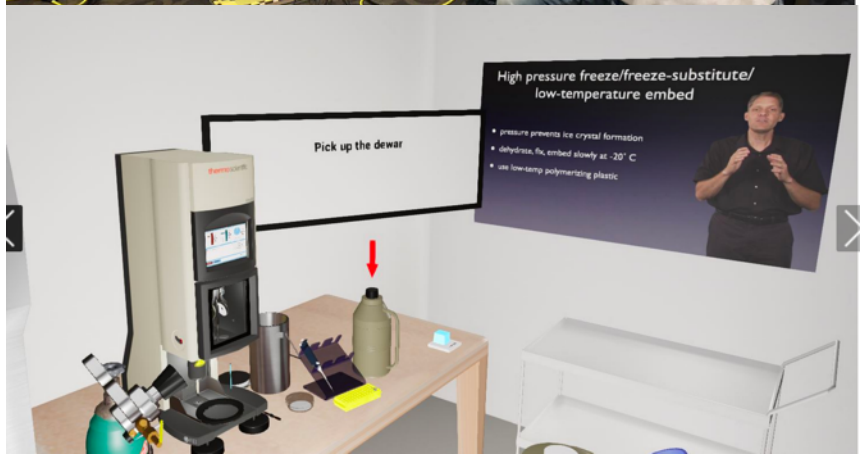


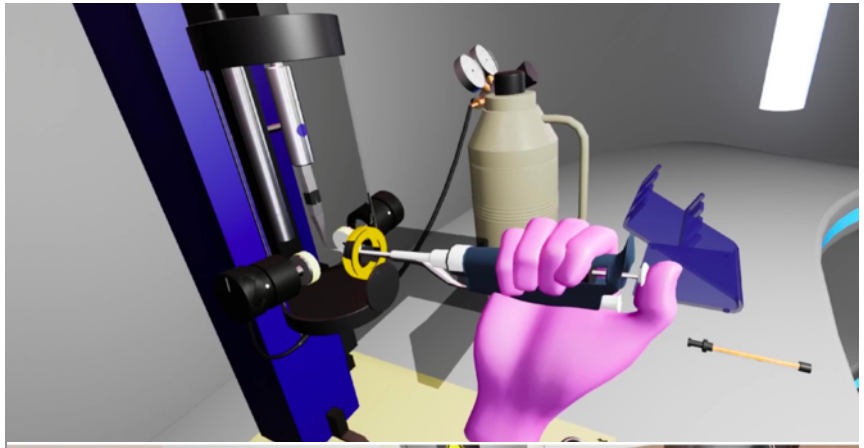
Online resources:

1. Grant Jensen's Course: https://jensenlab.caltech.edu/courses/
2. JoVE (e.g.) https://www.jove.com/v/52311/do-s-don-ts-cryo-electron-microscopy-primer-on-sample-preparation

Solutions: Virtual Reality Training - cryoVR

CryoVR is an NIH funded virtual reality training tool designed at Purdue University to familiarize users with cryoEM equipment, such as microscopes and sample preparation equipment, through a safe and accessible, virtual environment https://va.tech.purdue.edu/cryoVR/

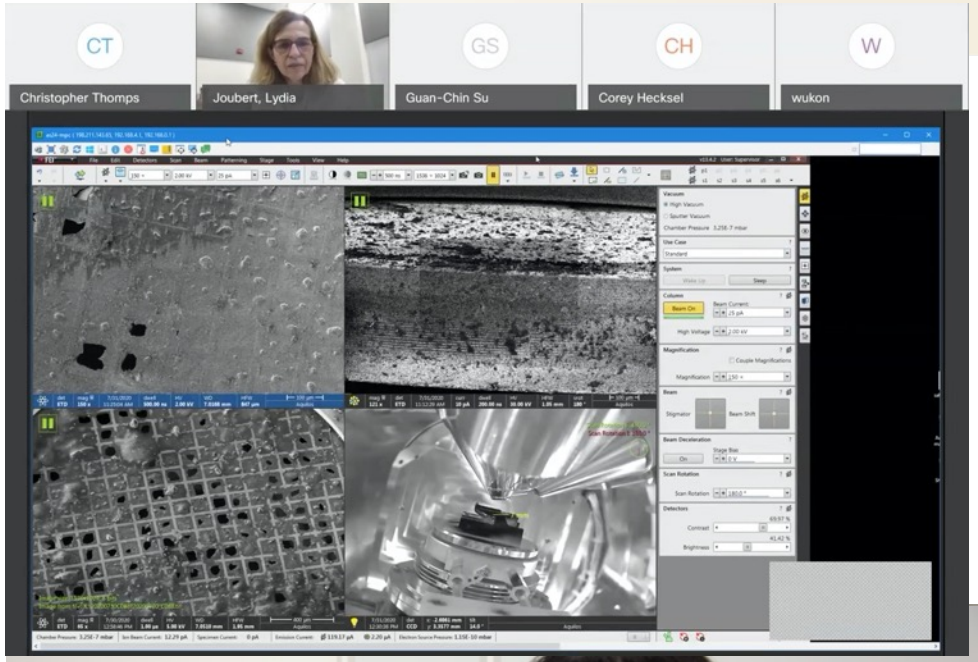




CryoVR Lite: PC version: https://www.youtube.com/watch?v=Pg9O2HbblUU&feature=emb_logo

CryoFIB-SEM: remote and on-site training

Software remote training

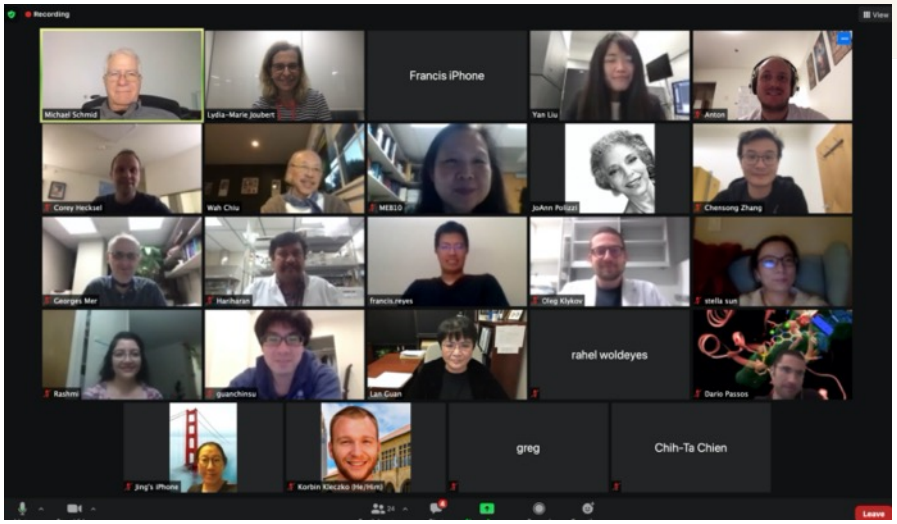


Challenges/Realities:

1. An expert on site must load the sample
2. System stability during training
3. Sample preparation and quality for training

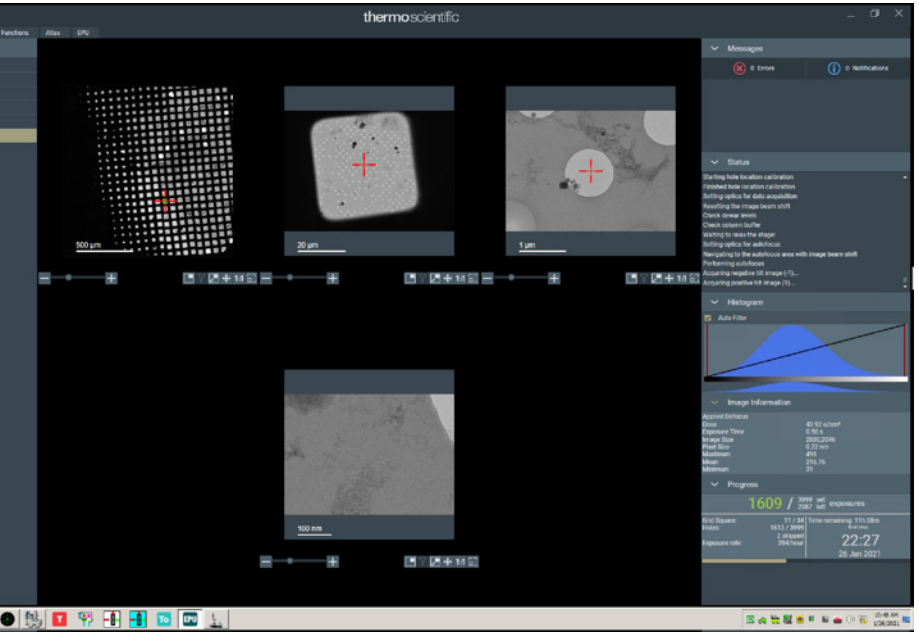
Practical aspects

Cryo-TEM: remote training and data collection

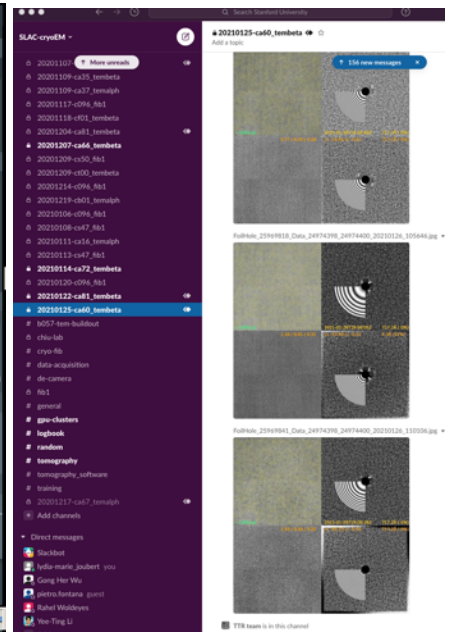


Remote Training with ThermoFisher Scientific (TFS) application specialist.
Single Particle Analysis (SPA) and cryo-Electron tomography (cryo-ET).
RAPID interface for TEM control (by TFS).
One staff member at Krios: RAPID and Zoom.
Thereafter one trainee at Krios: Zoom and FastX or RAPID.

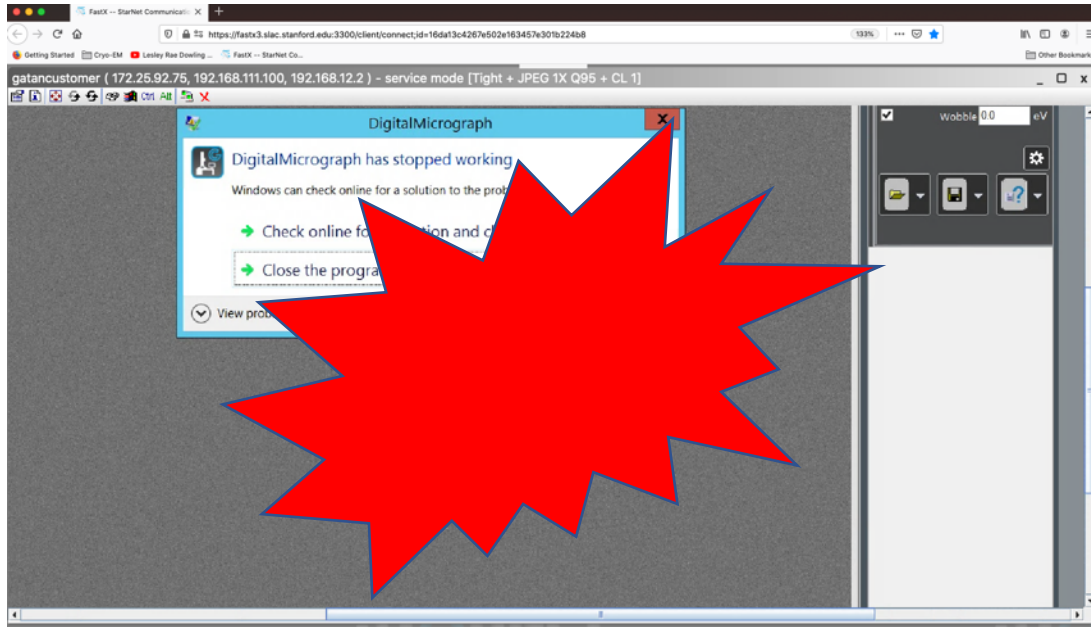
FastX: EPU data collection



SLACK: data processing pipeline



TRIALS and TRIBULATIONS: remote rescue



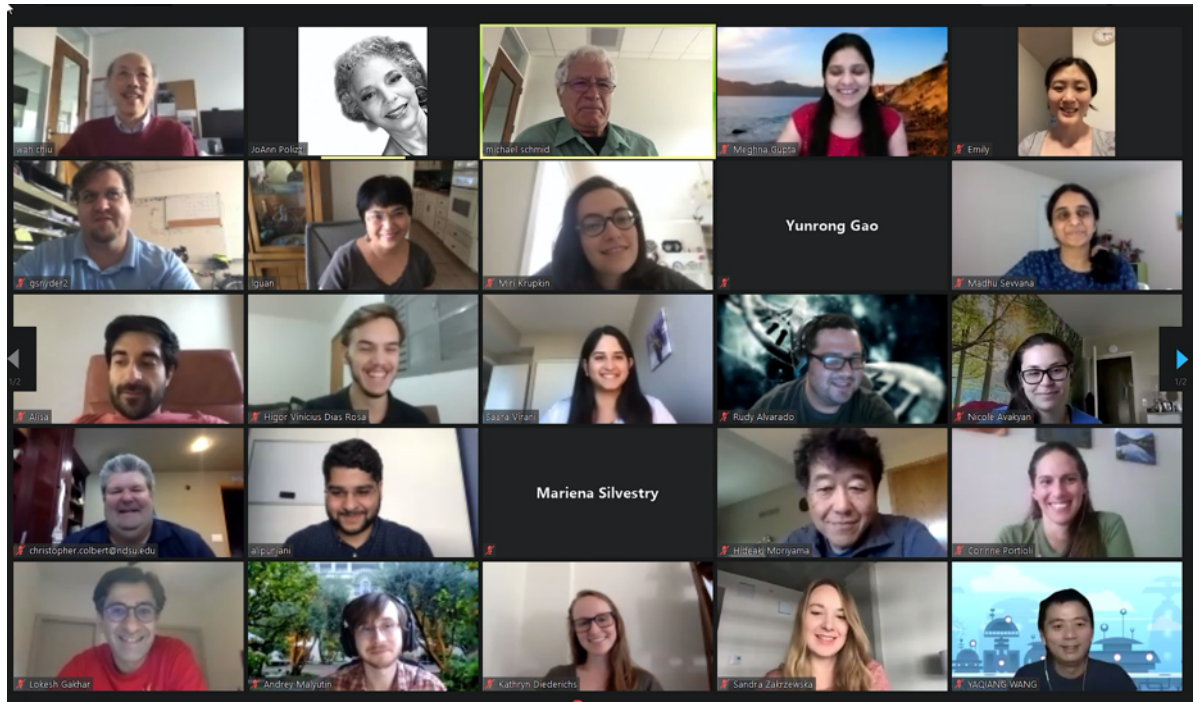
Workshops

THEN: 40-50 attendees on site

NOW: >400 attendees remotely

Topics:

1. Beginning cryo-EM
2. Data processing (SCIPION, cryoSPARK, etc)
3. Modeling (Chimera, Phenix, etc)



In Residence and Personalized Training: remotely

- Application portal: https://cryoem.slac.stanford.edu/s2c2/training/residence-training-program
- In progress:
  - Personalized training
  - Curriculum development
  - NIH Merit Badge program
  - Archive of previous workshops

  https://cryoem.slac.stanford.edu/s2c2/training/s%C2%B2c%C2%B2-workshops/archived-pdfs-and-videos-training-workshops-and-lectures

In-Residence Training Program

S^2C^2 provides in-residency cryo-TEM training to the local and international research community. We invite researchers with a variety of EM skill levels to apply for our in-residency training program, which is offered by a team of cryo-EM experts. Residency may vary in length and different aspects of cryo-TEM training will be addressed as requested by the applicant.

Who can apply?

Researchers (faculty and staff) and students with any level of qualifications that also include research experience (e.g. structural biology, biophysics and cryo-EM)

What documents are required?

- Application form
- Biosketch/CV upload
- Statement of motivation
- SLAC DOE Access form and related documents for site access

What research information and responsibilities must be specified?

- Details of applicant's current research projects and participations
- Justification of need to include cryo-EM in your current research and/or training responsibility in your affiliated lab
- Specify how training at S^2C^2 will benefit the wider research community at your institution or region.

Applications will be reviewed and awarded based on the above criteria with consideration given to the scientific merit of research projects and geographic location of the home institution.

For what period of time can residency be requested?

- Any suitable period from one week to one year
- Period of residency will be determined by applicant's need and available space at S^2C^2.

What aspects of EM training can be applied for?

- Specimen preparation
- Data collection
- Image processing
- modeling
- others

THANKS!