

Open Day of Technology **Platforms** Electron Cryo-Microscopy

31.01.2024 Carolin Seuring



Foto: Advanced Center for Ultra-fast Imaging. Excellence Cluster CUI:AIM.

cryo-EM images the small world



How the cryoEM TP contributes to UHH excellence





Real Life Sciences Teaching and Bioinformatics



Images with input from : Grange and Pražák et al. in preparation (Grünewald), Amir Banari et al. (CryoEM Team), Photographer CSSB

Cutting edge microscopes + auxiliaries in BSL-2

The Cryo-EM Facility is equipped with state-of-the-art instruments including two 300 kV electron microscopes for high-resolution data collection. All equipment can be operated remotely.



Talos L120c

- 120 kV
- CETA camera
- SerialEM

UΗ

 Cd/Te Detector (X-spectrum)



Talos Arctica

- 200 kV
- X-FEG
- Phase Plates
 - Ceta + Falcon 3EC
- + Falcon 4i (04/23)



Krios G3

- 300 kV
- X-FEG
- Bioquantum
- K3
- Phase Plates
- double-tilt stage
- + FFI (03/23)



Krios G3i

- 300 kV
- X-FEG
- BioquantumK3, Falcon 3
- N3, Falcon 3
 Phase Plates
- + FFI (05/23)



- AutoScripting
- Automatic Milling
- + iFLM (05/23)
- + cryo-lift-out

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- Plasma-FIB since 09/23
- + iFLM
 - BSL-3 heating option





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Jniversität Hamburg



Cutting edge microscopes + auxiliaries in BSL-2 + 3

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Funding CSSB Directors



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Images from Thermofisher.

Universität Hamburg

Sample Portfolio

We currently have over 30 biosafety level 2 organisms registered. Our user groups mainly work with the *herpesviridae*, *bunyaviridae*, *poxviridae* and influenza but also mycobacteria and parasites such as *Plasmodium falciparum* and *Giardia intestinalis*.





Our service: Training Modules and Workflows





Our service: 12 Training Modules and Workflows





Correlative light and electron microscopy

microED data collection

Problem:

• Pricise targetting of events

Aim:

• Improve Milling at your target site using correlation



MOF sample by Janina Sprenger, Anastasios Pateras et al.



Time-resolved sample vitrification



https://assets.thermofisher.com/TFS-Assets/MSD/Datasheets/iflm-aquilos-datasheet-ds0366.pdf

Publications from cryoEM TP





Type III needle complex



M. Lunelli et al., Plos Path. 2020





S. Albers et al., Nat Comms 2021







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DNA oriaami based tagging



E Silvester et al. Cell 202

S. Miletic et al., Nat Comms 2021

Type VII Secretion System

C. Bunduc, Nature 2021

Giardia lamblia endocytic system

unpublished, Lenka Cernikova / Kosinski Group

Type III Secretion System



cryo-Tomography review

E.R.J. Quemin et al., Ann Rev Virol. 2020

Shigella Needle Filament

V. Kotov et al., Biochem Biophys Rep 2021

Amyloid fibrils



R. Bücker et al., Nat Comms 2022

Microtubule architecture in malaria parasite



J. Ferreira et al., Nature Comms 2023

nanoparticle ensembles



Mechanism of RuvAB holiday junction branch migration



J. Wald et al., Nature 2023

hPepT1 / hPepT2



Killer et al., Science Advances, 2021

Molecular Pore in coronavirius replication organelle



super-resolution cryo-CLEM



F. Moser et al., PNAS 2019

Phenuiviridae L protein



D. Vogel et al., NAR 2020

single protein by ultrafast X-rays



Ekeberg et al., Nature Photonics in review, 2023

Herpesvirus kindergarden



Grange and Pražák et al. in preparation

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G. Wolff et al., Science 2020

Our Internal Advisory Board

Current Members:

- Arwen Pearson (tr-crystallography)
- Thomas Marlovits (electron cryo-microscopy)
- Henry Chapman (coherent diffraction imaging)
- Charlotte Uetrecht (mass spectrometry, samples)
- Maya Topf (integrative modelling)

Regular meetings - every three months.



External Advisory Board(s)

Regular evaluations by SAB Facility Specific evaluations



Who can get access and how?

- For UHH and consortium members email Ulrike Laugks via <u>cryoem@cssb-hamburg.de</u> to request access; the facility staff will organize an orientation training
- Up to 20 % of available time can be granted to external users, fees apply (Abt.
 7)
 - (1) collaborative with user groups or facility staff
 - (2) new technology developments
 - to get a quote or discuss interest, email Carolin Seuring via <u>cryoem@cssb-hamburg.de</u>
- 3 Industry in some cases (method developments)







Team CryoEM



cryoem@cssb-hamburg.de

weekly user meetings!

Carolin Seuring

Head of Technology Platform Cryo-EM

Ulrike Laugks

Specialist Cryo-Tomography (Deputy-Head)

Wolfgang Lugmayr

Staff Scientific Computing

Cornelia Cazey (Katharina Jungnickel*)

Staff Scientist Microscopy

Method development: Amir Banari

CUI-funded scientist "Jetfreezing"

Universität; Hamburg Der Forschung | der Lehre 1: der Bildung

Kay Grünewald : Scientific Director

Those interested in a tour, join me!







