Diamond BCI (Biological Cryo-imaging) User Meeting: eBIC & B24

All times UK (BST)

Wednesday 23rd April

Parallel morning satellite sessions (in-person only)

11.00 **Visualising structures in cells: latest in correlative microscopy at eBIC (Gallery Suite)**

Session host(s): Parijat Majumder (eBIC, DLS) & James Gilchrist (eBIC, DLS)

This workshop aims to guide participants through the latest advancements in cryo-Correlative Light and Electron Microscopy, with a primary focus on its application in visualizing structures inside cells. It will cover best practices in FIB milling and fluorescence-targeted FIB milling, providing a comprehensive overview of key aspects in correlative workflows, including experimental design, decision-making, sample preparation, and data handling. By integrating theoretical foundations with practical considerations, the workshop aims to deliver an enriching and informative experience. It will be particularly valuable for researchers new to the field or those interested in exploring correlative cryo-EM/ET capabilities at eBIC.

11.00 **An introduction to electron diffraction at eBIC (Conference Suite 1)**

Session host(s): David Owen (eBIC, DLS), Éilís Bragginton (eBIC, DLS), Adam Crawshaw (VMXm, DLS) & David Waterman (STFC Rutherford Appleton Laboratory)

Electron diffraction is a growing technique for deriving structural information from small molecules and macromolecules, with the promise of exploring previously intractable crystal systems, pushing the resolution envelope, and directly determining proton locations and metal ion charge states. This has been driven by increasing access to high-quality electron microscopes, dedicated electron diffraction instruments, and simultaneous improvements in detector technology, data collection strategies, sample preparation, and data analysis software. In this session, scientists from Diamond and STFC will describe our current electron diffraction set-up at eBIC, how to prepare optimal samples, and how the data is processed. We will discuss our journey to this point and developments we are planning for the future.

11.00 **HexAuFoil User Group meeting: Sharing experience and first results (Conference Suite 2)**

Session host(s): Paul Thaw (SPT Labtech) & Glenn Robinson (SPT Labtech)

The aim of the HexAuFoil workshop will be to provide updates on successful use cases for these grids via scientific presentations. We aim to include a round table discussion on use cases and any challenges encountered with experts on hand to answer HexAufoil questions as well as those more broadly relating to Quantifoil.

11.00 **Thermo Fisher meeting - Recent Advances in Cryo Electron Microscopy and Tomography (Conference Suite 3)**

Session host(s): Marc Storms (Thermo Fisher Scientfic)

In recent years, cryo-electron microscopy (cryo-EM) single-particle analysis (SPA) has greatly benefited from a multitude of technological advances culminating in breaking the atomic-resolution barrier for biological macromolecules. Since then, structural insights by cryo-EM have led to driving rational design of new vaccines and therapeutics due to high throughput and high-resolution screening and data collection technologies. Additionally, cryo-electron tomography (cryo-ET) has become an indispensable tool for structural cell biology. In this presentation we elaborate on the latest Thermo Fisher Scientific innovations for 300kV cryo electron microscopy (a.k.a. Krios 5) for SPA and cryo-ET to advance more workflow efficiency and performance. Our ongoing mission is to further improve the connectivity between the cryo-FIB and cryo-TEM for an even more streamlined tomography workflow that is safer, faster and cleaner. Data acquisition and processing can be a significant cryo-ET bottleneck. Our integrated solution, combining Thermo Scientific Tomography 5 and Tomo Live, automates pre-acquisition tasks, enhances productivity with predictive tracking and enables rapid quality assessment. Robust and optimized motion correction helps produce crisp tomograms and image quality needed for sub-tomogram averaging. Results are displayed with new quality metrics on a web platform, making the workflow user-friendly and facilitating structural biology advancements.

11.00 **Integrative Membrane Protein Structural Biology on the Harwell Campus (Conference Suite 4)**

Session host(s): Peter Harrison (eBIC/MPL, DLS) & Andrew Quigley (MPL, DLS)

The Harwell Campus is home to many national UK facilities including Diamond Light Source, the electron Bio-Imaging Centre (eBIC), the Central Laser Facility (CLF), ISIS Neutron and Muon Source, the Research Complex at Harwell among others. Diamond and the Research Complex are part of Instruct-ERIC, a European wide structural biology initiative that facilitates access for integrative structural biology. On the campus, there is a specific focus on membrane protein structural biology that includes the Membrane Protein Laboratory (MPL). The MPL is a Wellcome funded resource with expertise, methodologies and state-of-the-art instrumentation necessary to overcome some of the challenges associated with this important class of protein. Recent projects have supported visiting scientists with anything from producing challenging membrane proteins in E.coli or mammalian cells to solving structures using X-ray crystallography or single-particle cryo-EM. Through access to Diamond beamlines, dedicated to small-angle X-ray scattering or Circular Dichroism, membrane protein samples can be optimised for high-resolution approaches alongside providing critical information in solution. With the Octopus group in the CLF, super-resolution approaches can be used to look at membrane protein interactions on the surface of the cell. Efforts are now focused on bridging the gaps between the different techniques available on the campus to provide integrative solutions for membrane protein structural biology. This session is focused how MPL facilities and expertise can be leveraged to support integrative projects. There will be a short presentation before the opportunity to discuss project requirements with MPL staff. We are also keen to get feedback on the sort of support users of Diamond would like to see provided by the MPL in the future.

12:00 ***Lunch for all BCI user meeting attendees***

Diamond BCI (Biological Cryo-imaging) User Meeting: eBIC & B24

Wednesday 23rd April

Session 1:	***Chair: David Farmer (eBIC, DLS)***
13:00	**Welcome: Martin Walsh (eBIC & B24 DLS)**
13:10	**Vinod Vogirala (eBIC, DLS)** *eBIC user updates*
13:40	**David Waterman (STFC Rutherford Appleton Laboratory)** *User talk: The biogenic crystal structure of the malaria pigment hemozoin*
14:00	**Martin Rennie (University of Glasgow)** *User talk: Structural and biochemical basis of USP1 inhibition by small molecules*
14:20	**Keynote: David Sauer (University of Oxford)** *Keynote talk: Solute Carrier CryoEM: What comes after a revolution?*
15:00	***Coffee and Dectris Swiss chocolates***
Session 2:	***Chair: Kamal Nahas (B24, DLS)***
15:30	**Keynote: Valentina Loconte (B24, DLS)** *Keynote talk: Quantitative mapping of cellular ultrastructure using soft X-ray tomography*
16:10	**Sonia Rodriguez Fernandez (University of Cambridge)** *User talk: Zooming in on Metabolic Disease: Navigating Subcellular Complexity*
16:50	***Coffee and Dectris Swiss chocolates***
Session 3:	***Chair: Emma Buzzard (eBIC, DLS)***
17:20	**User meeting discussion** ***Question Hosts: Emma Buzzard (eBIC, DLS) & Éilís Bragginton (eBIC, DLS)*** ***Discussion Chairs:*** *Jamie Blaza (University of York) & Natasha Lukoyanova (Francis Crick Institute)* *Representatives from the Diamond User Committee (DUC) will lead a dynamic and interactive discussion on various topics with a panel of representatives from eBIC & B24. This is a unique opportunity for the user community to directly influence the evolution of our facilities, ensuring we provide a service that is both relevant and beneficial to the changing needs of our user community.*
18:20	**Keynote: Stephen Muench (The Astbury Centre, University of Leeds)** *Keynote talk: Back to the future: Challenges and solutions for sample preparation in single particle cryoEM*
19:00	**Drinks and Buffet reception for BCI attendees (sponsored by Thermo Fisher Scientific)**
20:30 -	**Ceilidh with 'Blackbeard's Tea Party' (sponsored by Dectris)**

Medical Research Council

Science and Technology Facilities Council

CCP-EM Spring Symposium

CCP-EM Spring Symposium Thursday 24th April

Session 1:	***Chair: René Frank (Leeds)***
9:00	Opening and welcome What's new in CCP-EM, eBIC & EMDB/EMPIAR CCP-EM: **Colin Palmer & Rangana Warshamanage**
9:45	DLS/eBIC: **Yuriy Chaban**
10:15	EBI: **Kyle Morris & Matthew Hartley**
10:45	***Coffee***
Session 2:	***Chair: Doryen Bubeck (Imperial)***
11:30	**Amit Singer (Princeton)** *RECOVAR: Cryo-EM heterogeneity analysis using regularized covariance estimation and kernel regression*
12:00	**Arjen Jakobi (TU Delft)** *Confidence-weighted and context-aware map optimisation with LocScale2*
12:30	***Lunch***
13:30	***Poster session 1***
Session 3:	***Chair: Natasha Lukoyanova (Crick)***
14:30	**Jessie Zhang (University of California, Berkeley)** *Laser phase plate in single particle analysis and tomography*
15:00	**Johannes Elferich (UMass Chan Medical School/HHMI)** *In situ high-resolution cryo-EM reconstructions from vitreous sections*
15:30	**Emily Boyle (Max Planck Institute of Biophysics)** *In situ structural analysis of a selective autophagic cargo*
15:50	***Coffee***
Session 4:	***Chair: James Streetley (Glasgow)***
16:30	**Joshua Jenkins (Leeds):** Structure and organisation of tau filaments in Alzheimer's disease postmortem human brain tissue
16:50	**Maud Dumoux (Rosalind Franklin Institute)** *Your FIB/SEM can do a lot ! Toward an integrated multi-scale workflow at cryogenic temperature*
17:20	**Andreas Engel (Case Western Reserve University)** *Nano litre multilayer sample writing to prepare vitrified grids*
17:50	*Break*
19:30	***Conference dinner***

Medical Research Council

Science and Technology Facilities Council

CCP-EM Spring Symposium

CCP-EM Spring Symposium Friday 25th April

Session 5:	***Chair: Pamala Williams (Astex)***
9:00	**Robert Englmeier (CryoCloud)**
	Towards automating cryo-EM data analysis: overcoming challenges of particle localization & preferred orientation
9:20	**Alexander Shtyrov (MRC-LMB)**
	Calculation of atomic scattering factors from cryo-EM maps
9:50	**Jose-Maria Carazo (National Center for Biotechnology-CSIC)**
	Cryo electron microscopy and conformational ensembles
10:20	***Coffee***
Session 6:	***Chair: Morgan Beeby (Imperial)***
11:00	**Nadav Elad (Weizmann Institute)**
	In-cell structure and variability of pyrenoid rubisco
11:20	**Alister Burt (Genentech)**
	Warp 2.0
11:50	**Kai Jack Zhang (Yale)**
	High-resolution in situ structures of mammalian respiratory supercomplexes
12:20	***Lunch***
13:00	***Poster session 2***
Session 7:	***Chair: Bertram Daum (Exeter)***
14:00	**Thom Sharp (Bristol)**
	In situ structural immunology: Protein structure determination from minimal systems towards whole cells
14:30	**Charlie Scarff (Leeds)**
	Capturing myosin in action with time-resolved cryoEM
15:00	*Coffee*
Session 8:	***Laura Spagnolo (Glasgow)***
15:30	**Taiana Maia de Oliveira (AstraZeneca)**
	Expanding Drug Discovery Insights: Protein dynamics and real world samples
16:00	**Wanda Kukulski (University of Bern)**
	The apoptotic factor Apaf1 inside cells during cell death - a case for cryo-CLEM
16:30	Community initiatives: Sustainable cryoEM, Tomography standards, Heterogeneity challenge
16:50	***Poster awards and meeting close***