The Electron Bio-Imaging Centre (eBIC)

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Three-dimensional electron microscopy (3D EM) is a key technique for studying large macromolecular assemblies and cellular machinery. As biomedical science moves from discovering the structures of individual proteins and small complexes towards integrating larger systems and understanding their function in the cell, the tools provided by 3D EM have become more prominent. The field is in a state of rapid development and provides many exciting opportunities to study cellular machines both in vitro and in situ. However, increasingly sophisticated equipment is needed for this work. State of the art electron microscopy is becoming too expensive and technically demanding for individual university or research institute laboratories to house and operate. To address these challenges eBIC has been recently established as a national cryo-electron microscopy centre providing peer-reviewed access to users from the UK and worldwide.

eBIC’s vision and mission

- Establish state-of-the-art facilities for single-particle analysis and cryo-tomography
- Provide cost-effective access, based on scientific excellence, to high-end microscopes and auxiliary equipment (including the containment facilities at OPIC, Oxford)
- Run 24/7, similar to a synchrotron beamline and supported by expert staff (the first of its kind worldwide)
- Provide a focus for future hardware/software developments
- Grow and train the user community- especially structural biologists and cell biologists, with facilities for advanced sample preparation
- Remain at the cutting edge with a strong in-house research program
- Form a key part of Diamond’s vision for an integrated approach to structural and cellular biology

Techniques on offer at eBIC

- Single Particle cryo-electron microscopy
- Molecular cryo-electron tomography
- Cellular cryo-electron tomography
- Focused Ion-Beam Milling and Imaging
- Electron crystallography (coming soon)

eBICs Krios user program offers free access for academic users for single particle and tomography projects. Access is through Block Allocation Groups (88%) or Rapid access, including iNEXT (12%).
Figure 1. Annual publications from eBIC staff and users. A total of 63 external user publications have been produced to date, many in high-ranking journals. 2019 data is January to June.

Figure 2. Focused ion-beam milling & imaging. This technique uses our Scios & Aquilos DualBeam Scanning Electron Microscope (SEM) and Focused Ion Beam (FIB) instruments. The primary use of the instruments is to generate thin lamellae of cellular samples for cryo-electron tomography. Our cryo-FIB user program offers 2 modes of access: standard (5 day) access comprising 3 days of sample milling and 2 days of Krios tomography time; or rapid access for 1-day of sample milling.

References: