

Cockcroft Institute Seminar

Molecular Structure Determination by combining Free-electron Laser Diffraction with Synchrotron X-Ray Imaging: A case study on using an X-ray FEL and storage ring

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Walton Rooms A & B, The Cockcroft Institute

X-ray Free-electron Lasers (XFEL) represent a new and distinct generation of x-rays sources from Synchrotron sources that are beginning to see fourth generation, e.g. MAX IV and SIRIUS coming through. XFEL are unique by virtue of their high peak brilliance, ultra short pulse length and almost complete transverse coherence and thus present exciting new opportunities in structural biology. With pulse lengths lasting barely several fs it is possible to 'outrun' radiation induced damage by capturing diffraction from molecular assemblies faster than the time frame of coulombic explosion. A major goal of XFEL science is the ability to obtain high-resolution diffraction images from single particles free of radiation damage. A key step towards this goal is the development of technology and methodologies to allow such experiments to be performed. This talk will focus on the application of Coherent Diffraction Imaging, a technique that allows the retrieval of real space images from non-crystalline matter using its diffraction pattern alone, at the SACLA (XFEL) and SPring-8 (storage ring) facilities. Details of the diffraction microscopes at each facility will be described, and the particular experimental considerations for using each source will be discussed. Current results from the application of CDI, using both XFEL and synchrotron radiation, to cells and macromolecular assemblies will also be presented.

Refreshments will be available