



25th May 2011 - 15:00
FLASH HALL, Seminar Room (28c)

Keith A. Nugent

ARC Centre of Excellence for Coherent X-ray Science, University of Melbourne, Australia
and
The Australian Synchrotron

Imaging with Coherent X-rays

The Australian Research Council Centre of Excellence for Coherent X-ray Science (CXS) is a major multi-institutional centre devoted to the development of coherent X-ray imaging approaches for application to the biological sciences.

In this talk I will outline the work of my centre. In particular, I will discuss the method of Coherent Diffractive Imaging and the contributions we have been making to its development for synchrotron applications¹. We have paid particular attention to the measurement of imperfect temporal and spatial coherence and the impact it can have on the analysis of the data².

Our work on partial coherence has also enabled us to think of damage processes as a dynamic partial coherence effect. We have recently used these ideas to consider new approaches to the analysis of data from molecules irradiated with light from an X-ray free electron laser³.

If time permits and as an intriguing aside, I will also introduce the application of the phase retrieval techniques for the analysis of four-wave mixing experiments for the study of energy transfer processes in biomolecules⁴.

1. Abbey, B. et al. Keyhole coherent diffractive imaging. *Nature Physics* 4, 394-398 (2008).
2. Whitehead, L.W. et al. Diffractive Imaging Using Partially Coherent X Rays. *Physical Review Letters* 103, 243902 (2009).
3. Quiney, H.M. & Nugent, K.A. Biomolecular imaging and electronic damage using X-ray free-electron lasers. *Nature Physics* 7, 142-146 (2011).
4. Davis, J.A. et al. Non-interferometric two-dimensional Fourier-transform spectroscopy of multilevel systems. *Physical Review Letters* 100, 227401 (2008).

Host: Henry Chapman, CFEL