

“Exploitation of Coherence in Beamlines for Materials and Biological Imaging”  
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Since the introduction of undulator-powered 3rd generation light sources, X-ray diffraction experiments have been able to exploit high coherence of the beams generated. Over the last ten years, our group has been developing Coherent X-ray Diffraction (CXD) imaging techniques and applied them to a number of Materials and Biological samples. The coherence leads to new interference features in the diffraction patterns produced. These features, as fringes or speckles, contain the phase information of the diffraction pattern that is unmeasurable by standard detectors. We have developed algorithms based on Fienup's Hybrid Input-Output (HIO) method to extract the encoded phases so that the diffraction patterns can be inverted to images of the sample.

This talk will summarise the methodology of CXD and show examples of imaging strains in ZnO nanocrystals and imaging the distribution of collagen protein fibres making up the rat tail tendon. These methods should all be practical at the new Turkish Light Source.