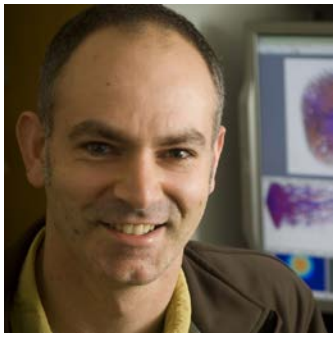
School of Physics and Astronomy

IMAGING & OPTICS SEMINAR

Date:	Tuesday 11 February
Time:	3pm to 5pm
Venue:	L1, Seminar Room 107, 10 College Walk, Clayton



3.00pm - Dr Gary Ruben, Monash University

Scavenging Compton scattered X-ray photons for tomographic benefit

Got unused X-ray photons? Sure, you could cart them down to the local op shop or sell them on ebay but why not use them to do tomography instead? Synchrotron imaging of objects produces Compton scattered photons at all angles. These encode internal structure of the object and can be captured and used to do tomography. We are combining full-field illumination with detection of the scattered photons by an array of collimated, pixelated detectors. I will describe our work in this area and show our first results showing lungs in small animals.

3.30pm - Dr Tim Gureyev, University of Melbourne

Multiple scattering and Fresnel diffraction in tomographic reconstruction of small molecules from electron defocus series

The relative roles of multiple electron scattering and in-molecule free-space propagation in transmission electron microscopy of small molecules will be discussed. It will be argued that while multiple scattering tends to have only a moderate effect in this case, the in-molecule Fresnel diffraction is likely to be significant due to the shallow depth of focus under the relevant experimental conditions. As a consequence, diffraction tomography (DT) based on the first Born or first Rytov approximation represents a more suitable method for the reconstruction of three-dimensional distribution of the electrostatic potential in this context, compared to conventional CT which relies on the validity of projection approximation. A new simplified DT method has been proposed and tested on numerically simulated examples. A different practical method utilising three-dimensional image pattern matching has also been studied, which is capable of unambiguous determination of the types and positions of atoms in small molecules from defocus series collected at only a few different angular orientations of the molecule. Numerical tests of this method will be presented which are based on multislice calculations of defocus series of small biological molecules.