# MME Seminar 2016

## Session 8

**Date:** Fri 17th Feb 2017  note the
**Time:** 10.30 to 11.30 am  *change!!*
**Venue:** Journal Room (NIE7-03-16)

## *X-Ray Video: from Science Fiction to Reality*

### *by Dr Kevin Byard*



Forming images of objects in the high energy domain, namely X-rays and gamma-rays, presents wholly different challenges compared to image formation in other regions of the electromagnetic spectrum, such as optical and radio imaging. The now standard technique for high energy imaging is coded aperture imaging (CAI). A close correspondence exists between CAI and traditional photography whereby an image needs to be 'developed' (which for CAI means that it needs to be decoded by a computer) before being able to be viewed, thus making CAI suitable only for still photography and not *video* imaging. Successful efforts by different authors have been made to speed up the decoding process for a number of existing coded aperture systems and some of these systems are briefly outlined in the presentation. However the improvements to date, while encouraging, have not been sufficient to enable viable coded aperture video images. The author and his colleagues at Singapore have developed an entirely new mathematical configuration for coded apertures, called Singer Product Apertures, that allow decoding speeds which for the first time make coded aperture video a realistic possibility. The decoding algorithm of Singer product apertures is discussed in detail and some timing results are presented.

Kevin has been working full time in the Faculty of Business and Law at AUT since July 2010, and part-time prior to this since 2008, teaching mathematics and statistics to business undergraduates. During this period he has been researching into mathematics, astronomy and pedagogy. Previous employment has included ten years as a primary school teacher and five years in the secondary sector, including time in both the UK and New Zealand. This has given Kevin a wide experience and interest in pedagogy at all levels, particularly computer and mathematics education. He undertook undergraduate and postgraduate studies at the University of Southampton, where he also worked as a full time researcher, developing the imaging system on the International Gamma-Ray Astrophysical Laboratory (INTEGRAL) for the European Space Agency. He has also completed a PhD, studying part-time at Massey University, graduating in 2010.

## *All are welcome!*