

# Seminar

## Measuring Orbital Angular Momentum of Electron Beams Using Vortex Gratings

 <b>Thursday November 12, 2020</b>	<b>Professor Koh Saitoh</b> Koh Saitoh is a Professor at the Institute of Materials and Systems for Sustainability at Nagoya University, Japan.
 <b>4.00pm (AEDT)</b>	
 <b>ZOOM – PASSCODE: 123456</b> <a href="https://monash.zoom.us/meeting/register/tZcucO-oqzsrGtZ5pXo3mA4IJZ52O8gIstNt">https://monash.zoom.us/meeting/register/tZcucO-oqzsrGtZ5pXo3mA4IJZ52O8gIstNt</a>	

### Abstract

The orbital angular momentum (OAM) of free electrons is a new degree of freedom that has attracted considerable attention in the past decade in fundamental research and for potential applications and now established. A variety of methods for generating electron beams carrying OAM have been reported. Electron OAM can be transferred via various scattering processes between an incident beam and a scatterer, such as an atom and a solid. As is the case for generation methods, techniques and devices used to measure the OAM of electrons are of great significance to novel scattering and spectroscopy experiments.

In the present seminar, we first summarize the methods to generate and to measure electron OAM reported so far, and then, we proposed a method for effectively measuring electron OAM via a two-dimensional (2D) Dammann vortex grating (DVG), which can generate an equal-intensity array among all of the desired diffraction orders. By using this device analyzer, we demonstrated the extraction of superposed OAM components of electrons with OAM values between  $-10\hbar$  and  $10\hbar$ .

Additionally, as another application of the vortex gratings, a phase retrieval method using vortex gratings is going to be presented.

### The Presenter

Koh Saitoh completed his PhD at Tohoku University, Sendai studying the structure of decagonal quasicrystals by convergent-beam electron diffraction and electron microscopy. Following the completion of his PhD he was a guest scientist at the Friedrich-Schiller University in Jena, Germany, before beginning a Humboldt Foundation Research Fellowship at Tu Darmstadt, Germany. He returned to Japan in 2003, continuing his research at the National Institute for Advanced Industrial Science and technology, Tsukuba and then moved to Nagoya University, initially at the EcoTopia Science Institute followed by the Institute of Materials and Systems for Sustainability.

### Convener

Professor Joanne Etheridge  
Director, Monash Centre for Electron Microscopy