



**The Hong Kong University of Science and Technology**

**Department of Mathematics**

**Departmental Colloquium**

*Twisted X-rays, orbital angular momentum  
and the determination of atomic structure*

by

*Prof. Richard JAMES*

*University of Minnesota*

**Abstract**

We find exact solutions of Maxwell's equations that are the precise analog of plane waves, but in the case that the translation group is replaced by the Abelian helical group. These waves display constructive/destructive interference with helical atomic structures, in the same way that plane waves interact with crystals. We show how the resulting far-field pattern can be used for structure determination. We test the method by doing theoretical structure determination on the Pfl virus from the Protein Data Bank. The underlying mathematical idea is that the structure is the orbit of a group which relates to the invariance group of the differential equations (Maxwell's equations, in this case). Joint work with Dominik Juestel and Gero Friesecke, TU Munich.

***Date: Thursday, 24 Aug 2017***

***Time: 11:00a.m. - 12:00noon***

***Venue: Room 3472, Academic Building  
(near Lifts 25&26), HKUST***

***All are welcome!***