

**IMIA Operator Algebra Seminar**  
University of Wollongong

Title: Free actions of compact quantum group on unital  $C^*$ -algebras

Speaker: Piotr M. Hajac (IMPAN / Warsaw University / University of New Brunswick)

Time and Date: 3:30pm Thursday, 29 August 2013

Location: Room 39C.tearoom

Abstract: Let  $F$  be a field,  $G$  a finite group, and  $\text{Map}(G, F)$  the Hopf algebra of all set-theoretic maps  $G \rightarrow F$ . If  $E$  is a finite field extension of  $F$  and  $G$  is its Galois group, the extension is Galois if and only if the canonical map resulting from viewing  $E$  as a  $\text{Map}(G, F)$ -comodule is an isomorphism. Similarly, a finite covering space is regular if and only if the analogous canonical map is an isomorphism. The main result to be presented in this talk is an extension of this point of view to arbitrary actions of compact quantum groups on unital  $C^*$ -algebras. I will explain that such an action is free (in the sense of Ellwood) if and only if the canonical map (obtained using the underlying Hopf algebra of the compact quantum group) is an isomorphism. In particular, we are able to express the freeness of a compact Hausdorff topological group action on a compact Hausdorff topological space in algebraic terms. Also, we can apply the main result to noncommutative join constructions and coactions of discrete groups on unital  $C^*$ -algebras. (Joint work with Paul F. Baum and Kenny De Commer.)