

# Topology Seminar

**Ian Hambleton**

of McMaster University and Fields Institute will be speaking on

## Group actions on spheres with rank one isotropy

on November 23 at 4:30 in  
MIT Room 2-131

Actions of finite groups on spheres can be studied in various different geometrical settings, such as (A) smooth  $G$ -actions on a (closed manifold) homotopy sphere, (B) finite  $G$ -homotopy representations (as defined by tom Dieck), and (C) finite  $G$ -CW complexes homotopy equivalent to a sphere. These three settings generalize the basic models arising from unit spheres  $S(V)$  in orthogonal or unitary  $G$ -representations. In the talk, I will discuss the group theoretic constraints imposed by assuming that the actions have rank 1 isotropy (meaning that the isotropy subgroups of  $G$  do not contain  $\mathbb{Z}/p \times \mathbb{Z}/p$ , for any prime  $p$ ). Motivation for this requirement arises from the work of Adem and Smith (2001) on the existence of free action on products of spheres.

The main results are as follows: we give a complete answer in setting (C), where we prove that a necessary and sufficient group theoretic condition is that certain extensions, called  $QD(p)$ , of  $SL(2, p)$  by  $\mathbb{Z}/p \times \mathbb{Z}/p$  are not involved in  $G$ . In setting (B) we encounter more group theoretic restrictions, and give a complete answer for the finite simple groups  $G$  of rank 2. The arguments use chain complexes over the orbit category. This is joint work with Ergun Yalcin.