

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.