1116-55-2421 **Courtney M Thatcher*** (cthatcher@pugetsound.edu). *Free Group Actions on Products of Spheres.*

The spherical space form problem, the classification of all groups that act freely on S^n, was first stated by Hopf in 1925, and Madsen, Thomas, and Wall provided the following strong result: a finite group G can act freely on a sphere if and only if for every p, every subgroup of order p^2 and order $2p$ is cyclic. Much work has been done related to this result and various extensions of the question, and its study provided motivation for early algebraic K-theory and surgery theory.

One direction that continues to be open and of interest is the classification of what groups can act on a product of spheres and how they act. A group G that acts on $S^n \times S^n$ cannot contain A_4 or $\mathbb{Z}/p \times \mathbb{Z}/p \times \mathbb{Z}/p$, $p > 3$ prime, as a subgroup, but it is not known whether $\mathbb{Z}/p \times \mathbb{Z}/p \rtimes SL_2(\mathbb{F}_2)$ can act on $S^n \times S^n$, for example. In this talk we will present how the subgroups, $\mathbb{Z}/p$ and $\mathbb{Z}/p \times \mathbb{Z}/p$, can act on $S^n \times S^n$. In particular, all of the $\mathbb{Z}/p$ actions are linear and determined by the first k-invariant, but cohomology calculations show further restrictions in the $\mathbb{Z}/p \times \mathbb{Z}/p$ case. (Received September 22, 2015)