Edward Swartz

Matroids and Quotients of Spheres

Abstract for the Combinatorics and Geometry/Topology Seminars 2000 February 3

The main theme is a connection between quotients of spheres by elementary abelian p-groups, and matroids representable over Z_p . We will start with problems from Riemannian geometry in which quotient spaces of the form $X=S^n/G$, where G is an elementary abelian p-group, play an important role. Then we will show how to associate a matroid M_X to X. Next we will see how M_X gives a tremendous amount of information about the geometry and topology of X. Finally, the topology of X points us toward new results in matroid theory. These include new inequalities for the Tutte polynomial of a representable matroid, and a surprisingly simple relationship between the Mobius function of a matroid and whether or not it is affine.