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Matroids and Quotients of Spheres

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The main theme is a connection between quotients of spheres by elementary abelian p -groups, and matroids representable over \mathbb{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.

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