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An introduction to the topology of symplectic quotients

This talk will be an overview of modern symplectic-geometric techniques which compute the topology of symplectic quotients. There are many parallels with the algebraic-geometric theory of GIT (Geometric Invariant Theory) quotients, and I will mention these as time allows. First, I will give a very brief account of the construction of symplectic quotients, starting from the data of a Hamiltonian compact group action on a symplectic manifold. I will then review the pioneering work of Kirwan, as well as that of her collaborators and followers (Jeffrey–Kirwan, Tolman–Weitsman, Goldin, to name a few) which allows us to compute the cohomology of these symplectic quotients using equivariant techniques “upstairs” on the original Hamiltonian space. The original work in this area uses rational Borel-equivariant cohomology. Time permitting, I will mention my recent work with collaborator Greg Landweber which generalizes this “Kirwan package” to the case of integral topological K-theory, thus incorporating torsion considerations.