

Department Colloquium

Speaker: Jordan Watts, University of Colorado, Boulder

Time: 2:30 p.m.

Place: Jeffery 234

Title: Quotients of Lie Group Actions

Abstract: It is well-known that the orbit space of a compact Lie group action is a (local) semi-algebraic variety. The algebraic structure of this variety is obtained locally via invariant theory, and by a famous result of Schwarz we also obtain a differentiable structure on this space, and so we can do analysis on it as well. In fact, the differentiable structure determines the variety. There is a question of uniqueness: given a differentiable semi-algebraic variety that comes from a compact Lie group action, is there a unique compact Lie group action, up to some form of equivalence, that yields the variety? In general, the answer is "no". However, if we restrict our attention to group actions whose stabilizers are all finite (that is, orbifolds), then the answer is yes. We will talk about this result, as well as applications of it to circle actions; especially symplectic circle actions. In particular, symplectic quotients by such circle actions are never orbit spaces of Lie group actions unless they are orbifolds, with restrictions on when this can happen. This extends a result of Herbig-Schwarz-Seaton, which is concerned with orbifolds in a slightly more algebraic setting. This talk is designed for a general mathematical audience; no prior knowledge of symplectic or algebraic geometry, invariant theory, etc., is required.