Non-Hamiltonian symplectic torus actions

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Abstract

An action of a torus T on a compact connected symplectic manifold M is Hamiltonian if it admits a momentum map, which is a map on M taking values in the dual of the Lie algebra of T. In 1982, Atiyah and Guillemin-Sternberg proved that the image of the momentum map is a convex polytope, now called the momentum polytope. In 1988, Delzant showed that if the dimension of T is half of the dimension of M, the momentum polytope determines M up to equivariant symplectomorphism. Moreover, Delzant proved that given a polytope with certain properties (now called Delzant polytopes), one can construct a manifold whose momentum polytope is precisely this one. In this talk, I will describe the classification of symplectic torus actions with coisotropic principal orbits, without assuming that the action is Hamiltonian. In this case, the polytope is one of six invariants of the manifold M. We also show that given a collection of such six ingredients, one can construct a manifold whose invariants are precisely these ingredients. This is joint work with J. J. Duistermaat from Utrecht University.