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Duistermaat-Heckman Measure of a Twisted q -Hamiltonian Space

A q (uasi)-Hamiltonian G -space (M, ω, Φ) can be viewed as a generalization of a symplectic manifold with a Hamiltonian action of a Lie group G , where one has an Ad-equivariant group-valued moment map $\Phi : M \rightarrow G$, along with an invariant 2-form ω on M satisfying a minimal degeneracy condition and whose differential is the pullback of the Cartan 3-form on G . As in the symplectic setup, a q -Hamiltonian space has a notion of Liouville form, and its push-forward under the moment map defines a Duistermaat-Heckman (DH) measure on the Lie group G that encodes the volumes of “symplectically” reduced spaces.

Building on work of Alekseev, Bursztyn and Meinrenken, we give a characterization of the DH measure of a twisted q -Hamiltonian G -space. This is a generalization in which the moment map Φ is equivariant with respect to twisted conjugation: $\text{Ad}_g^{(\tau)}(h) = g \cdot h \cdot \tau(g^{-1})$ for $g, h \in G$, where τ is a Dynkin diagram automorphism. Our main result is a localization formula for the Fourier coefficients of the DH measure, and we illustrate its use with examples relevant to Lie theory and mathematical physics.