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Non-Abelian Localization and U(1) Chern-Simons Theory

Our goal in this talk is to describe the method of non-abelian localization and how this method yields some new results in $U(1)$ Chern-Simons theory. Starting from a beautiful localization result of Duistermaat and Heckman, we review localization on a finite dimensional Hamiltonian G-space and recall how this result is generalized to path integrals in quantum field theory. In particular, we briefly recall Edward Witten's 1992 paper, "Two dimensional Gauge Theories Revisted," where non-abelian localization is introduced and applied to two dimensional quantum Yang-Mills theory, and Chris Beasley's and Edward Witten's 2005 paper, "Non-Abelian Localization for Chern-Simons Theory." We will then present our results (joint with Lisa Jeffrey), which follow by adapting the method of non-abelian localization to $U(1)$ Chern-Simons theory.