

1064-22-329

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In the 1950's, Gelfand and Zeitlin produced a basis for finite dimensional highest weight representations for certain classical groups. Thirty years later, Guillemin and Sternberg produced an integrable system on conjugacy classes of Hermitian matrices that is related to the Gelfand-Zeitlin basis for the unitary group via geometric quantization. In 2006, Kostant and Wallach developed a complexified version of the Gelfand-Zeitlin integrable system on the full Lie algebra of $n \times n$ complex matrices, $\mathfrak{gl}(n)$.

The Gelfand-Zeitlin system on $\mathfrak{gl}(n)$ integrates to a holomorphic action of a group $A \cong \mathbb{C}^{\frac{n(n-1)}{2}}$ on $\mathfrak{gl}(n)$ whose orbits of dimension $\frac{n(n-1)}{2}$ are Lagrangian submanifolds of regular adjoint orbits. In this talk, we will describe the orbit structure of the group A and discuss the algebraic integrability of the Gelfand-Zeitlin system. We will also discuss the construction of a nonlinear version of the Gelfand-Zeitlin system for the dual Poisson Lie group $GL(n, \mathbb{C})^*$. (Received September 13, 2010)