Queen's Algebraic Geometry — Seminar —

Linear and Nonlinear Gelfand-Zeitlin Integrable Systems

MARK COLARUSSO
Université Laval

Abstract

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 (i.e. maximal Poisson commuting family) 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, gl(n).

The Gelfand-Zeitlin system on gl(n) integrates to a holomorphic action of a group A on gl(n). The group A is isomorphic to $\mathbb{C}^{n(n-1)/2}$ and its orbits of dimension $n(n-1)/2$ are Lagrangian submanifolds of regular adjoint orbits. In this talk, we 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)*.

Monday 14 February 2011
16:30 – 17:30
319 Jeffery Hall