1052-22-133 **Mark Colarusso*** (mcolarus@nd.edu), Department of Mathematics, 255 Hurley Hall, Notre Dame, IN 46556-4618, and **Sam Evens** (sevens@nd.edu), Department of Mathematics, 255 Hurley Hall, Notre Dame, IN 46556-4618. *Algebraic integrability of the Gelfand-Zeitlin system on* $\mathfrak{gl}(n,\mathbb{C})$.

The Gelfand-Zeitlin integrable system on $\mathfrak{gl}(n,\mathbb{C})$ was constructed by Kostant and Wallach. They showed that it integrates to an action of a complex Lie group $A \cong \mathbb{C}^{\frac{n(n-1)}{2}}$ on $\mathfrak{gl}(n,\mathbb{C})$. Orbits of the group A of maximal dimension $\frac{n(n-1)}{2}$ form the leaves of a polarization of an open, dense subvariety of a regular adjoint orbit. We call an element of $\mathfrak{gl}(n,\mathbb{C})$ *strongly regular* if its orbit under the action of A is $\frac{n(n-1)}{2}$ -dimensional. In this talk, we discuss joint work with Sam Evens in which we extend a result of Kostant and Wallach concerning the algebraic integrability of the Gelfand-Zeitlin system to the full locus of strongly regular elements. We use decomposition classes to stratify the strongly regular set by smooth subvarieties. For each stratum we construct an étale covering and use Poisson geometry to lift the Hamiltonian vector fields of the Gelfand-Zeitlin system to the covering and integrate them to an action of a connected, commutative algebraic group. (Received August 25, 2009)