Front Range Algebra, Geometry and Number Theory Seminar

# The invariant Hilbert scheme and equivariant degenerations of spherical modules


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**Part I: Alexeev and Brion's Invariant Hilbert Scheme Through Examples** The invariant Hilbert scheme was introduced by V. Alexeev and M. Brion in 2003 as a new tool for the classification problem of affine algebraic varieties equipped with an action of a complex reductive group G. Given a finite-dimensional G-module V, the invariant Hilbert scheme classifies those closed G-subschemes Z of V whose coordinate ring O(Z) has a prescribed G-module structure. I will introduce this object and some of its basic properties by means of several elementary examples.

**Part II: Equivariant degenerations of spherical modules for groups of type A** We will work over the complex numbers. When an algebraic group G acts on an affine variety X, the coordinate ring O(X) of X is naturally a G-module. A natural question is whether (or to what extent) the G-module structure of O(X) determines its G-algebra structure. In the setting where G is a reductive linear algebraic group and the G-module O(X) has finite multiplicities, V. Alexeev and M. Brion brought geometry to this question by constructing a moduli scheme which parametrizes the G-multiplication laws "compatible" with the given G-module structure. After briefly reviewing examples of this moduli scheme due to S. Jansou, P. Bravi and S. Cupit-Foutou, I will discuss joint work with S. Papadakis on the case where the given module structure is that of the coordinate ring of a spherical module (i.e. a finite dimensional G-module which is spherical as a G-variety) and G is of type A. In all these examples, the moduli schemes are open subschemes of invariant Hilbert schemes.

Thursday January 20th 2011
3:00-5:00 p.m.
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