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The invariant Hilbert scheme of V. Alexeev and M. Brion: a survey.

In 2003 V. Alexeev and M. Brion introduced the invariant Hilbert scheme as a new tool for the classification problem of affine algebraic varieties equipped with an action of a complex reductive group G . It is a common generalization of the G -Hilbert scheme of Y. Ito and I. Nakamura (where G is finite) and of the multigraded Hilbert scheme of M. Haiman and B. Sturmfels (where G is diagonalizable). Loosely speaking, it brings geometry to the following natural question: to what extent does the G -module structure of the coordinate ring of an affine G -variety determine its algebra structure?

In this talk I will present the definition and basic properties of the invariant Hilbert scheme and discuss several examples due to S. Jansou, N. Ressayre, J. Budmiger, T. Becker and R. Terpereau. I will then give an overview of the applications of the invariant Hilbert scheme to the classification of spherical varieties, including work by P. Bravi, S. Cupit-Foutou, S. Papadakis, G. Pezzini and me. (Received February 11, 2013)