

# AN EXAMPLE OF AN $SL_2$ -HILBERT SCHEME

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ABSTRACT. Group actions play an important role in many fields within mathematics and physics. A natural aim is to understand the orbits of such an action. In the context of algebraic geometry one can assign a so-called *Hilbert function* to an orbit (or to its topological closure, respectively). Given now an algebraic group  $G$  acting on an affine variety  $X$  and given a fixed Hilbert function  $h$ , a recent theorem by Alexeev and Brion states that under some additional minor assumptions there exists a so-called *equivariant Hilbert scheme* parametrising all closed  $G$ -stable subschemes of  $X$  with Hilbert function  $h$ . There are, however, virtually no examples known of equivariant Hilbert schemes illustrating this theorem.

In this talk we explain these ideas and give an approach to this topic, always bearing in mind a concrete example of an  $SL_2$ -action, where we can - at least partially - say something on the corresponding Hilbert scheme.

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