RANK VARIETIES, SCHEMES OF TORI, AND THE REPRESENTATION TYPE OF INFINITESIMAL GROUPS

In this talk we shall be concerned with representations of infinitesimal group schemes that are defined over an algebraically closed field of positive characteristic. This part of general representation theory is not nearly as well understood as its classical precursor, the modular representation theory of finite groups. Most of the standard methods of the latter, such as the Mackey decomposition theorem, fail for infinitesimal groups.

Recent work by Friedlander-Suslin has made methods from homological algebra and algebraic geometry amenable to applications. In particular, one can define support varieties and rank varieties of modules. The representation type of the underlying group is reflected in the size of the rank varieties.

While rank varieties consist of subgroups analogous to the elementary abelian groups of a finite group, schemes of tori are varieties of groups of multiplicative type. They enable us to study the structure of groups with small rank varieties. In the final part of the talk, which is based on joint work with Detlef Voigt, I will show how these methods lead to a reasonably good understanding of infinitesimal groups of finite and tame representation type.