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Some graded analogues of one-parameter subgroups and applications to the cohomology of graded group schemes

Throughout, we work over a field of characteristic $p > 0$. Let $\mathbb{G}_{a(r)}$ denote the r -th infinitesimal Frobenius kernel of the additive group scheme \mathbb{G}_a . In 1997, Suslin, Friedlander, and Bendel showed that the cohomology variety of a height- r infinitesimal group scheme G identifies with the variety of homomorphisms $\nu : \mathbb{G}_{a(r)} \rightarrow G$. They called this the ‘variety of infinitesimal one-parameter subgroups of height $\leq r$ in G .’ The SFB theorem provided a direct analogy for infinitesimal group schemes of Quillen’s 1971 stratification theorem for finite groups, which roughly states that the cohomology variety of a finite group G is determined by the varieties of the elementary abelian p -subgroups of G . Later, Friedlander and Pevtsova unified the results of Quillen and SFB through the machinery of π -points.

In this talk I will discuss joint work with Jonathan Kujawa in which we begin extending the results of SFB to the broader context of graded group schemes, or equivalently, to finite-dimensional cocommutative Hopf superalgebras (i.e., Hopf algebras in the braided monoidal category of $\mathbb{Z}/2\mathbb{Z}$ -graded vector spaces). In particular, I will discuss a family of finite supergroup schemes that may play the role of SFB’s infinitesimal one-parameter subgroups, and I will discuss our progress in using this family of supergroup schemes to describe (up to a finite morphism) the cohomology variety of $GL_{m|n(r)}$, the r -th Frobenius kernel of the general linear supergroup $GL_{m|n}$.