Algebra Seminar

On semi-simplicity of tensor products in positive characteristics

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Abstract: We work over an algebraically closed field k of characteristic p greater than 0. In 1994, Serre showed that if semi-simple representations V_i of a group \Gamma are such that \sum (dim(V_i) - 1) less than p, then their tensor product is semi-simple. In the late nineties, Serre generalized this theorem comprehensively to the case where \Gamma is a subgroup of G(k), for G a reductive group, and answered the question of complete reducibility of \Gamma in G (Seminaire Bourbaki, 2003). In 2014, Deligne generalized the results of Serre (of 1994) to the case when the V_i are semi-simple representations of a group scheme \mathfrak{G}. In my talk I will present the recent work of mine with Deligne and Parameswaran where we consider the case when \mathfrak{G} is a subgroup scheme of a reductive group G and generalize the results of Serre and Deligne. A key result is a structure theorem on doubly saturated subgroup schemes \mathfrak{G} of reductive groups G. As an application, we obtain an analogue of classical Luna's etale slice theorem in positive characteristics.

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