Title: On semi-simplicity of tensor products in positive characteristics.

Abstract: We work over an algebraically closed field $k$ of characteristic $p > 0$. In 1994, Serre showed that if semi-simple representations $V_i$ of a group $\Gamma$ are such that $\sum (\dim V_i - 1) < p$, 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 $G$, (Seminare 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 $\mathcal{G}$. In my talk I present the recent work of mine with Deligne and Parameswaran where we consider the case when $\mathcal{G}$ 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 $\mathcal{G}$ of reductive groups $G$. As an application, we obtain an analogue of classical Luna’s étale slice theorem in positive characteristics.