

Sandwich classification theorem by generic element method

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The talk is about the lattice of subgroups of a Chevalley group $G(R)$ over a commutative ring R , containing the elementary subgroups $D(R)$ of another Chevalley group over the same ring. The standard description of the lattice asserts that it splits into a disjoint union of «sandwiches», parametrized by ideals of R . For example, the standard description in the case of $G = SL_n$ and D being the elementary subgroup of a classical group in the natural representation, was obtained by Nikolai Vavilov and Victor Petrov in 2000-2007. The most difficult step in the proof is extraction of a nontrivial elementary unipotent element. Using "decomposition of transvections" guarantees that the extracted unipotent is nontrivial. When "decomposition of transvections" does not work, this is a very difficult problem. Our method is to extract a unipotent from the generic element of the group scheme. It is easy to check that it is nontrivial. If it vanishes for all homomorphisms, sending the generic element to the elements of a considered subgroup H , then H lies in a closed subscheme. Using the result over fields and for subradical subgroups we show that this is impossible. Thus, H contains an elementary root unipotent as required.

The talk is based on joint work with Roman Lubkov.

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