

Root Graded Groups

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Abstract

Let Φ be a finite root system. A Φ -graded group is a group G together with a family of subgroups $(U_\alpha)_{\alpha \in \Phi}$ satisfying some purely combinatorial axioms. The main examples of Φ -graded groups are the Chevalley groups of type Φ , which are defined over a commutative ring and which satisfy the well-known Chevalley commutator formula. We show that if Φ is of rank at least 3, then every Φ -graded group is defined over some algebraic structure (e.g. a ring, possibly non-commutative or, in low ranks, even non-associative) such that a generalised version of the Chevalley commutator formula is satisfied. A new computational method called the blueprint technique is crucial in overcoming certain problems in characteristic 2. This method is inspired by a paper of Ronan-Tits.

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