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Makar–Limanov's conjecture on free subalgebras

The purpose of this talk is to show that over every countable field K there is a nil algebra R such that the algebra obtained from R by extending the field K contains noncommutative free subalgebras of arbitrarily high rank.

It is also shown that over every countable field K there is an algebra R without noncommutative free subalgebras of rank two such that the algebra obtained from R by extending the field K contains a noncommutative free subalgebra of rank two. This answers a question of Makar–Limanov.