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Polynomial identities and central polynomials of associative algebras

In my talk I will start by giving an overview of some of the links that the theory of polynomial identities has with other branches of mathematics.

Then I will focus on the progress made in the last few years in the construction of invariants of the identities of an algebra involving central polynomials.

Let A be an associative algebra over a field F and $F\langle X \rangle$ the free associative algebra of countable rank.

A polynomial $f \in F\langle X \rangle$ is a central polynomial of A if for any $a_1, \dots, a_n \in A$, $f(a_1, \dots, a_n) \in Z(A)$, the center of A . In case A takes only the zero value, f is a polynomial identity of A whereas if it takes a non-zero value in $Z(A)$, we say that f is a proper central polynomial of A .

For instance $[x_1, x_2]^2$ is a proper central polynomial of $M_2(F)$, the algebra of 2×2 matrices over F .

I will compare the growth of the spaces of central polynomials, proper central polynomials and polynomial identities of an algebra A in characteristic zero, in a sense that I will explain. I will be interested in the asymptotic behavior of certain corresponding numerical sequences, and I will construct some algebras with specific extreme properties.