Polynomial Identities in Algebra

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In this seminar we will introduce the theory of polynomial identities. The algebras that satisfy at least a non-trivial polynomial identity are called PI-algebras. The theory of PI-algebras arises from group theory and can be seen, in some sense, as a generalization of the commutative world. Studying the identities of a PI-algebra is a very difficult problem, so that mathematicians tried to analyze them with combinatoric objects and asymptotic methods.

Indeed, some of the most important results in PI-theory are about the asymptotic behavior of the sequence $c_n(A)$, that denotes the dimension of the the space of multilinear polynomials of degree n modulo the polynomial identities of an associative PI-algebra A.

In order to recover information on the identities of an associative PI-algebra A, we will introduce central polynomials, explaining why they are important for the research on polynomial identities. Also their behavior can be studied by analyzing the behavior of a sequence: $c_n^z(A)$ denotes the dimension of the space of multilinear polynomials of degree n modulo the central polynomials of an associative PI-algebra A.

In 2018, Giambruno and Zaicev established, for associative algebras, the existence of the limit

$$\lim_{n\to\infty} \sqrt[n]{c_n^z(A)}.$$

In this talk we will present research advances on this problem, with special focus on associative superalgebras with superinvolution.

This talk is based on [1], a joint work with Antonio Ioppolo, Antônio Augusto dos Santos and Ana Cristina Vieira.

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References

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