

SEMINARIO DI GEOMETRIA E ALGEBRA

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Dipartimento di Matematica UniBa, Aula IX (primo piano)

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A generalization of Cayley-Hamilton algebras and an introduction to their geometries

Abstract.

There are several important theorems concerning the subject of matrix embeddings. Many of these results aim to address the following fundamental question: When does a given ring have an embedding into $n \times n$ matrices over some commutative ring? An obvious necessary condition is that the ring must satisfy the polynomial identities of $n \times n$ matrices, but this condition is not sufficient for $n > 2$. Procesi proved that an algebra R with trace can be embedded into $n \times n$ matrices over some commutative ring if and only if it satisfies the Cayley-Hamilton identity of degree n . Here we recall that the Cayley-Hamilton polynomial of a matrix a can be written as a polynomial whose coefficients are polynomials in the traces of a^k , $k \geq 1$. Such algebras are known as Cayley-Hamilton algebras. Interestingly, the image of this embedding aligns with a ring of invariants, hinting at potential geometrical applications. The main goal of this talk will be to discuss these results in algebras far beyond Cayley-Hamilton algebras, presenting recent developments and findings in this area. This research is supported by the São Paulo Research Foundation (FAPESP), grant N° 2023/04011-9.



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