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SEMINÁRIO DE GEOMETRIA

Dia 17 de Novembro (sexta-feira), às 14h00, sala 6.2.33

On polynomials with given Hilbert function

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Abstract: The rank of a homogeneous polynomial F of degree d is the minimal number of summands when it is written as a sum of powers of linear forms. In terms of apolarity the rank is the minimal length of a smooth finite apolar subscheme, i.e. a subscheme whose homogeneous ideal is contained in the annihilator of the form in the ring of differential operators. We define the *cactus rank* of F as the minimal degree of *any* scheme apolar to F (not necessarily smooth). The cactus variety of degree d forms is the closure of the family of degree d forms with cactus rank r .

Bernardi and Ranestad proved that the cactus rank of a general cubic form F in $n + 1$ variables is at most $2n + 2$ and conjectured that this upper bound is attained for $n \geq 8$. In a joint work with these authors and Jelisiejew, we present a decomposition of the cactus variety of cubic forms based on sets of Gorenstein Artinian algebras defined by polynomials with given Hilbert functions, with the aim of tackling its dimension and thus give an approach to computing the cactus rank of a general cubic.

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