SEMINARIO DI GEOMETRIA E ALGEBRA

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Aula multimediale (2° piano)

Dipartimento di Meccanica, Matematica e Management (DMMM), Politecnico di Bari

via Edoardo Orabona 4 - 70125 Bari

Nicola Picoco (Università di Bari)

Cayley–Bacharach property: a little history and some applications

Abstract. The Cayley–Bacharach condition is a very classical property that found its roots in ancient and classical geometry. In this talk we retrace the main steps through the history that have led to the modern formulation. We show how being Cayley–Bacharach with respect to the complete linear system of hypersurfaces of given degree forces a set of points in the projective space to lie on a reduced curve of low degree. In particular, starting from a result for points in the projective plane due to Lopez and Pirola, we present some partial extensions to any $\mathbb{P}^n$. Moreover, in a joint work with F. Bastianelli, we study the Cayley–Bacharach condition for points on Grassmannians; we rephrase the Cayley–Bacharach condition as a property for linear subspaces and we prove that this property affects their geometry. Namely, we get an upper bound for the dimension of the linear span of linear subspaces satisfying Cayley–Bacharach conditions. Finally we apply these results to different topics. The main one is the computation of the covering gonality of the 3-fold and 4-fold symmetric product of a smooth complex projective curve of genus at least 4 and 5 respectively. Other applications concern linear series on curves lying on smooth surfaces in $\mathbb{P}^3$ and the so-called correspondences with null trace.

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