SEMINARIO

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Sumsets, semigroups and Castelnuovo-Mumford regularity of projective monomial curves

Abstract: Given $A = \{a_0, \ldots, a_{n-1}\}$ a finite set of $n \geq 4$ non-negative integers that we will assume to be in normal form, i.e., such that $0 = a_0 < a_1 < \cdots < a_{n-1} = d$ and relatively prime, the s-fold sumset of A is the set sA of integers obtained by collecting all the sums of s elements in A. On the other hand, given an infinite field k, one can associate to A the projective monomial curve $\mathcal{C}_A$ parametrized by A, that is, the Zariski closure of

$$\{(v^d : u^{a_1} v^{d-a_1} : \cdots : u^{a_{n-2}} v^{d-a_{n-2}} : u^d) \mid (u : v) \in \mathbb{P}^1_k\} \subset \mathbb{P}^n_k .$$

This allows us to establish a bridge between Additive Number Theory and Commutative Algebra and obtain some results connecting the Castelnuovo-Mumford regularity of $\mathcal{C}_A$ and the behaviour of the sumsets sA.

This talk is based on a joint work with Philippe Gimenez

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