

# Unlikely intersections and applications to Diophantine problems

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The Zilber-Pink conjectures on unlikely intersections deal with intersections of subvarieties of a (semi)abelian variety or, more in general, of a Shimura variety, with "special" subvarieties of the ambient space. These conjectures generalize many classical results such as Faltings' Theorem (Mordell Conjecture), Raynaud's Theorem (Manin-Mumford Conjecture) and André-Oort Conjecture, and have been studied by several authors in the last two decades.

After a general introduction to these problems, I will present results of unlikely intersections in families of abelian varieties, such as relative Manin-Mumford (proved in a series of paper by D. Masser and U. Zannier) and subsequent generalizations obtained in joint work with F. Barroero.

The proof of these results follows the well-established Pila-Zannier strategy, first introduced by the two authors in 2008 to give an alternative proof of Raynaud's theorem. The strategy combines counting theorems on rational points of bounded height in o-minimal structures (Pila-Wilkie's theorem and subsequent generalizations) with other diophantine ingredients. I will also present applications of these results to other Diophantine problems, such as solvability of Pell equations in polynomials and more recent applications to a conjecture of Silverman on the GCD of certain divisibility sequences over function fields.