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Differential Equations and Unlikely Intersections

In many cases of interest, special points on algebraic varieties are cut out by algebraic differential equations. For example, on a moduli space of abelian varieties there are algebraic differential equations capturing the isogeny classes and there are differential polynomials vanishing on finitely generated subgroups of abelian varieties. From differential algebra and the model theory of differentially closed fields, one may deduce explicit bounds on the certain unlikely intersections of such sets.

In this lecture, I will explain the differential algebraic method to compute such bounds in detail and illustrate it by answering some questions of B. Mazur on Hecke orbits and nonmodular automorphisms.