

Point counting and foliations

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I'll talk about bounds for the number of algebraic points in transcendental sets. This subject has a long history, but it received a major push with the Pila-Wilkie counting theorem and its numerous applications in diophantine geometry and functional transcendence. I'll give an overview of the state of the art on this theorem and some of the applications, and the main open problems and conjectures.

I will then discuss how the study of leaves of algebraic foliations, and their images under rational maps, presents a good setup for attacking these open problems. I'll also explain how this leads to polynomial-time algorithms (some effective, and some involving an undetermined constant) for various problems in diophantine geometry (Andre-Oort, relative Manin-Mumford, Pell's equation over the polynomials). Finally I'll also discuss how this theory leads to new proofs of Galois-orbit lower bounds for special points in abelian varieties and Shimura varieties.