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Rational points near hypersurfaces

The distribution of rational points on algebraic varieties is a central problem in number theory. An even more general problem is to investigate rational points lying very close to manifolds, where the algebraic condition is replaced with the non-vanishing curvature condition. In this talk, we will establish a sharp upper bound for the number of rational points of a given height and within a given distance to a hypersurface. This has surprising applications to counting rational points lying on the manifold; indeed setting the distance to zero, we are able to prove an analogue of Serre's Dimension Growth Conjecture (originally stated for projective varieties) in this general setup. Our main innovation in the proof is a bootstrap method that relies on the synthesis of Poisson summation, projective duality and the method of stationary phase.