

Abstracts Week 3

János Kollár

Title: Szemerédi–Trotter-type theorems in dimension 3

Abstract: The Szemerédi–Trotter theorem bounds the number of incidences in a configuration of m lines and n points in the plane. The main term is $m^{2/3}n^{2/3}$.

We estimate the number of incidences in a configuration of m lines and n points in dimension 3. For non-planar configurations the main term is $mn^{1/3}$ if we work over the real or complex numbers but $mn^{2/5}$ over finite fields. Both of these are optimal, aside from a multiplicative constant that is at most 5.

Zsolt Patakfalvi

Title: A generic vanishing theorem in positive characteristic

Abstract: I will present a generic vanishing type theorem in positive characteristic. I will also introduce a new invariant, the S-Kodaira dimension, which can be thought of as the Frobenius stable Kodaira dimension. Examples of applications of the above mentioned generic vanishing type theorems, that I will present, are:

1) If the S-Kodaira dimension of a smooth variety X over an algebraically closed field of positive characteristic is zero, then the Albanese morphism of X is surjective. In particular, the first Betti number of X is at most twice the dimension of X .

2) A characterization of smooth projective varieties birational to ordinary abelian varieties.

This is joint work with Christopher Hacon.

Karl Schwede

Title: F-singularities with the computer

Abstract: I will discuss recent work on a Macaulay2 package for computing things like test ideals, F-pure thresholds, F-regularity and F-signature. The goal will be to show what can be computed and give you an idea of what still needs to be done and improved. This is a joint project with Daniel Hernandez, Moty Katzman, Sara Malec, Pedro Teixeira and Emily Witt.

Kevin Tucker:

Title: Comparing multiplier ideals to test ideals on numerically \mathbb{Q} -Gorenstein varieties

Abstract: In this talk, I will focus on the connection between two important measures of singularities: multiplier ideals in characteristic zero and test ideals in positive characteristic. While their relationship is well understood in many cases (e.g. hypersurface or finite quotient singularities), it remains conjectural for non- \mathbb{Q} -Gorenstein varieties. I will discuss positive recent progress on this conjecture for so-called numerically \mathbb{Q} -Gorenstein varieties (which include all normal surface singularities). This is joint work with T. de Fernex, R. Do Campo, and S. Takagi.