

Course 4

Algebraic cycles and birational geometry

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Abstract:

The course is centered on the Chow group of algebraic cycles on an algebraic variety. Some introductions to this material are Hartshorne's section II.6 on Divisors and Appendix A on Intersection Theory. We will mostly use what we need from Fulton's Intersection Theory without proof.

One main theme of the course is the notion of "decomposition of the diagonal", which describes the geometric consequences that hold for a variety with "small" Chow groups. The basic argument by Bloch and Srinivas is very simple, once you know the formal properties of Chow groups.

The course will end with applications of these ideas to birational geometry. In particular, we will use Chow groups to prove a striking recent result: many Fano hypersurfaces X in projective space are not stably rational. (That is, no product of X with projective space is birational to projective space.)