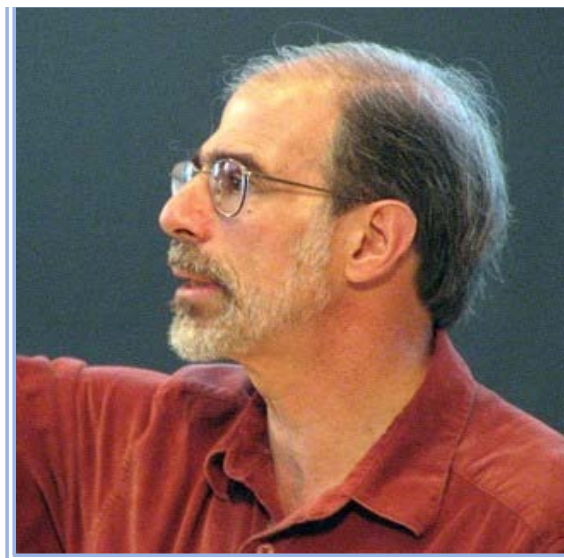


Ellis R. Kolchin Memorial Lecture



David Eisenbud

University of California, Berkeley

“Vector Bundles and Free Resolutions”

Free resolutions of graded modules over polynomial rings are a way of generalizing the solutions of a system of linear equations over a field. Their study was initiated by David Hilbert as a way of obtaining invariants of projective algebraic varieties. Vector Bundles on projective spaces are a different way of encoding the solution of systems of linear equations with varying coefficients.

A group of remarkable conjectures about free resolutions by Boij and Soederberg in 2006 suggested a novel way of thinking about graded modules and set off a wave of activity. The conjectures have now been proven, and themselves greatly extended. The proofs have led, among other things, to a still mysterious duality between a description of the numerical invariants that are possible for the free resolution of a graded module on one side, and the numerical invariants of the cohomology of a vector bundle on projective space on the other. As a result we now have far more precise understanding of both these geometrically important objects.

I will try to give an accessible description of some of this new work, mostly through examples from elementary algebraic geometry.

Tuesday, April 20, 2010, 4:30 PM

Lehman Auditorium, 202 Altschul Hall, Barnard College (Enter at 117th Street & Broadway)

Tea will be served at 4:00 PM

508 Mathematics Hall, Columbia University

(Enter at 117th Street & Broadway)