Department of Mathematics
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ALGEBRAIC GEOMETRY AND COMMUTATIVE ALGEBRA SEMINAR

Speaker: Anand Patel
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Date: Thursday, September 14, 2023
Time: 3:30 PM
Location: 258 Hurley Hall
Zoom URL: NA

Lecture Title:
Counting cubic surfaces

Abstract

The classical Thom-Porteous formulas essentially tell us how many times a matrix of a particular rank arises in a family of matrices. In other words, it tells us how many times a matrix is equivalent to the particular rank r matrix of the form $\begin{pmatrix} 1 & 0 & \dots & 0 \\ 0 & 1 & \dots & 0 \\ \vdots & \vdots & \ddots & 0 \end{pmatrix}$ after performing row and column operations. The formulas themselves are certain expressions in chern classes of the vector bundles involved. The main point of my talk is to advertise the simple observation that these sorts of formulas continue to exist beyond linear algebra. Unfortunately, the new formulas are mostly intractable right now. In the ultra-classical world of cubic surfaces, however, Anand Deopurkar, Dennis Tseng and I did find some success, and my talk will focus primarily on this case. Our key formula unlocks things like: a general cubic surface arises 96120 times in a general 4-dimensional linear system of cubic surfaces, or a general cubic surface arises 42120 times as a hyperplane section of a general cubic threefold.