ALGEBRAIC GEOMETRY AND
COMMUTATIVE ALGEBRA SEMINAR

Speaker: Amy Huang
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Date: Wednesday, April 17, 2019
Time: 3:00 PM
Location: 258 Hurley Hall

Lecture Title:
Syzygies of Determinantal Thickenings via General Linear Lie Superalgebra Representations

Abstract

The coordinate ring $S = \mathbb{C}[x_{i,j}]$ of space of $m \times n$ matrices carries an action of the group $\text{GL}_m \times \text{GL}_n$ via row and column operations on the matrix entries. If we consider any $\text{GL}_m \times \text{GL}_n$-invariant ideal $I$ in $S$, the syzygy modules $\text{Tor}_i(I, \mathbb{C})$ will carry a natural action of $\text{GL}_m \times \text{GL}_n$. Via BGG correspondence, they also carry an action of $\Lambda^*(\mathbb{C}^m \otimes \mathbb{C}^n)$. It is a recent result by Raicu and Weyman that we can combine these actions together and make them modules over the general linear Lie superalgebra $\text{gl}(m|n)$. We will explain how this works and how it enables us to compute all Betti numbers of any $\text{GL}_m \times \text{GL}_n$-invariant ideal $I$. The latter part will involve combinatorics of Dyck paths.