

ALGEBRA GRADUATE STUDENT SEMINAR

Guest Speaker: Emanuela Marangone
University of Notre Dame

Date: Friday, September 8, 2023

Time: 1:00 PM

Location: 258 Hurley Hall

Zoom URL: notredame.zoom.us/j/97124319354



Lecture Title:

The non-Lefschetz locus, jumping lines and conics

Abstract

An Artinian Algebra A has the *Weak Lefschetz Property* (WLP) if there is a linear form, ℓ , such that the multiplication map $\times \ell$ from A_i to A_{i+1} has a maximal rank for each integer i . We want to study the set of linear forms for which maximal rank fails, this is called the *non-Lefschetz locus* and has a natural scheme structure. An important result by Boij–Migliore–Miró-Roig–Nagel states that for a general Artinian complete intersection of height 3, the non-Lefschetz locus has the expected codimension and the expected degree. In this talk, we will define in a similar way the non-Lefschetz locus for conics. We will show that for a general complete intersection of height 3, the non-Lefschetz locus for conics has the expected codimension as a subscheme of \mathbb{P}^5 , and that the same does not hold for certain monomial complete intersections. The non-Lefschetz locus for Artinian complete intersections can be generalized to modules $M = H_*^1(\mathbb{P}^2, \mathcal{E})$ where \mathcal{E} is a vector bundle of rank 2. In this case, we show that the non-Lefschetz locus is exactly the set of jumping lines of \mathcal{E} , and the expected codimension is achieved when \mathcal{E} is general. In the case of conics, the same is not true. The non-Lefschetz locus of conics is a subset of the jumping conics, but it is a proper subset when \mathcal{E} is semistable with first Chern class even.