

# Algebra and Geometry Seminar

**Speaker:** Matthew Mastroeni (Iowa State University)

**Title:** Chow rings of matroids are Koszul

**Abstract:** The Chow ring of an algebraic variety is an algebro-geometric analog of the cohomology ring of a smooth manifold that encodes important information about the intersections between its subvarieties. Feichtner and Yuzvinsky computed a presentation for the Chow ring of a smooth toric variety associated to a matroid (and some other data) which is now called the Chow ring of the matroid. These rings have garnered significant attention in recent years thanks to their role in establishing long-standing conjectures on the combinatorics of matroids, including the resolution of the Heron-Rota-Welsh Conjecture by Adiprasito, Huh, and Katz and the resolution of the Top-Heavy Conjecture by Braden, Huh, Matherne, Proudfoot, and Wang.

From a commutative algebra standpoint, Chow rings of matroids are very nice graded Artinian Gorenstein rings defined by quadratic relations, and so, a natural conjecture posed by Dotsenko is that the Chow ring of a matroid is always Koszul. In this talk, we will discuss how the combinatorics of a matroid influences algebraic properties of its Chow ring, culminating in recent joint work with Jason McCullough giving an affirmative answer to Dotsenko's conjecture.