Cleveland State University
College of Science

COLLOQUIUM

Francesca Gandini

Visiting Assistant Professor

Department of Mathematics

Kalamazoo College (MI)

Degree bounds for invariant skew polynomials

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https://csuohio.zoom.us/j/91945126460

Bio: Francesca Gandini is a Visiting Assistant Professor at Kalamazoo College, a small liberal arts college in western Michigan. Her research interests lie at the intersection of commutative algebra, invariant theory, and representation theory. She enjoys investigating questions that can be studied with a computational or combinatorial approach. Before her time in Kalamazoo, she received her Math PhD from the University of Michigan under the supervision of Harm Derksen. At Michigan she also earned a master in Post-Secondary Science Education with her master work supervised by Pat Herbst. She completed her bachelor and master integrated program in Mathematics at the University of Edinburgh in the UK with her master work supervised by Milena Hering.

Abstract: When we consider the action of a finite group on a polynomial ring, an invariant is a polynomial unchanged by the action. A famous result of Noether states that in characteristic zero the maximal degree of a minimal generating invariant is bounded above by the order of the group. Our work establishes that the same bound holds for invariant skew polynomials in the exterior algebra. Our approach to the problem relies on a theorem of Derksen that connects invariant theory to the study of ideals of subspace arrangements. We reduce the problem to establishing a bound on the Castelnuovo-Mumford regularity of intersections of linear ideals in the exterior algebra, which we prove using tools from representation theory. We also examine another result from classical invariant theory, Weyl's Polarization Theorem, and show that this result does not hold in the exterior algebra but also provide an alternative bound that does hold in this context.