# Christopher G. Eppolito (Binghamton)

# Geometric Algebra for Matroids

## Abstract for the Combinatorics Seminar 2016 April 4

In a 1989 paper, Dress and Wenzel create a group which recasts the realization problem for matroids in a more algebraic framework. In particular, they prove that for any matroid M there is a “universal representation ring” R such that the set of ring homomorphisms from R to any field F is in natural bijection with the set of realizations of M over F. This approach naturally extends to an algebraic criterion to determine which matroids admit orientation via a chirotope.

In the first talk I construct two groups related to the combinatorial structure of a general matroid and prove that these groups are cryptomorphic via an exact sequence. In the second talk I exploit this machinery to sketch a proof of the aforementioned result.

This is Mr. Eppolito's Admission-to-Candidacy examination. The examining committee consists of Laura Anderson (chair), Michael Dobbins, and Thomas Zaslavsky.

All interested persons are welcome to attend.

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