

## Christopher G. Eppolito (Binghamton)

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### Geometric Algebra for Matroids

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#### Abstract for the Combinatorics Seminar 2016 April 4

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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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