

Ed Swartz (Cornell)

Representations of Matroids

Abstract for the Combinatorics and Number Theory Seminar 2003 February 10

What is the nature of linear independence over fields of different characteristics? For a specific vector space, what are the possible geometric point configurations? Matroids, introduced by Whitney in 1935, are a framework for answering these and other questions involving notions of independence such as algebraic independence. In the 70's researchers of real hyperplane arrangements, the simplex algorithm, and directed graphs were independently and simultaneously led to oriented matroids. This combinatorial abstraction of linear independence in an ordered field can always be realized by an arrangement of pseudospheres. We now know that if we allow homotopy spheres then all matroids have such a representation.

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Last update: **2020/01/29 19:03**