

Matroids and algebraic geometry

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Abstract

Matroids are combinatorial structures that generalize various notions of independence: e.g. linear or algebraic. To any matroid one naturally associates a normal, projective toric variety. Many combinatorial properties of matroids can be expressed in terms of the associated toric varieties. One of the examples is White's conjecture, which predicts generators of the ideal of the associated toric variety. We will prove that these generators indeed define the correct projective scheme. We will also show White's conjecture for strongly base orderable matroids. As an application, we provide a scheme-theoretic description of the closure of any torus orbit on any flag variety of type A_n (e.g. Grassmannian).

These results are from a joint work with Michal Lason.