

Modularly Contractible Representable Matroids and Projective Geometries

Ken Bogart
Dartmouth College

Abstract

In the geometric lattice of flats of an affine geometry, all proper contractions are projective geometries and thus modular lattices. In this talk we ask which (representable) matroids have the property that all proper contractions have lattices of flats which are modular. In the case of binary matroids, the answer is a lovely generalization of the relationship between affine and projective geometries: all the proper contractions of a nonmodular binary matroid (of rank at least 4) are modular if and only if the matroid is a projective geometry with a flat deleted. More generally, all the proper contractions of a nonmodular representable matroid (of rank at least 4) are modular if and only if the matroid is obtained from a projective geometry by deleting a set which does not contain exactly q points from any line of a q -ary projective geometry. We will outline a proof of these results. This is joint work with David Neel.