

# ON REPRESENTABLE MATROIDS WITH LARGE PLANES

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ABSTRACT. Two  $GF(q)$ -representable matroid  $M(A)$  and  $M(B)$  may be isomorphic as matroids, but there may be no way of obtaining matrix  $A$  from matrix  $B$  by applying elementary row operations, column permutations, or a field automorphism. In this case we say  $A$  and  $B$  are inequivalent representations of the same matroid. Inequivalence in matroids is closely related to solving Rota's conjecture that  $GF(q)$ -representable matroids have a finite list of minimal excluded minors. We prove that inequivalence is not an issue for 3-connected  $GF(q)$ -representable matroids with large planes (planes with at least  $2q$  elements) because they are stabilized by their rank 3 minors. We also prove that any 3-connected  $GF(5)$ -representable matroid with a  $PG(2, 5)$  minor is uniquely representable over  $GF(5)$ .

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