1037-05-123 **Rudi Pendavingh*** (`rud@win.tue.nl`), TU/e, HG 9.30, Den dolech 2, P.O.Box 513, 5600MB Eindhoven, Netherlands, and **Stefan van Zwam**. *Partial fields and matroids with several inequivalent representations over $GF(5)$.*

et $D := \{(-1)^s 2^t \mid s, t \in \mathbb{Z}\} \cup \{0\}$. A matrix A is *dyadic* if the determinant of each submatrix of A is in D. A matroid is dyadic if it is represented by a dyadic matrix. A theorem of Whittle states that the following are equivalent for a matroid M:

1. M is dyadic;
2. M is representable over $GF(3)$ and $GF(5)$; and
3. M is representable over $GF(p)$, for $p = 3$ and all p such that $p = 2 \bmod 3$.

We present a lifting theorem for partial field homomorphisms. As a corollary we obtain Whittle's Theorem and a characterization of the matroids representable over $GF(4)$ and $GF(5)$ announced by Vertigan. We also characterize matroids with k representations over $GF(5)$.

Let $G := \{i^a(1-i)^b \mid a, b \in \mathbb{Z}\} \cup \{0\}$, where i is the complex unit. A matrix A is *Gaussian* if the determinant of each submatrix of A is in G. A matroid is Gaussian if it is represented by a Gaussian matrix. We show that if M is a 3-connected non-dyadic matroid, then the following are equivalent:

1. M is Gaussian;
2. M has two representations over $GF(5)$, and
3. M has two representations over $GF(p)$, for all p such that $p = 1 \bmod 4$.

(Received January 29, 2008)