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Projection-Forcing Multisets of Weight Changes

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Let F be a finite field. The *Hamming weight* of a vector is the number of nonzero entries. A multiset S of integers is called *projection forcing* if every linear map φ: F^n —> F^m, whose multiset of weight changes, $\{w(\varphi(v)-w(v)\}$, is S, is a coordinate projection up to permutation of entries. The MacWilliams Extension Theorem from coding theory says that S = {0, 0, ..., 0} is projection forcing.

In work with Josh Brown Kramer, we give a (super-polynomial) algorithm to determine whether or not a given set S is projection forcing. we also give a condition that can be checked in polynomial time that implies that S is projection forcing.
