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John I Haas* (haasji@missouri.edu). *Two families of weighted complex projective 2-designs.*

Weighted complex projective 2-designs are valuable because they provide optimal state determination in quantum experiments involving fixed numbers of outcomes. Two examples of such objects with equal weights are *maximal sets of mutually unbiased bases*, which are known to exist whenever the dimension of the underlying Hilbert space is a prime power, and *maximal sets of equiangular lines*, which are believed to exist in all dimensions but have only been verified in a finite number of cases.

In this talk, we consider the the case of unequal weights. By generalizing known constructions of 1-designs based on difference sets, we construct two infinite families of weighted complex projective 2-designs. Whenever the dimension M of the underlying Hilbert space is a prime power plus one, we obtain complex projective 2-designs of $M^2 + 1$ points, and whenever M is a prime power, we obtain complex projective 2-designs of $N = M^2 + M - 1$ points. In addition, we show that our examples achieve the orthoplex bound and therefore correspond to Grassmannian frames. (Received July 17, 2016)