1137-41-35 **Somantika Datta*** (sdatta@uidaho.edu) and **Jesse Oldroyd** (oldroyd.j@wvwc.edu).

Construction of low coherence unit norm tight frames.

Equiangular tight frames (ETFs) are characterized by the fact that the coherence between any two distinct vectors is equal to the Welch bound. This guarantees that the maximum coherence between pairs of vectors is minimized. Despite their usefulness and widespread applications, ETFs of a given size N are only guaranteed to exist in $\mathbb{R}^d$ or $\mathbb{C}^d$ if $N = d+1$. This leads to the problem of finding approximations of ETFs of N vectors in $\mathbb{R}^d$ or $\mathbb{C}^d$ where $N > d+1$. To be more precise, one wishes to construct a unit norm tight frame (UNTF) such that the maximum coherence between distinct vectors of this frame is as close to the Welch bound as possible. Here low coherence UNTFs in $\mathbb{R}^d$ are constructed by adding a strategically chosen set of vectors called an *optimal* set to an existing ETF of $d+1$ vectors. This is done by means of combinatorial objects called block designs. It is shown that for certain block designs, the constructed UNTF attains the smallest possible maximum coherence between pairs of vectors among all UNTFs containing the starting ETF of $d+1$ vectors. This is particularly desirable if there does not exist a set of the same size for which the Welch bound is attained. (Received January 16, 2018)