1106-15-661 **Rachel Domagalski*** (domag1rj@cmich.edu), **Hong Suh** and **Xingyu Zhang**. *Tight Frame Structure and Scalability.* Preliminary report.

In $\mathbb{R}^n$, a frame is defined to be a spanning set. A collection $F = \{f_i\}_{i=1}^k \subseteq \mathbb{R}^n$ is a λ-tight frame if there exists $\lambda > 0$ such that for every $f \in \mathbb{R}^n$, $\lambda \|f\|^2 = \sum_{i=1}^k |\langle f, f_i \rangle|^2$. We examine the structure of frames through factor posets and scalability. A factor poset for a frame $F = \{f_i\}_{i=1}^k$ is the set $P = \{J \subseteq \{1, \ldots, k\} : \{f_j\}_{j \in J}$ is a tight frame$\}$, partially ordered by set inclusion, $\emptyset \in P$. This definition leads to the question: given a poset P, when is P a factor poset? We call this problem the *inverse factor poset problem* (IFPP). The IFPP was solved in $\mathbb{R}^2$ in 2013. In our goal of solving the IFPP in $\mathbb{R}^n$, we discovered combinatorial properties of tight frames and explored constructions of frames from posets. Next, we examine the scalability of frames. For a frame $F = \{f_i\}_{i=1}^k$, a scaling is a vector $w = (w(1), \ldots, w(k)) \in \mathbb{R}_{\geq 0}^k$ such that $\{\sqrt{w(i)} f_i\}_{i=1}^k$ is a 1-tight frame in $\mathbb{R}^n$. We establish results on the structure of the scalability polytope and its connection to the factor poset. This research completed at Central Michigan University's 2014 REU. (Received September 04, 2014)