1145-52-1638 **Thomas C. Hull*** (thull@wne.edu), Western New England University, 1215 Wilbraham Road, Springfield, MA, MA 01119. *Higher dimensional flat origami and non-crossing conditions.*

In flat origami theory, an *isometric folding* is map $f : S \to \mathbb{R}^2$ whose domain $S$ is a bounded region of the plane and where $f$ is a continuous piecewise isometry. The set $\Sigma(f) \subset S$ of all points where $f$ is non-differentiable is called the *crease pattern* of $f$. One can prove that $\Sigma(S)$ will be a planar graph. Two basic theorems of flat origami are *Maekawa's Theorem* (a combinatorial theorem on the parity of creases around a vertex in $\Sigma(f)$) and *Kawasaki's Theorem* (a necessary and sufficient condition for a vertex in $\Sigma(f)$ to, locally, be an isometric folding). However, it turns out that isometric foldings in arbitrary dimension were studied by Robertson (1977) and Lawrence & Spingarn (1989). Both proved a generalized Kawasaki's Theorem, but neither considered Maekawa nor the sufficient direction of Kawasaki. In this talk we prove a version of Maekawa in arbitrary dimension, which requires us to develop a partial ordering (which we call a *layer ordering*) of regions in the compliment of $\Sigma(f)$. This in turn allows us to define what it means for $n$-dimensional paper to *self-intersect* (similar to self-intersection in 2D paper) and thus establish a full version of Kawasaki in arbitrary dimension. (Received September 23, 2018)