1067-51-1552 **Stephon Alexander**, **Elaine Chew*** (echew@usc.edu), **Robert Rowe** and **Sam Rodriguez**.

The Pentahelix: a Four-Dimensional Realization of the Spiral Array.

We propose to extend Chew's spiral array (2000), a geometric model for tonality, to four dimensions using simplical complexes so as to represent tetrachords. The spiral array represents pitch classes, triads, and keys as discretized helices embedded in three-dimensional space. Any discretized spiral, such as the pitch class helix in the spiral array, can be mapped into a tetrahelix. This map is not always one to one; the pitch class spiral, where adjacent pitches are seven half steps apart, maps to one tetrahelix, but a spiral in which adjacent pitch classes are only one half step apart maps to two tetrahelices. The building block of a tetrahelix is a tetrahedron, a 3-simplex. One full turn of the pitch class spiral corresponds to one full tetrahedron, and every triad corresponds to a specific face of the tetrahedron. We can make a linear chain of stacked tetrahedra by glueing faces of pairs of tetrahedral, and form a spiral by drawing a smooth curve connecting adjacent vertices of this chain. In a similar fashion, we can construct a pentahelix, a spiral chain of pentachorons (4-simplices) in four dimensions. We present the pentahelix extension of the spiral array and examine projections of the structure to lattices in two dimensions. (Received September 21, 2010)