1105-51-255 **John C Bowers*** (jbowers@cs.umass.edu) and **Ileana Streinu**. *Lang's Universal Molecule Algorithm.*

Robert Lang's Universal Molecule algorithm, a landmark in modern computational origami, is the main component of his widely used TreeMaker program for origami design. It computes a crease pattern of a convex polygonal region, starting with a compatible metric tree. Although it has been informally described in several publications, neither the full power nor the inherent limitations of the method are well understood. In this talk we introduce a rigorous mathematical formalism to relate the input metric tree, the output crease pattern and the folded uniaxial origami base produced by the Universal Molecule algorithm. We characterize the family of tree-like 3D shapes that are foldable from the computed crease patterns and give a correctness proof of the algorithm. This is joint work with Ileana Streinu. (Received September 23, 2014)