1067-78-1149 **Paul M Bellan*** (pbellan@caltech.edu), 128-95 Caltech, 1200 E. California Blvd, Pasadena, CA 91107. *Self-organization resulting from conservation of magnetic helicity, a distributed form of linkages; applications to lab and solar phenomena.*

A magnetic field (or any other solenoidal field) can have one part of the field link another. This generalization of knottedness extends to the field having linkages, twist, and writhe which are topologically mutually equivalent; helicity accounts for all of these forms. Magnetic helicity is more "robust" than magnetic energy in the sense that fine-scale rearrangements (e.g., conversion of linkage to twist or writhe) dissipates magnetic energy while conserving magnetic helicity. Unstable systems seek a minimum energy state whereby twists, writhe, and linkages exchange to minimize energy while conserving helicity. The resulting state, called a relaxed state, is a unique meta-equilibrium towards which instabilities drive any arbitrary initial state; i.e., the system self-organizes. Spheromaks and reversed field pinch fusion plasma configurations are practical examples of such self-organized systems. Solar corona loops are similar, the main difference being the boundary conditions. If excessive helicity is injected into a configuration for given boundary conditions, no relaxed state exists and the system burps off a bubble-like structure containing the excess helicity. Spheromak formation and solar loops/prominence eruption involve this mechanism. (Received September 19, 2010)