1067-70-1042   **David T. Uminsky*** (`duminsky@math.ucla.edu`), UCLA Mathematics Department, Los Angeles, CA 90095-1555, and **Theodore Kolokolnikov**, **Hui Sun** and **Andrea Bertozzi**. *A theory of complex patterns arising from 2D particle interactions.*

Pairwise particle interactions arise in diverse physical systems ranging from insect swarms to self assembly of nanoparticles. In this talk we will present a theory for the morphology of patterns in two dimensions - which can range from ring and annular states to more complex spot patterns with N-fold symmetry. Many of these patterns have been observed in nature although a general theory has been lacking, in particular how small changes to the interaction potential can lead to large changes in self-organized state. Emergence of these patterns is explained by a stability analysis of a ring solution. This analysis leads to analytic formulae involving the interaction potential that provide detailed information about the structure of complex equilibria. (Received September 17, 2010)