

## **Clocks & Flocks: An Introduction to Synchronization & Collective Behavior**

**Andrew J. Bernoff** ([ajb@hmc.edu](mailto:ajb@hmc.edu))

Department of Mathematics,  
Harvey Mudd College, Claremont, CA 91711

### **Abstract:**

The flocking of starlings, contractions of heart muscle, and fads in culture and fashion are examples of systems where social and/or biological interactions promote the emergence of coherence from disorder. Temporally, coupling of oscillators leads to the synchronization observed in the flashing of fireflies or the trending of hashtags in twitter. Spatially, coupling leads to biological aggregation such as the swarming of locusts or the schooling of fish. In this talk we will give an overview of some of the ways in which social and biological coupling facilitate collective behavior and describe some of the characteristic of the phenomena they manifest.