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A Realtime Active Feedback Control System For Coupled Nonlinear Chemical Oscillators NATHAN TOMPKINS, SETH FRADEN, Brandeis University — We study the manipulation and control of oscillatory networks. As a model system we use an emulsion of Belousov-Zhabotinsky (BZ) oscillators packed on a hexagonal lattice. Each drop is observed and perturbed by a Programmable Illumination Microscope (PIM). The PIM allows us to track individual BZ oscillators, calculate the phase and order parameters of every drop, and selectively perturb specific drops with photo illumination, all in realtime. To date we have determined the native attractor patterns for drops in 1D arrays and 2D hexagonal packing as a function of coupling strength as well as determined methods to move the system from one attractor basin to another. Current work involves implementing these attractor control methods with our experimental system and future work will likely include implementing a model neural network for use with photo controllable BZ emulsions.

Nathan Tompkins
Brandeis University

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