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Using a Projector to Control BZ Drops: Attractor Selection by Pattern Entrainment NATHAN TOMPKINS, HECTOR GONZALEZ OCHOA, IRVING EPSTEIN, SETH FRADEN, Brandeis University — An emulsion consisting of drops in the 100μm diameter range containing the Belousov-Zhabotinsky (BZ) oscillatory chemicals can interact via diffusive inhibition and can be thought of as coupled phase oscillators. For weak coupling, a 2-D hexagonal lattice of these drops naturally develop regions of attractor states of sequential oscillations with phase differences of plus/minus $2\pi/3$ much like the 2D anti-ferromagnetic Heisenberg spin model. An untrained system of these oscillators will develop unstable regions of both attractors that grow and compete. We use photo-initiated inhibition to optically entrain the system with a projected $+2\pi/3$ pattern in an attempt to force the system into the $+2\pi/3$ attractor state. However, both the left and right handed variants of the $2\pi/3$ attractor are present in the entrained system. Defining an order parameter $e^{i3\phi}$ allows for a quantitation of the purity of the $2\pi/3$ attractor state in the final system.

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