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Phase and frequency entrainment in locally coupled phase oscillators with repulsive interactions MICHAEL GIVER, ZAHERA JABEEN, BULBUL CHAKRABORTY, Martin A. Fisher School of Physics, Brandeis University — Recent experiments in one and two-dimensional microfluidic arrays of droplets containing Belousov - Zhabotinsky reactants show a rich variety of spatial patterns [J. Phys. Chem. Lett. 1, 1241-1246 (2010)]. These experiments provide the first steps towards creating easily reproducible model active emulsion systems. Motivated by this experimental system, we study repulsively coupled Kuramoto oscillators with nearest neighbor interactions on a linear chain as well as a ring in one dimension. We show using linear stability analysis as well as numerical study, that the stable phase patterns depend on the geometry of the lattice and that a transition to the ordered state does not exist in the thermodynamic limit. We will also present results comparing our Kuramoto model with finite element simulations of the Brusselator model in geometries similar to those of the experiment.

Michael Giver
Martin A. Fisher School of Physics, Brandeis University

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