Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Defect Dynamics in Active 2D Nematic Liquid Crystals STEPHEN DECAMP, GABRIEL REDNER, MICHAEL HAGAN, ZVONIMIR DOGIC, Brandeis University — Active materials are assemblies of animate, energy-consuming objects that exhibit continuous dynamics. As such, they have properties that are dramatically different from those found in conventional materials made of inanimate objects. We present a 2D active nematic liquid crystal composed of bundled microtubules and kinesin motor proteins that exists in a dynamic steady-state far from equilibrium. The active nematic exhibits spontaneous binding and unbinding of charge +1/2 and -1/2 disclination defects as well as streaming of +1/2 defects. By tuning ATP concentration, we precisely control the amount of activity, a key parameter of the system. We characterize the dynamics of streaming defects on a large, flat, 2D interface using quantitative polarization light microscopy. We report fundamental characteristics of the active nematics such as defect velocities, defect creation and annihilation rates, and emergent length scales in the system.

Stephen DeCamp
Brandeis University

Date submitted: 15 Nov 2013 Electronic form version 1.4