

Abstract Submitted  
for the MAR06 Meeting of  
The American Physical Society

**Polarization-Enhanced Interaction between Islands on Freely-Suspended Smectic C\* Liquid Crystal Films**<sup>1</sup> APICHART PATTANA-PORKKRATANA, Department of Physics and Liquid Crystal Materials Research Center, University of Colorado, Boulder, CO 80309, U.S.A, CHEOL S. PARK TEAM, JOSEPH MACLENNAN TEAM, NOEL A. CLARK TEAM — Smectic liquid crystals can be made to form freely suspended films, two-dimensional systems locally quantized in thickness by an integral number of smectic layers, on which islands, circular regions of greater thickness than the surrounding film area, can be generated. In smectic C films, each such island is accompanied by a topological defect pair, an  $s = +1$  topological defect inside and an  $s = -1$  defect nearby on the background film. The distortions of the in-plane orientational order of the smectic C director field result in elastic interactions between the islands, with a short-range repulsion and a long-range dipolar attraction governing their stability and leading to their organization in chain-like structures with an equilibrium island separation. We have directly measured the repulsive and attractive forces between smectic C\* islands using multiple optical traps and have compared the results quantitatively with theory. We find that the interactions between islands are much smaller in the racemic smectic C case than in the chiral smectic C\*, an effect we attribute to long-range coulombic forces arising from polarization charges.

<sup>1</sup>This work was supported by NASA Grant NAG-NNC04GA50G and NSF MRSEC Grant No. DMR 0213918.

Apichart Patta

Department of Physics and Liquid Crystal Materials Research Center, University of Colorado, Boulder, CO

Date submitted: 30 Nov 2005

Electronic form version 1.4