

Abstract Submitted  
for the MAR15 Meeting of  
The American Physical Society

**Director distortion reduces molecular order of lyotropic chromonic liquid crystal on large scales**<sup>1</sup> SHUANG ZHOU, SERGIJ SHIYANOVSKII, OLEG LAVRENTOVICH, Liquid Crystal Institute, Kent State University — In thermotropic liquid crystals, energy required to change molecular order is usually orders of magnitude higher than the energy associated with elastic distortions. The scalar order parameter ( $S$ ) is a constant beyond nanometers range from the defect core. However, in lyotropic chromonic liquid crystals (LCLCs), the elastic distortion reduces  $S$  on a scale up to tens of micrometers. Using PolScope, we study the optical retardance of areas tens of micrometers near half integer disclinations and find that the birefringence, a quantity proportional to  $S$ , is lower than that of uniform samples. Combining PolScope and TEM techniques, we also demonstrate that the ratio between splay and bend elastic constants  $K_1/K_3$  increases to 1 as the distance to the defect core reduces to tens of nanometers. We explain our findings based on the fact that LCLCs are formed by reversible rod-shape aggregates of disc-shape molecules, unlike their thermotropic counterparts, where the basic building units are rigid molecules made of covalent bounds. In LCLCs the combining force to form the molecular stacks is only weak van der Waals force on the order of  $k_B T$ , thus the aggregation can be influenced by elastic distortion.

<sup>1</sup>This work is supported by DMS-1434185.

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Date submitted: 13 Nov 2014

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