Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Escaped-radial configuration with a twist: lyotropic chromonic liquid crystals confined to cylindrical cavities[1] JOONWOO JEONG, LOUIS KANG, ZOEY S. DAVIDSON, MATTHEW LOHR, DANIEL A. BELLER, RANDALL D. KAMIEN, TOM C. LUBENSKY, A.G. YODH, Department of Physics & Astronomy, University of Pennsylvania, PETER J. COLLINGS[2], Department of Physics & Astronomy, Swarthmore College — We report new chiral-symmetry-broken configurations of nematic liquid crystals (LCs) confined to cylindrical cavities with a homeotropic boundary condition. In order to relieve high splay deformation in the center of the cylinder with the homeotropic boundary condition, many nematic LCs adopt an escaped-radial configuration where LC directors are radial near the cavity wall but parallel to the cylindrical axis near the center. Interestingly, we find that achiral lyotropic chromonic liquid crystals (LCLCs) having an unusually small twist modulus can have a configuration that is both escaped and twisted radially. Sunset Yellow FCF, a nematic LCLC, is introduced into capillaries coated with a homeotropic alignment layer, and its configurations are investigated by polarized optical microscopy and numerical calculations. Additionally, we discuss other newly observed structures: 1) domain-wall-like defects separating regions of opposite handedness in the twisted- and escaped-radial configuration and 2) another chiral configuration having a double helix of disclination lines along the cylindrical axis.

[1]We acknowledge support from the National Science Foundation: DGE-1321851, DMR-1104707, DMR-1205463, and MRSEC DMR-1120901
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Date submitted: 13 Nov 2013 Electronic form version 1.4