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Unified theory of chiral smectic A monolayers and π-wall defects C. NADIR KAPLAN, MARK J. ZAKHARY, THOMAS GIBAUD, EDWARD BARRY, ROBERT B. MEYER, ZVONIMIR DOGIC, Brandeis University — Monodisperse suspensions of the rod-like chiral *fd* viruses are condensed into one rod length thick colloidal monolayers of aligned rods by depletion forces. Twist deformations of the molecules are expelled to the monolayer edge as in a chiral smectic A (Sm-A*) liquid crystal, and a cholesteric (Ch) region forms at the edge. Coalescence of two such isolated monolayers results in a cholesteric wall sandwiched between two regions of aligned *fd* viruses, dubbed π-wall defects. Based on the analogy of Sm-A* with superconductors, we develop a unified theory of the π-wall defects and the monolayer edge structure. Our model yields the molecular tilt profiles, the local thickness change, and the crossover from Sm-A*-to-Ch behavior across the monolayer and the π-wall. These allow us to determine the line tension as a function of the depletant polymer concentration and the chirality of the viruses, in agreement with experiment.

C. Nadir Kaplan
Brandeis University

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