

Abstract Submitted
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Helical nanofilaments and the high chirality limit of smectics-

A GARETH ALEXANDER, University of Pennsylvania, ELISABETTA MATSUMOTO, University of Pennsylvania, RANDALL KAMIEN, University of Pennsylvania — Motivated by recent experiments on chirality in smectic systems of achiral bent core molecules [1], I shall describe our recent work on the theory of chiral smectic-A liquid crystals and argue that at sufficiently large chiralities the traditional twist grain boundary phase is augmented by a new texture [2]. This bulk texture is characterized by an array of parallel, coherently rotating helical nanofilaments, which represent the local optimal configuration for chiral smectics, laced together by a lattice of defects, in a fashion akin to the cholesteric blue phases. A mean field analysis of the properties of this nanofilament phase shows good qualitative agreement with the germane features of the experiment, which can be improved upon by including the layer curvature energy, as well as bringing up several subtle aspects of the familiar analogy between smectics and superconductors. [1] L. E. Hough et al, Science 325, 456-460 (2009). [2] E. A. Matsumoto, G. P. Alexander, and R. D. Kamien, arXiv:0909.3529 [cond-mat.soft] (2009).

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