

Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Contact Topology and Cholesteric Liquid Crystals¹ THOMAS MACHON, Univ of Pennsylvania, GARETH ALEXANDER, University of Warwick — Understanding the topological aspects of cholesteric liquid crystals has long stood as a challenge, with the standard homotopy theoretic techniques well-known to be both incomplete and conceptually flawed. We show how contact topology supplies a natural language in which one can describe and understand the many chiral structures observed in cholesterics, with familiar structures such layers, dislocations and double twist cylinders becoming essential topological objects in the theory. Using these techniques we establish the topological classification of cholesteric textures in a variety of domains, in particular we show how the mathematical concept of over-twistedness necessarily leads to the existence of topological solitons in cholesterics which have no analogue in non-chiral systems. Finally, we discuss the structure and topology of disclination loops in this context and sketch a connection between their entanglement and exotic topological invariants from contact homology theories.

¹Work funded by the EPSRC (A.MACX.0002), Simons Foundation and NSF (DMR97-32963)

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Date submitted: 10 Nov 2016

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