

Abstract Submitted
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Chirality and biaxiality in cholesteric liquid crystals¹ SUBAS DHAKAL, JONATHAN SELINGER, Liquid Crystal Institute, Kent State University — Chiral liquid crystals commonly form a cholesteric phase, in which the molecular director is twisted into a helix. A longstanding problem in liquid-crystal science is how to determine the pitch of the cholesteric helix in terms of microscopic parameters, and how to explain why the pitch is so much larger than molecular length scales. One theory has argued that the pitch is large, i.e. the twist is small, because any twisting torque of one molecule on a neighbor requires at least short-range biaxial correlations between the molecules [1]. To investigate this concept, we develop a lattice model for chiral molecules interacting via anisotropic van der Waals forces. Through this model, we calculate the macroscopic pitch as a function of molecular chirality, molecular biaxiality, and temperature. These calculations show that the cholesteric twist decreases with increasing temperature, as seen in several experiments. Furthermore, they show that biaxial correlations enhance the twist, but are not required for a twist with this fluctuation-induced interaction. The simulation results are consistent with mean-field calculations for this model. [1] A.B. Harris, R.D. Kamien, and T.C. Lubensky, *Phys. Rev. Lett.* 78, 1476 (1997).

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