Abstract Submitted
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Fluctuation modes in the twist bend nematic phase of certain liquid crystal mixtures studied by dynamic light scattering[1] ZEINAB PARSOUZI A.SH, VOLODYMYR BORSHCH, PAVAN CHALLA KUMAR, OLEG LAVRENTOVICH, JAMES T. GLEESON, ANTAL JAKLI, SAMUEL SPRUNT, Kent State University — The "twist-bend nematic"(N_{TB}) is a recently discovered phase of liquid crystals. Its ground state features a heliconical molecular arrangement in which the nematic director precesses uniformly about a fixed axis, at a finite angle to this axis. The helicoid has a nanoscale pitch. We present the dynamic light scattering studies in two different mixtures of a dimeric material (M2), which exhibits nematic and N_{TB} phases. In the nematic phase, two fluctuation modes are observed: one is the usual hydrodynamic, uniaxial director mode, while the second is clearly non-hydrodynamic and corresponds to fluctuations of biaxial order. The non-hydrodynamic mode is also observed in the N_{TB} phase, with a significantly higher and strongly temperature-dependent relaxation rate. Scattering from the twist-bend director mode disappears in the N_{TB} phase, while splay fluctuations still contribute. We discuss our results in terms of a theoretical model based on a combination of two elements: (1)a coarse-grained elastic free energy (in which the N_{TB} is modeled a smectic-like, pseudo-layered structure) and (2)a recent theory [1] describing local polar order in the N_{TB} phase.

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