

Abstract Submitted  
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**A Twist in the Nematic Phase of Mixtures of Achiral Cyanobiphenyl Dimer Mesogens**<sup>1</sup> G. SINGH, D. KOOLJMAN, M. FISCH, KSU, M. VENGATESAN, J.K. SONG, SKKU, S. KUMAR, KSU — The twist-bend nematic ( $N_{tb}$ ) phase characterized by a heliconical structure forms below the regular uniaxial nematic (N) phase in achiral mesogens, CB  $(CH_2)_n$  CB, constituted of two cyanobiphenyl (CB) moieties connected by a alkyl linkage with odd number  $n$  of  $-CH_2-$  segments. This phase is absent in the homologs with even  $n$ . The precise structure of the  $N_{tb}$  phase in these and other systems is intriguing and remains under investigation. To gain an insight into the  $N_{tb}$  phase, we studied the pure and mixtures of odd ( $n = 7$ ) and even ( $n = 6$ ) homologues using polarizing optical microscopy and high-resolution x-ray diffraction. The latter technique was used to calculate the orientational order parameters  $\langle P_2(\cos\theta) \rangle$ ,  $\langle P_4(\cos\theta) \rangle$ , and  $\langle P_6(\cos\theta) \rangle$  as functions of temperature in the two nematic phases. The results show that order parameter  $\langle P_2 \rangle$  and its higher moment  $\langle P_4 \rangle$  increase with decreasing temperature in N phase as expected. The value of  $\langle P_6 \rangle$  remains relatively small at all temperatures in the two phases. In the  $N_{tb}$  phase,  $\langle P_4 \rangle$  decreases and eventually becomes negative. This behavior is consistent with heliconical arrangement of dimer molecules. The phase diagram, temperature-dependent heliconical tilt, and the pitch were measured optically. The behavior of the order parameters qualitatively remains the same in mixtures of CB  $(CH_2)_7$  CB and CB  $(CH_2)_6$  CB while their values vary with concentration.

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