Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

**Direct Observation of Heliconical Pitch in the Twist-bend Nematic Liquid Crystal Phase of Bent Molecular Dimers**[1] MIN SHUAI, MICHAEL TUCHBAND, DONG CHEN, ARTHUR KLITTNICK, JOSEPH MACLENNAN, MATTHEW GLASER, NOEL CLARK, Department of Physics and Liquid Crystal Materials Research Center, University of Colorado - Boulder, EVA KORBLOVA, DAVID WALBA, Department of Chemistry and Biochemistry and Liquid Crystal Materials Research Center, University of Colorado - Boulder — Nanometer-scale modulation of the director field is directly observed using freeze-fracture transmission electron microscopy (FFTEM) in the heliconical twist-bend nematic ($N_{TB}$) phase, a periodic mesophase with no detectable modulation of the electron density [Chen, D., *et al.*, PNAS, 2013, 110(40):15931–15936]. A homologous series of achiral odd-methylene-linked dimers CB$m$CB ($m$ = 5, 7, 9, and 11) and binary mixtures with simple cyanobiphenyl $n$CBs ($n$ = 5, 6, 7, and 8) in the $N_{TB}$ phase has been studied. The helix pitch is found to vary between 6 and 11 nm. Increase the m or n value increases the helix pitch. Meanwhile, surprisingly, the helix pitch becomes shorter as the monomer concentration in the mixtures increases. FFTEM images show homogenous phases and preliminary measurements of the transition temperature versus concentration indicate that the binary mixtures are close to ideal. Polarized optical microscopy and calorimetry are carried out to study the nature of the N-$N_{TB}$ transition in detail.

[1]This work is supported by NSF MRSEC Grant DMR-0820579, ICAM Postdoctoral Fellowship Award OCG5711B, and ED GAANN Award P200A120014.

Min Shuai
Department of Physics and Liquid Crystal Materials Research Center,
University of Colorado - Boulder

Date submitted: 14 Nov 2013 Electronic form version 1.4