Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Spontaneous Ferromagnetic Ordering of Nanoplatelets in Isotropic Solvent[1] MIN SHUAI, ARTHUR KLITTNICK, MICHAEL TUCHBAND, MATTHEW GLASER, JOSEPH MACLENNAN, NOEL CLARK, Department of Physics and Liquid Crystal Materials Research Center, University of Colorado Boulder, ROLFE PETSCHEK, Physics Department, Case Western Reserve University, ALENKA MERTELJ, DARJA LISJAK, J. Stefan Institute, MARTIN COPIC, J. Stefan Institute, Faculty of Mathematics and Physics, University of Ljubljana — Room-temperature ferromagnetic fluids were first experimentally demonstrated by Mertelj, *et al* (*Nature*, **504**: 237–241, 2013), by suspending surfactant wrapped coated barium hexaferrite (BHXF) nanoplates in the liquid crystal 5CB. We have studied the liquid crystal phase behavior of BHXF magnetic platelets suspended in isotropic solvent (1-butanol) at high volume fraction, where simulations predict an N-I transition for monodisperse hard plates. In these suspensions, the anisotropic particles can be aligned by magnetic fields as weak as 2 gauss, leading to a state with substantial birefringence and dichroism. When the volume fraction of the magnetic platelets is higher than 28%, we observe a phase co-existence, with an isotropic state at the top of a capillary and a birefringence phase at the bottom. In the lower phase, domains are found to have different magneto-optical response from each other and the response is dependent on the *sign* of the magnetic field, showing broken time-reversal symmetry and ferromagnetism. Spike structures are observed at the interface between the isotropic and ferromagnetic states.

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

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Date submitted: 14 Nov 2014 Electronic form version 1.4