Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Phase diagram of weakly coupled Heisenberg spin chains subject to a uniform Dzyaloshinskii-Moriya interaction[1] WEN JIN, OLEG STARYKH, University of Utah — Motivated by recent experiments on spin chain materials $K_2CuSO_4Cl_2$ and $K_2CuSO_4Br_2$, we theoretically investigate the problem of weakly coupled spin chains (chain exchange J, interchain J') subject to a *staggered between chains*, but *uniform* within a given chain, Dzyaloshinskii-Moriya interaction (DMI) of magnitude D. In the experimentally relevant limit $J' \ll D \ll J$ of strong DMI the spins on the neighboring chains are forced to rotate in opposite directions, effectively resulting in a cancelation of the interchain interaction between components of spins in the plane normal to the vector $\mathbf{D}$. This has the effect of promoting two-dimensional collinear spin density wave (SDW) state, which preserves U(1) symmetry of rotations about the D-axis. We also investigate response of this interesting system to an external magnetic field h and obtain the $h - D$ phase diagrams for the two important configurations, $h \parallel D$ and $h \perp D$. The transitions between various SDW-like phases are found to be of either a commensurate-incommensurate or a spin-flop kind.

[1]Supported by NSF DMR-1507054

Oleg Starykh
University of Utah

Date submitted: 06 Nov 2015 Electronic form version 1.4