Phase diagram of weakly coupled Heisenberg spin chains subject to a uniform Dzyaloshinskii-Moriya interaction\textsuperscript{1} WEN JIN, OLEG STARYKH, University of Utah — Motivated by recent experiments on spin chain materials $\text{K}_2\text{CuSO}_4\text{Cl}_2$ and $\text{K}_2\text{CuSO}_4\text{Br}_2$, we theoretically investigate the problem of weakly coupled spin chains (chain exchange $J$, interchain $J'$) subject to a \textit{staggered between chains}, but \textit{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 $D$. 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.

\textsuperscript{1}Supported by NSF DMR-1507054