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Skyrmions in quasi-2D chiral magnets with broken bulk and surface inversion symmetry[1] JAMES ROWLAND, Ohio State University, SUMILAN BANERJEE, Ohio State University and Weizmann Institute of Science, MOHIT RANDERIA, Ohio State University — Most theoretical studies of skyrmions have focused on chiral magnets with broken bulk inversion symmetry, stabilized by easy-axis anisotropy [1]. Recently, we considered 2D systems with broken surface inversion [2] and showed that skyrmion crystals are more stable than in 3D, pointing out the importance of easy-plane anisotropy. In the present work we investigate quasi-2D systems which break both bulk and surface inversion symmetry. The Landau-Ginzburg free energy functional thus contains two Dzyloshinskii-Moriya terms of strength D_D and D_R arising from Dresselhaus and Rashba spin-orbit coupling respectively. We trace the evolution of the phase diagram as D_D/D_R is varied, and find that skyrmions are increasingly destabilized with respect to the cone phase as D_D increases relative to D_R. We find an evolution from vortex-like skyrmions in the pure Dresselhaus limit to hedgehog-like skyrmions in the pure Rashba limit. We discuss the relevance of these results to existing experiments and the prospects of tuning the ratio of Dresselhaus and Rashba spin-orbit coupling via film thickness and strain. [1] M. Wilson et al., PRB 89, 094411 (2014). [2] S. Banerjee, J. Rowland, O. Erten, and M. Randeria, PRX 4, 031045 (2014).

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James Rowland
Ohio State University

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