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Easy-plane anisotropy stabilizes skyrmions in 2D chiral magnets[1]
JAMES ROWLAND, SUMILAN BANERJEE, MOHIT RANDERIA, Ohio State Univ - Columbus — Experiments on two-dimensional (2D) chiral magnetic materials, like thin films of non-centrosymmetric helimagnets and metallic magnetic layers, have revealed interesting spatially modulated spin textures such as spirals and skyrmions. Motivated by this we study the ground-state phase diagram for a 2D chiral magnet in a magnetic field using a Ginzburg-Landau model, with Dzyaloshinskii-Moriya (DM) term, anisotropic exchange and single-ion anisotropy. The easy-axis anisotropy region of the phase diagram has been well-studied [1], whereas the easy-plane region has not been discussed. In the easy-plane region, we find an unexpectedly large stable skyrmion crystal (SkX) phase in a perpendicular magnetic field. We find re-entrant transitions between ferromagnetic and SkX phases, and intriguing internal structure of the skyrmion core with two-length scales. We argue that such an easy-plane anisotropy arises naturally from the compass terms induced by spin-orbit coupling that is also responsible for the DM term, as proposed recently in the context of oxide interfaces [2]. We also discuss the phase diagram in a tilted field configuration, relevant for torque magnetometry experiments. [1] Robler et. al. Phys.: Conf. Ser. 303, 012105 (2011). [2] Banerjee et. al. Nat. Phys. 9, 626 (2013).

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James Rowland
Ohio State Univ - Columbus

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