Abstract Submitted
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Spin-orbit coupling, compass anisotropy and skyrmions in 2D chiral magnets[1] SUMILAN BANERJEE, Department of Physics, The Ohio State University, ONUR ERTEN, Department of Physics and Astronomy, Rutgers University, JAMES ROWLAND, MOHIT RANDERIA, Department of Physics, The Ohio State University — Spin-orbit coupling (SOC) gives rise to the chiral Dzyaloshinskii-Moriya (DM) interaction in systems that lack inversion symmetry like non-centrosymmetric helimagnets, and two-dimensional magnetism at surfaces and interfaces. We explore here the role of SOC in several microscopic exchange mechanisms – superexchange, double exchange and RKKY – in insulating and itinerant electron systems. We show that, in addition to giving rise to the DM interaction, SOC generically leads to compass anisotropy terms. Although seemingly negligible, the compass terms are energetically comparable to DM and play a crucial role in deciding the fate of the magnetic ground state. We demonstrate that the compass terms act as an effective easy-plane anisotropy in 2D chiral magnets and lead to extremely large region of stable skyrmion crystal (SkX) phase in a perpendicular magnetic field. We discuss the electronic properties of SkX in this hitherto unexplored region of the anisotropy-field plane for itinerant systems. We also comment on the possibility of realizing such SkX phase in the oxide interfaces [1]. [1] S. Banerjee, O. Erten and M. Randeria, Nature Physics 9, 626 (2013).

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