Skyrmion lattice formation and topological Hall effect induced by spin chirality

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A class of helimagnet is derived from the Dzyaloshinskii-Moriya(DM) interaction on a non-centrosymmetric crystal; prototypical examples are the B20 type (FeSi type) transition-metal silicide and germanide families. Recently, the Skrymion lattice was confirmed to form in a narrow temperature(T) -magnetic field(B) region near the hlimagnetic to paramagnetic transition boundary. By contrast, thin films of B20 type MSi (M=Mn or $Fe_{1-x}Co_x$) or MGe (M=Mn, Fe), whose thickness is smaller than the helical spin modulation period (=10-100nm), ubiquitously form the two-dimensional (2D) Skyrmion crystal with magnetic fields (B) applied normal to the film plane over a wide T-B region. The implication of such a 2D Skyrmion crystal in the magneto-transport properties is discussed, such as the spin-chirality- induced topological Hall effect.