

# Dynamics of Chiral Systems, Vortices, Skyrmions, and Active Matter

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There are various systems that exhibit chiral dynamics induced by Magnus forces, where the response is perpendicular to the direction of the applied forces. Examples include vortices in fluids and superfluids, charges in magnetic fields, and spinning particles in a medium. Similar dynamics appears for skyrmions in chiral magnets, where the Magnus force leads to a Hall angle. Here, we show how the Magnus force affects the skyrmion depinning and how the quenched disorder leads to drive dependent Hall effect. We also demonstrate that a lattice of skyrmion can exhibit a thermal peak effect similar to that found for vortices in type-II superconductors, where the temperature modifies the skyrmion-skyrmion interactions and causes the Hall angle to change across the skyrmion solid to skyrmion liquid phase transition. For chiral active matter, we observe effects similar to those found for skyrmions including a drive dependent Hall angle; we also find edge currents around active solids.

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