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Collective Transport Properties of Driven Skyrmions with Random Disorder DIPANJAN RAY, CYNTHIA OLSON REICHHARDT, CHARLES REICHHARDT, Los Alamos National Laboratory — We use particle-based simulations to examine the static and driven collective phases of skyrmions interacting with random quenched disorder. We show that non-dissipative effects due to the Magnus term reduce the depinning threshold and strongly affect the skyrmion motion and the nature of the dynamic phases. The quenched disorder causes the Hall angle to become drive-dependent in the moving skyrmion phase, while different flow regimes produce distinct signatures in the transport curves. For weak disorder, the skyrmions form a pinned crystal and depin elastically, while for strong disorder the system forms a pinned amorphous state that depins plastically. At high drives the skyrmions can dynamically reorder into a moving crystal, with the onset of reordering determined by the strength of the Magnus term.

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