

Abstract Submitted
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Dissipationless mechanism of skyrmion Hall effect in two-dimensional double-exchange ferromagnets SHIGEKI ONODA, Condensed Matter Theory Laboratory, RIKEN, KI-SEOK KIM, Asia Pacific Center for Theoretical Physics and Department of Physics, Pohang University of Science and Technology — We revisit a theory of nonequilibrium single-skyrmion transport in two-dimensional double-exchange ferromagnets with the Rashba spin-orbit interaction. Combining the collective-coordinate approach with the Keldysh formalism and an effective U(1) gauge theory, the velocity of a skyrmion core is calculated under the electric field. Then, it is found that the emergent Chern-Simons term and the associated intrinsic anomalous Hall can produce a dissipationless skyrmion Hall current through the coupling between electrons and localized spins, which takes the form of the spin transfer torque. In metals, this is additive to the conventional dissipative motion of magnetic vortices, which relies on phenomenological damping terms in the Landau-Lifshitz-Gilbert equation.

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