

Magnon-driven Anomalous Hall effect in Unconventional Magnets

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Anomalous Hall effect is one of fundamental phenomena in solid state physics for probing time-reversal symmetry breaking. It connects the microscopic quantum geometrical concept with the macroscopic spin order. Based on the symmetry requirement, the anomalous Hall effect requires a chiral direction, which is usually provided by the spin order. However, in collinear antiferromagnets, the oppositely aligned spin order may restrict the anomalous Hall effect. In this talk, we focus on the magnon mode in antiferromagnets, for which the opposite local spin orders have the same precession direction. This precession direction can offer the chiral direction for the anomalous Hall effect, inducing a magnon-driven anomalous Hall effect. The latter has unique features which can be used to probe general antiferromagnetic spin order, such as altermagnetic order and non-collinear spin order.

References:

[1] Zheng Liu, Yang Gao, and Qian Niu, arXiv: 2603.19737 (2026).