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Skyrmion motion induced by the spin Seebeck effect and ac current generation in chiral magnetic insulators AVADH SAXENA, SHI-ZENG LIN, CRISTIAN BATISTA, CHARLES REICHHARDT, Los Alamos National Laboratory, USA — Stable topological excitations such as domain walls, and vortices are ubiquitous in condensed matter systems and are responsible for many emergent phenomena. Recently a new mesoscopic spin texture called skyrmion with radius about $10 \sim 100$ nm was discovered experimentally in certain conducting as well as insulating chiral magnets. In the temperature-magnetic field phase diagram, skyrmions form a triangular lattice in the low temperature and intermediate magnetic field regime in thin films. Because of the low dissipation and the existence of magnetoelectric coupling, skyrmions in insulators have attracted considerable interests. In this work, we show that a thermal gradient can be used to move magnetic skyrmions in insulating chiral magnets: the induced magnon flow from the hot to the cold region drives the skyrmions in the opposite direction via a magnonic spin transfer torque. We also show that a temperature gradient induces an ac electric current in multiferroic insulators when the sample is embedded in a circuit. Both results are combined to compute the effect of skyrmion motion on the ac current generation. We demonstrate that skyrmions in insulators are a promising route for spin caloritronics applications.

Shi-Zeng Lin
Los Alamos National Laboratory, USA

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