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Evidence for a Magnetic Seebeck effect[1] SYLVAIN BRECHET, FRANCESCO VETRO, ELISA PAPA, EPFL, STEWART BARNES, University of Miami, JEAN-PHILIPPE ANSERMET, EPFL — Spin caloritronics is mainly focused on studying the effects of a temperature gradient on the time evolution of the local spin average of a classical system. In many experimental situations, the system can be treated as a classical continuum with magnetisation on the scale of interest where the quantum fluctuations average out and the underlying microscopic structure is smoothed out. Recently, we established a clear classical formalism describing the thermodynamics of a matter continuum with magnetisation interacting with external electromagnetic fields. This formalism accounts for the thermal and electric magnetisation accumulations and magnetisation waves. It also predicts that a temperature gradient in the presence of magnetisation waves induces a magnetic induction field, which is the magnetic analog of the Seebeck effect. This thermal gradient modulates the precession and relaxation. The Magnetic Seebeck effect implies that magnetisation waves propagating in the direction of the temperature gradient and the external magnetic induction field are less attenuated, while magnetisation waves propagating in the opposite direction are more attenuated. This effect has been observed on a YIG slab in our laboratory and it is in very good agreement with the thermodynamic prediction.

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