

Spin Mechanics 4



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Spin Mechanics with YIG

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One of the subfields of spin mechanics addresses the interaction between spin and lattice waves. Magnetic insulators such as yttrium iron garnet (YIG) are very suitable materials to investigate the magnon-phonon coupling because of the combination of a high Curie temperature and a high quality of the magnetization and lattice dynamics. Incoherent magnon-phonon scattering is important to understand spin transport in magnetic insulators that are actuated electrically and thermally by heavy metal contacts, in local or non-local configurations. The coherent magnon-phonon interaction gives rise to hybrid states or “magnon-polarons”. These have been identified in spatiotemporally resolved Kerr rotation experiments that observe the magnetization waves generated by focussed fs optical excitation. The strong coupling of magnons and phonons to coherent magnon-polarons also gives rise to transport anomalies that are detected as sharp peaks or dips in the spin Seebeck effect as a function of applied magnetic field.

This talk will review the progress in understanding magnon-phonon interactions in YIG with emphasis on the theoretical issues.

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