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Magnon-phonon interactions and spin transport in insulators[1]
STEPHEN R. BOONA, HYUNGYU JIN, Department of Mechanical and Aerospace Engineering, The Ohio State University, Columbus, OH, JOSEPH P. HEREMANS, Department of Mechanical and Aerospace Engineering, Department of Physics, The Ohio State University, Columbus, OH — The spin Seebeck effect (SSE) is now a well established phenomenon whereby a spin current can be thermally pumped from a ferromagnetic (FM) material into a normal metal (NM), where the spin current is then converted into a transverse charge current through the inverse spin Hall effect. The most interesting feature of SSE is that it occurs even if the FM is an insulator, *e.g.*, yttrium iron garnet (YIG). Although the existence of the effect is well established, its microscopic origins are still not completely understood; the detailed nature of interactions between the elementary excitations (electrons, phonons, and magnons) that give rise to SSE are complex and strongly dependent on factors like materials selection and temperature. One particularly important issue that remains unclear is the role that magnon-phonon interactions play in generating spin currents, especially within the context of diffusive vs drag currents. This talk will address this question by discussing some of our recent experiments aimed at exploring the temperature and length dependence of thermal and spin transport phenomena in magnetically ordered insulators.

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