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Magnon-phonon drag induced in a paramagnet[1] ARATI PRAKASH, JACK BRANGHAM, SARAH WATZMAN, FENGYUAN YANG, JOSEPH HEREMANS, Ohio State Univ - Columbus — Recent theory predicts nonlocal magnon drag in a ferromagnetic bilayer, where magnetic current in one material induces a chemical potential in the neighboring material. [1] This inspires the possibility of inducing magnon drag from a temperature gradient on a ferromagnet into an adjacent paramagnet. To explore this concept, we compare the thermopower of Pt films grown on ferrimagnetic $Y_3Fe_5O_{12}$ (YIG) to that grown on paramagnetic $Gd_3Ga_5O_{12}$ (GGG). To isolate the hypothetical drag contribution from the magnons in YIG into the adjacent Pt film, we design a thermocouple using a hybrid sample with half GGG/Pt and half GGG/YIG(250nm)/Pt. The 6-nm Pt film is a rectangular U with one arm on YIG and the other on GGG. We measure the voltage between the arms of the U, while applying a temperature gradient parallel to the arms and perpendicular to the bottom connection. With a uniform applied temperature gradient, the Pt acts as a differential thermocouple. The effective voltage at the isothermal ends of the Pt is $\Delta V = (\alpha_{YIG/Pt} - \alpha_{GGG/Pt})\Delta T$. This provides a direct measure of the difference in thermopower of the two systems, which we attribute to magnon dynamics in YIG and their interactions at the YIG/Pt interface. We conduct thermopower measurements, investigating temperature dependence and in-field behavior. We repeat the experiment using Ag and Al instead of Pt, and varied YIG crystal orientation. [1] T. Liu, et al. Phys. Rev. Lett. 116, 237202 (2016)

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Arati Prakash
Ohio State Univ - Columbus

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