Abstract Submitted
for the MAS15 Meeting of
The American Physical Society

Terahertz spectroscopy to explore magnon dynamics in antiferromagnetic MnF2[1] DEREK BAS, SERCAN BABAKIRAY, DAVID LEDERMAN, PAVEL BORISOV, ALAN BRISTOW, West Virginia University — Antiferromagnetic magnon signatures appear in the terahertz (THz) absorption spectrum of 2-mm bulk Manganese(II) fluoride (MnF2) when cooled below the Neel temperature TN $\approx$ 67 K. Models are used to map the strength and frequency of the magnon as it changes with temperature, and the temporal shift of the THz transient is used to observe the refractive index as thermal expansion and magnetostrictive effects cause it to change. Results of THz spectroscopy, X-ray photoelectron spectroscopy (XPS), and superconducting quantum interference device (SQUID) measurements match known signatures and confirm that the material is pure MnF2. In addition, the UV absorption spectrum reveals a low-temperature D band resonance with a sharp peak at 357 nm. Therefore, by pumping the sample with 357 nm light and simultaneously probing by transmitting a THz source, we propose to excite the magnon directly via the D band and observe its relaxation dynamics' dependence on time and temperature.

[1]Terahertz spectroscopy to explore magnon dynamics in antiferromagnetic MnF2

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Date submitted: 22 Sep 2015 Electronic form version 1.4