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Electromagnons: Electrically active spin excitations in multiferroics STANISLAV KAMBA, VERONICA GOIAN, FILIP KADLEC, CHRISTELLE KADLEC, PREMYSL VANEK, MARTIN KEMPA, Academy of Sciences of the Czech Republic, MARTI GICH, Institut de Cincia de Materials de Barcelona, ACADEMY OF SCIENCES OF THE CZECH REPUBLIC TEAM[1], INSTITUT DE CIÈNCIA DE MATERIALS DE BARCELONA TEAM[2] — In some multiferroics spin wave can be excited by electric component of elmg. radiation and such excitations activated by dynamic magnetoelectric coupling are called electromagnons. We will discuss mechanism of electromagnon activation in the THz spectra of three different compounds: In the multiferroic $TbMnO_3$, the ferroelectricity is induced by inverse Dzyaloshinskii-Moriya interaction, but two electromagnons are activated by the magnetostriction. Second example is $CaMn_7O_{12}$, whose polarization is the highest among all spin-induced ferroelectrics. In this material we observed three electromagnons, whose frequencies correspond to maxima of magnon density of states, so they should correspond to magnons from Brillouin zone boundary. Finally we will demonstrate that electromagnons are not limited to spin-induced ferroelectrics. We have observed an electromagnon in nanograin ceramics of epsilon-Fe_2O_3. This material is below 490 K a pyroelectric ferrimagnet and the electromagnon activates in the THz spectra only below 110 K, when the magnetic structure becomes incommensurately modulated. We will show how by combining infrared, THz and inelastic neutron scattering experiments, the electromagnons can be discerned from magnons or phonons.

[1]Performed all measurements
[2]Prepared nanograin ceramics of epsilon-Fe2O3

Stanislav Kamba
Academy Sci of the Czech Rep

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