

# THZ SPECTROSCOPY OF SPIN WAVES IN MULTIFERROIC $\text{LiNiPO}_4$ IN HIGH MAGNETIC FIELDS

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$\text{LiNiPO}_4$  belongs to the family of multiferroic lithium-ortho-phosphates where correlation between magnetic and electric dipoles leads to the ac and dc magnetoelectric (ME) effect. Manifestation of the ac ME effect is non-reciprocal directional dichroism which can be probed with ME spin excitations [1]. Thus, the knowledge of the spectrum of spin excitations and their activity is crucial in understanding ME effect. We have measured the THz absorption spectra of spin excitations in single crystals of  $\text{LiNiPO}_4$  at temperatures below 4K and in high magnetic fields. In the low temperature commensurate phase we have observed magnetic-dipole, electric-dipole and simultaneously magnetic- and electric-dipole active spin waves, a two-magnon bound state, and a two-magnon continuum. Three spin flop transitions are identified for the magnetic field parallel to the magnetic easy axis. Exchange interactions and the single ion anisotropies of a mean-field spin model are determined based on the magnetic field dependence of the spin-wave excitations.

## References

1. Szaller et al., “Effect of spin excitations with simultaneous magnetic- and electric-dipole character on the static magnetoelectric properties of multiferroic materials”, Phys. Rev. B 89 (184419) 2014.



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