Lifetime of terahertz magnons in ultrathin ferromagnets: Temperature effects

Khalil Zakeri[1, 2]

[1] *Heisenberg Spin-dynamics Group, Physikalisches Institut, Karlsruhe Institute of Technology, Karlsruhe, Germany*

[2] *Max-Planck Institute of Microstructure Physics, Halle, Germany*

Utilizing spin-polarized high resolution electron energy loss spectroscopy we investigate the ultrafast terahertz magnons, excited in an ultrathin ferromagnet. We demonstrate that the engineering of the electronic structure of a ferromagnetic metal, by reducing its dimensionality and changing its chemical composition, opens a possibility to strongly suppress the relaxation channels of terahertz magnons and thereby enhance the magnons' lifetime. For the first time, we report on the long-living terahertz magnons excited in ultrathin metallic alloy films and explain the microscopic nature of this long lifetime [1]. We further monitor the terahertz magnons as a function of temperature and across the magnetic transition temperature T_C. We demonstrate that although at T_C these excitations are affected by different damping mechanisms, they still behave as well-defined collective excitations [2].

References:

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