Effects of heat current on magnetization dynamics in ferromagnetic insulator

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The work presented here is aimed at investigating the interplay between spin dynamics and heat currents in single-crystal Yttrium Iron Garnet (YIG). The irreversible thermodynamics for a continuous medium [1] predicts that a thermal gradient, in the presence of magnetization waves, produces a magnetic induction field, thus a magnetic analog of the well-known Seebeck effect. Time-resolved transmission measurements of magnetization waves propagating along the thermal gradient of a thin slab of YIG crystal provided an experimental observation of this Magnetic Seebeck effect [2].

In order to characterise further this effect, we have also conducted a study on magnetization dynamic in normally magnetized YIG disk subjected to a temperature gradient perpendicular to the plane of the disk and parallel to the applied magnetic field. For this experiment a standard FMR technique at x-band frequencies has been used.

References: