A7

Collective effects and instabilities of a magnon gas

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Subproject A: Spatially confined magnon condensates and coherent magnon transport

Aims

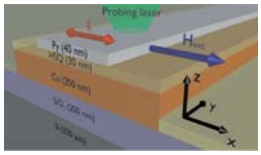
Behaviour of magnon gases in gradients in a potential leading to the generation of phase induced magnon currents

- Magnon BEC and coherent magnon transport in one- and two-dimensional thermal gradients
- Nonlinear confinement of the magnon-phonon condensate and leakage phenomena
- Magnon-phonon condensation in ultra-thin magnetic films
- Magnon BEC of low energy edge modes of micro-structured magnetic samples

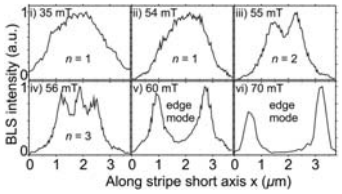
Achievements

Parametric magnon injection into micro-patterned magnetic samples

Access to dynamics of plane and edge modes of a narrow magnetic sample

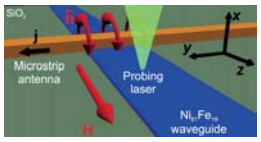


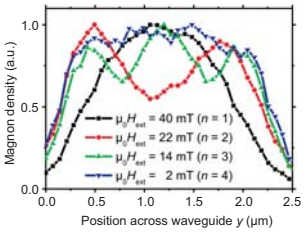
Profiles of the generated magnon modes



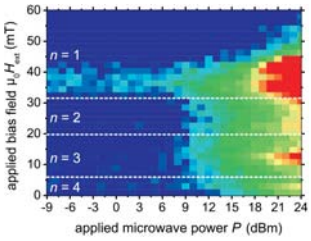
Appl. Phys. Lett. **99**, 162501 (2011)

Characteristics of magnon generation in longitudinally and in transversally in-plane magnetized Py stripes





Efficiency of parametric generation of transversely quantize magnon modes

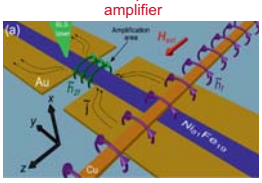


Appl. Phys. Lett. **103**, 142415 (2013)
Appl. Phys. Lett. **104**, 092418 (2014)

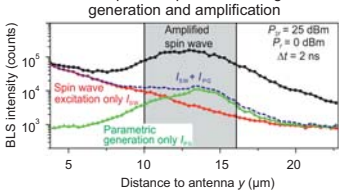
Coherent regeneration of externally excited magnon packets

Non-stationary regime of a coherent magnon generation by pulsed pumping

Microsized parametric amplifier



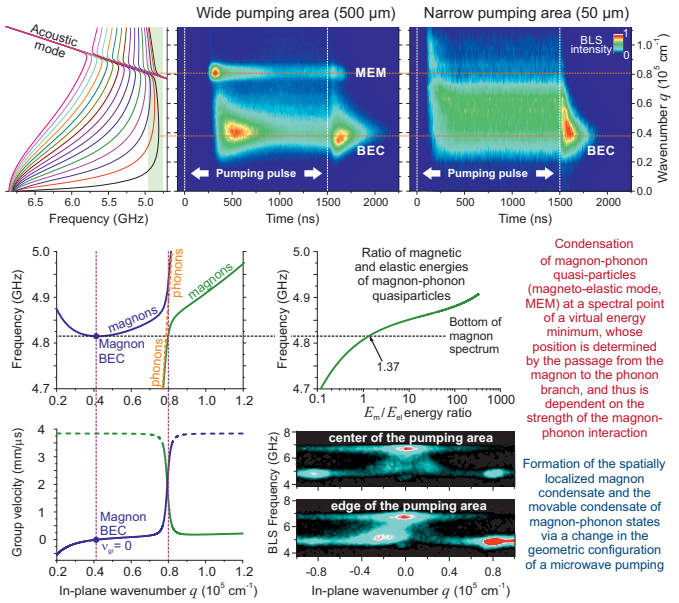
Time dependent parametric magnon generation and amplification



Appl. Phys. Lett. **103**, 202408 (2014)
Appl. Phys. Lett. **105**, 232409 (2014)

Achievements

Condensation of mixed magnon-phonon states

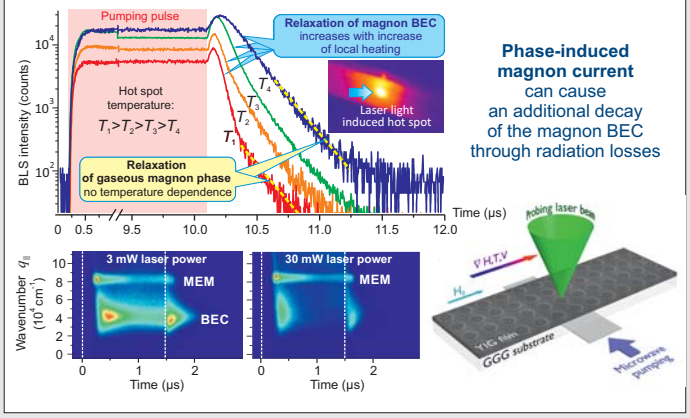


Condensation of magnon-phonon quasi-particles (magneto-elastic mode, MEM) at a spectral point of a virtual energy minimum, whose position is determined by the passage from the magnon to the phonon branch, and thus is dependent on the strength of the magnon-phonon interaction

Formation of the spatially localized magnon condensate and the movable condensate of magnon-phonon states via a change in the geometric configuration of a microwave pumping

Preliminary Work

Decay of the magnon BEC in a local temperature gradient



Phase-induced magnon current can cause an additional decay of the magnon BEC through radiation losses

Role within the SFB / TR 49

A8 Theoretical support will be provided by subproject (a) of project A8 (Kopietz), where the magnon distributions will be calculated microscopically.

A9 The subproject has a close correspondence to the BEC of ultra-cold atoms in a one-dimensional optical lattice which will be studied in project A9 (Ott) for the strongly interacting case.