Project 4.6 Study of the effect of the nanostructured periodic nanomagnet lattices on magnon-photon coupling, project 1 (experimental)

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Background:

Magnons have recently been considered a new candidate for coherent quantum information processing, where magnon-photon interactions can be achieved via magnetic dipoles. Magnons are the collective excitation of spins in magnetic materials. Their frequency range lies from GHz to THz. Magnetic materials can provide much larger coupling strength and cooperativity because they have spin densities four to six orders of magnitude higher than in spin ensembles. This means magnons can exchange information faster and for more cycles before losing coherency while keeping the device dimension small.

Aim:

On-chip integration and miniaturization on a nanoscale are required to implement the high spin density magnetic materials into practical quantum devices. To achieve this goal, many fundamental physics and technological issues must be addressed, such as 1) Does the magnon-photon coupling scales as we systematically reduce the dimensions of the magnetic element into the nanoscale regime? 2) Are their critical dimensions of magnetic elements where magnon-photon coupling enhances or reduces? 3) Can we tune the magnon-photon interaction via periodic nano structurization?

Requirements:

- Masters in Physics or a related discipline is required,
- Prior experience of working with nanofabrication-related equipment, such as electron beam lithography, is highly desired but not required.

Funding:

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