Project 4.3 Study of the effect of the nanostructured quasicrystal nanomagnet lattices on magnon-photon coupling, project 2 (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. Quasicrystalline arrays are aperiodic but exhibit long-range order. One can place more nanomagnets in a given area using quasicrystalline arrays compared with periodic arrays.

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. Does the quasicrystalline arrangement of nanomagnets result in better magnon-photon coupling than the periodic counterpart?

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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