SEMINARIUM Z MAGNETYZMU I NADPRZEWODNICTWA

Uprzejmie zawiadamiamy, że w **środę**

18 grudnia 2024 r., o godz.10:00

odbędzie się seminarium **w sali 203, budynek I**

na którym

prof. dr hab. Maciej Krawczyk

(Instytut Spintroniki i Informacji Kwantowej, Wydział Fizyki i Astronomii, Uniwersytet im. Adama Mickiewicza w Poznaniu)

wygłosi referat na temat:

"Liniowa i nieliniowa dynamika fal spinowych w kryształach magnonicznych"

The development of information technology is characterised by faster, miniaturised and more efficient information processing to meet the growing expectations of modern society. Since the frequency range of spin waves is from a few GHz to a few hundred GHz, and the corresponding wavelengths can be very short, from micrometres to a few nm, magnonics can play a role in this process. Therefore, conversion methods are sought that allow the excitation of very short spin waves, below 100 nm, and high frequencies, e.g. those used in wireless and cellular transmission ranges (including future 6G technologies), i.e. from 1 GHz to 100 GHz. In recent years, there have been some demonstrations of the conversion of microwaves into short spin waves with wavelengths well below 100 nm. However, the frequencies of these waves are usually well below 10 GHz. I will present promising approaches recently developed in our group to excite high frequency and very short wavelength spin waves using magnonic crystals. We propose to exploit three-magnon nonlinear processes occurring in the magnonic crystal under microwave magnetic field excitation to induce high-frequency harmonics of very short wavelengths. Using micromagnetic simulations, we show that a microwave-pumped spin wave mode confined to the cavity or the edges of the antidots of a thin film magnonic crystal can be used to generate waves at tens of GHz and wavelengths well below 50 nm. These multi-frequency harmonics of the fundamental cavity mode, or edge spin waves, are generated when the amplitude of the pumping microwave field exceeds a threshold, and their intensities then scale linearly with the field intensity, allowing optimisation of the power used. Furthermore, since the frequency of the cavity mode is close to the ferromagnetic resonance (FMR) frequency of the planar ferromagnetic film and overlaps with the magnonic band gap, and in the second scenario the frequency of the edge mode is below the FMR, the proposed mechanism provides an efficient mechanism for magnetic field tunability.

Nikhil Kumar, Paweł Gruszecki, Mateusz Gołebiewski, Jarosław W. Kłos, and Maciej Krawczyk
Exciting High-Frequency Short-Wavelength Spin Waves using High Harmonics of a Magnonic Cavity Mode, Adv. Quantum Technol. 2024, 2400015 (2024); doi: https://doi.org/10.1002/qute.202400015

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Wykład będzie prowadzony w sali 203, dostępna będzie również transmisja ZOOM - link podany jest na stronie IF PAN.

Serdecznie zapraszamy

Roman Puźniak / Andrzej Szewczyk / Henryk Szymczak