Programme of the 1st Transnational Round Table on Magnonics, High-Frequency Spintronics, and Ultrafast Magnetism (TRTM'2024), Exeter, 3 – 7 June 2024

	Monday, 3 June	Tuesday, 4 June	Wednesday, 5 June	Thursday, 6 June	Friday, 7 June
8:30	Arrivals	Coffee from 8:45	Coffee from 8:45	Coffee from 8:45	Coffee from 8:45
9:00		**Breakfast discussion** Magnonics, spintronics, and ultrafast magnetism for edge computing	**Breakfast discussion** MaxLLG: Introduction	**Breakfast discussion** TRTM's format: First lessons and next steps	**Breakfast discussion** THz magnonics: Ways forward
9:30	Arrivals, registration, and welcome coffee		**Amir Capua** Spin torque driven skyrmion resonance technique in magnetic bulk crystals		
10:00		**Susmita Saha** Tunable spin wave dynamics in two-dimensional deterministic magnonic fractals		**Oksana Chubykalo-Fesenko** Ultrafast switching and domain wall dynamics in Mn_2Au by novel laser-induced torques	**Thomas Thomson** Magnetisation dynamics of magnetically coupled multilayer thin films
10:30	Arrivals, registration, collaboration, and welcome coffee / Group lab tour 1		**Andrei Kirilyuk** Ultrafast magnetization reversal by excitation at the frequencies of optical phonons		
11:00		**Jaroslaw Kłos** Unconventional spin wave localization in magnonic nanostructures of long-range order		**Pranaba Muduli** Controlling ultrafast terahertz dynamics through crystalline orientation in antiferromagnetic hematite	**Andrey Shytov** Chiral resonant scattering of spin waves in magnetostatically coupled systems
11:30	Group lab tour 2		Light lunch		
12:00		Buffet lunch	Excursion bus departure at 12:15	Buffet lunch	Awards, feedback, and conference closing
12:30	Time for putting posters on		Bus travel to Tintagel		Buffet lunch
13:00	Buffet lunch	**Matteo Vitali** Magnetic nanopatterning of YIG films via direct laser writing for magnonics		**Maciej Dąbrowski** All-optical control of spins in van der Waals magnets	MaxLLG practice, collaboration and networking, additional lab tours / Departures
13:30					
14:00	Conference opening	**Huixin Guo** Realization and control of bulk and surface modes in 3D nanomagnonic networks by additive manufacturing of ferromagnets	Tintagel Castle visit	**Sergii Parchenko** Magnetization dynamics after non-collinear dual optical excitation	
14:30	**Denis Candido** Hybrid magnonics as a unique platform for spin centre-based quantum technologies				
15:00		Coffee break		Coffee break	Coffee break
15:30	Coffee break	**Pieter Gunnink** Accessing topological magnonic excitations in non-equilibrium	Bus departure at 16:15 and travel to Camelot Castle	MaxLLG seminar / Collaboration and networking	MaxLLG practice, collaboration and networking
16:00	**Tom Hayward** Integrated magnonic reservoir computing with magnetic metamaterials				
16:30		**2 min poster pitches**	Afternoon tea at Camelot Castle		Informal walking tour around Exeter and local pub visit*
17:00	**Kirill Rivkin** Spin wave computing and mode engineering using hard media bias field				
17:30		Posters and refreshments		Drinks reception and posters	
18:00	Welcome reception		Photos		
18:30			Bus departure at 18:30	Conference dinner (until about 21:00)	
19:00			Travel to Exeter (stopping at Rougemont and then Reed Hall)		
19:30					

* Informal dinner at a local venue will also be organised at about 6-7pm on Sunday, 2 June for those arriving to Exeter early enough on the day.

Spin wave confinement in hybrid superconductor-ferromagnet nanostructure

(complete result)

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Eddy currents in a superconductor (SC) shield the magnetic field in its interior and are responsible for the formation of a magnetic stray field outside of the SC structure. The stray field can be controlled by the external magnetic field and affect the magnetization dynamics in the magnetic system located in the vicinity of SC. In our work, we investigate theoretically and numerically the spin-wave (SW) confinement induced in a uniform magnetic layer by the stray field of a SC strip.

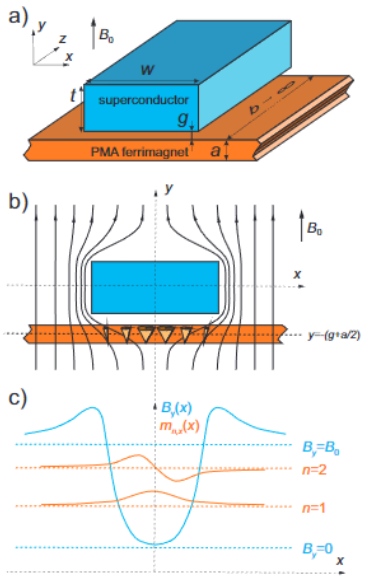

Fig.1. (a) A thin FM film (a = 20 nm) is exposed to the stray field of a rectangular SC strip (w = 800 nm, t = 100 nm). The FM and the SC are separated by a small gap (g = 10 nm). (b) The static internal magnetic field is lowered in the region of the FM, underneath the SC strip. This leads to the confinement of SW modes, (c) which are quantized in the well.

The investigated hybrid system consists of Ga:YIG ferrimagnetic (FM) thin film and Nb SC stripe, which are placed in an external magnetic field perpendicular to the FM layer (Fig. 1). The eddy currents in SC create a non-uniform distribution of the magnetic field in the FM film. In Ga:YIG, the shape anisotropy is overcame by the out-of-plane anisotropy, leading to the magnetization being directed out of plane. Then, the stray field of SC induces the well of static effective field in the FM layer, which can confine the SWs of the frequencies lower than the FMR frequency of FM layer in the absence of SC stripe. For considered geometry, there is no need to take into account the impact of FM layer on the SC stripe.

Fig.2 The frequencies of the localized SW modes *versus* the external magnetic field. The solid lines and square dots correspond to the semi-analytical theory and micromagnetic simulations, respectively. Dashed line shows the FMR frequency of homogeneous film.

Our studies were carried out in two stages. We first calculated the static stray field generated by the SC strip. It was determined from the distribution of SC currents, which was found by semi-analytical solution of the London equation [1]. The static field generated by SC stripe was then included as a component of effective field to Landau-Lifshitz (LL) equation, which was used to find the confined SW modes. The solutions of LL equation were found both semi-analytically [2] and numerically. We have shown that the applied field can tune the depth of the stray field well, and thus we can control the number and frequencies of the SW modes confined in the well (Fig.2).

[1] E.H. Brandt, *Superconductors of finite thickness in a perpendicular magnetic field: Strips and slabs*, Phys. Rev. B **54**, 4246 (1996).

[2] E. V. Tartakovskaya, et al, *Spin-wave localization in tangentially magnetized films*, Phys. Rev. B **93**, 214436 (2016).

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