Supplementary material

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Stimulated amplification of propagating spin waves

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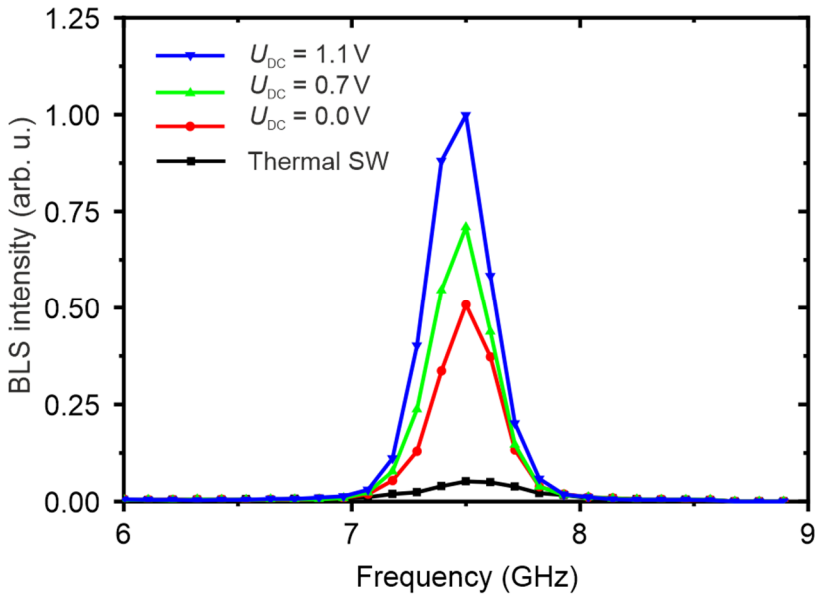
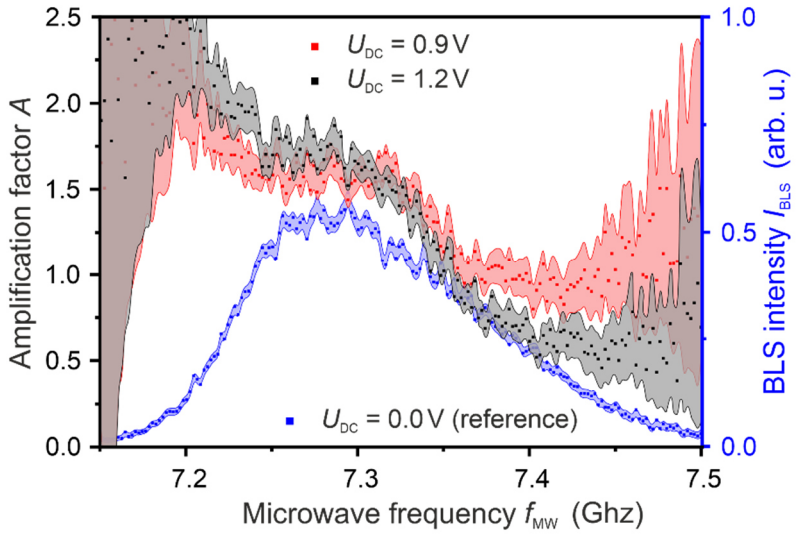
I. FREQUENCY OF THE AMPLIFIED SPIN-WAVE PACKET



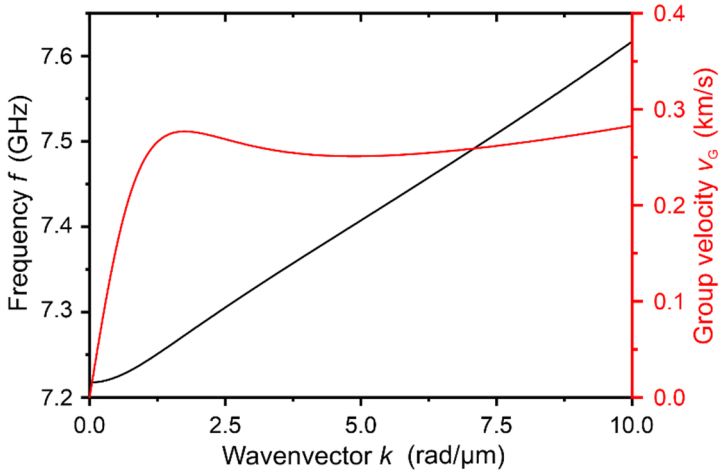
Supplementary Fig. 1: BLS frequency of the spin-wave packet for different DC pulse amplitudes/amplification levels. The frequency of the spin-wave packet is preserved in the amplification process. **Black:** Thermal spin-wave spectrum for comparison.

II. INFLUENCE OF THE RF FREQUENCY ON THE AMPLIFICATION FACTOR



Supplementary Fig. 2: **Left scale**: Amplification factor as a function of the microwave frequency used for spin-wave excitation, for two different DC pulse voltages (red, black curves). **Right scale**: BLS intensity of the spin-wave packet as a function of the microwave frequency without DC pulse ($U_{\mathrm{DC}} = 0.0\,\mathrm{V}$) as reference (blue curve).

III. SPIN-WAVE DISPERSION RELATION AND GROUP VELOCITY



Supplementary Fig. 3: **Left scale**: Calculated spin-wave dispersion relation for the fundamental waveguide mode. **Right scale**: Corresponding spin-wave group velocity as a function of the wavevector. Calculations were performed following [S1] and assuming $M_S = 142.3\,\mathrm{kA/m}$, $A = 3.5\,\mathrm{pJ/m}$, $t_{\mathrm{YIG}} = 34\,\mathrm{nm}$, $w_{\mathrm{eff}} = 1.9\,\mu\mathrm{m}$ and $\mu_0 H_{\mathrm{app}} = 188\,\mathrm{mT}$, additionally taking into account $\mu_0 H_{\mathrm{demag}} = 3.58\,\mathrm{mT}$.

References

S1. B. A. Kalinikos, A. N. Slavin, Theory of dipole-exchange spin wave spectrum for ferromagnetic films with mixed exchange boundary conditions,
Journal of Physics C: Solid State Physics **19**, 7013 (1986)