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【101】Cherenkov radiation of spin waves by ultra-fast-moving magnetic flux quanta

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Despite theoretical predictions for the Cherenkov radiation of spin waves (magnons) by various propagating magnetic perturbations, it has not been observed so far. Our recent experiments arXiv:2103.10156 evidence the Cherenkov radiation of magnons in a Co-Fe magnonic conduit by fast-moving magnetic flux quanta (Abrikosov vortices) in an adjacent Nb-C superconducting strip. The radiation is evidenced by the microwave detection of spin waves and it is accompanied by a magnon Shapiro step in superconductor's current-voltage curve. The spin-wave excitation is unidirectional and monochromatic, with sub-40 nm wavelengths determined by the period of the vortex lattice. The magnon/fluxon phase-locking limits the vortex velocity and reduces the dissipation in the superconductor.

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