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Electron spin resonance study in the chiral ferrimagnet Cu2OSeO3 using pulsed magnetic fields up to 64 T and terahertz free electron laser

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The recent discovery of skyrmions in Cu2OSeO3 has established a new platform to create and manipulate skyrmionic spin textures. We use high-field electron spin resonance (ESR) spectroscopy combining a terahertz free electron laser and pulsed magnetic fields up to 64 T to probe and quantify its microscopic spin-spin interactions. Besides providing direct access to the long-wavelength Goldstone mode, this technique probes also the high-energy part of the excitation spectrum which is inaccessible by standard low-frequency ESR. Fitting the behavior of the observed modes in magnetic field to a theoretical framework establishes experimentally that the fundamental magnetic building blocks of this skyrmionic magnet are rigid, highly entangled and weakly coupled tetrahedra.

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