Universität Münster

Aktuelle Fragen der Nanophysik

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R87, Wilhelm-Klemm-Str. 10

Odd-Parity-Wave Magnons and Nonrelativistic Thermal Edelstein Effect

Dr. Robin Neumann

Institut für Festkörpertheorie
Universität Münster

Altermagnets and odd-parity-wave magnets are unconventional magnetic phases with compensated magnetization and nonrelativistic spin splitting in their electronic band structures. In altermagnets, this spin splitting is symmetric in momentum space, whereas in odd-parity-wave magnets it is antisymmetric.

In this talk, I will go beyond electrons by considering magnons, the collective spin excitations of magnetically long-range ordered systems. I will present how to stabilize odd-parity-wave magnetism at the level of minimal spin Hamiltonians using only nonrelativistic exchange interactions. Despite the nonrelativistic nature of these models, spin-polarized magnon band structures with p- and f-wave symmetries emerge, which I link to the symmetries of the magnetic ground states using spin groups, a symmetry framework that separates spin and crystal spaces. As a characteristic footprint of p-wave magnons, I propose the linear thermal Edelstein effect – a nonequilibrium magnetization induced by a temperature gradient. Here, the angular dependence reflects the partial wave character of the underlying spin-polarized magnon band structure, outlining a path for their experimental verification and practical functionalization.