

Chiral magnons in altermagnets

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Altermagnetism, a novel class of antiferromagnets susceptible to spintronics, has recently attracted the scientific interest. Combining the favorable properties of ferromagnets, such as spin-polarized conduction electrons, with the advantages of antiferromagnets, such as zero net magnetisation and high-frequency switching, it is a promising area of research [1]. While the ground state properties of altermagnets have been studied, their dynamic properties, such as magnon dispersions, remain elusive. Understanding these properties includes the investigation of magnon excitations, which is essential for the development of spintronic and magnonic devices based on altermagnets. In altermagnets, the chiral magnon degeneracy of antiferromagnets is lifted along certain wave-vector directions and chiral magnons emerge as a consequence of exchange interactions and crystal symmetry, rather than from spin-orbit coupling. Unlike chiral magnets, where chirality originates from the Dzyaloshinskii-Moriya interaction in non-centrosymmetric systems, altermagnetic chiral magnons arise from the momentum-dependent spin splitting enforced by symmetry, even in centrosymmetric materials. In this presentation, results are presented of our recent investigation [2] on the interplay between electronic band spin splitting and chiral magnon excitations in a series of metallic *g*-wave altermagnets of 3*d*-transition-metal pnictides, TmPn, in the NiAs structure with a 3*d* element (Tm=V, Cr), and a pnictogen (Pn= As, Sb, Bi) using density functional theory and many-body perturbation theory [3]. The latter theory allows a coherent investigation of Stoner and magnon excitations in metallic magnets. For example, we find that the magnon damping due to Stoner excitations is highly wavevector-dependent, reaching substantial values in specific Brillouin zone regions. I relate to recent RIXS experiments [4-6] on CrSb that confirmed the presence of polarization-dependent magnon modes.

Work was carried out in collaboration with W. Beida, E. Sasioglu, C. Friedrich, G. Bihlmayer, and Y. Mokrousov.

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