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Electrical and Thermal Transport in Altermagnetic CrSb

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Altermagnets are compensated collinear magnets in which opposite sublattices are related by crystal symmetries that permit momentum-dependent spin splitting despite vanishing net magnetization [1]. Among the experimentally established examples, CrSb is a particularly attractive platform because of its simple binary composition, high Néel temperature, and semimetallic electronic structure [2,3]. Recent progress in thin-film growth further extends its potential as a materials platform for altermagnetic electronics [4].

In this talk I will discuss recent progress in understanding altermagnetism in CrSb from complementary transport studies. First, I will present Shubnikov-de Haas measurements in microstructured single crystals in magnetic fields up to 68 T, combined with first-principles calculations. The observed oscillation spectrum, its temperature dependence, and its angular evolution consistently track calculated extremal orbits and confirm the predicted spin-split multiband Fermi surface of altermagnetic CrSb [5]. Second, I will show how extended-field electrical and thermal magnetotransport establish CrSb as a benchmark altermagnetic semimetal.

We observe large nonsaturating magnetoresistance, a pronounced nonlinear Hall response, and high-mobility transport channels, while thermal measurements reveal a nonlinear thermal Hall effect and deviations from a simple Wiedemann-Franz description [6]. Together, these results show how altermagnetic symmetry shapes both the Fermi-surface topology and the coupled electrical and thermal response of CrSb.

References:

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