

Altermagnetic Transport – From Electrons to Magnons

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While much work has been going on to demonstrate the key operations of “reading” [1], “writing” [2], and “transporting information” [3] in antiferromagnets, this class of materials entails a number of challenges, such as no spin-split electronic and magnonic bands for spin-polarized transport.

Going beyond antiferromagnets, we develop altermagnetic materials [4,5]. This recently identified class magnets with collinear antiferromagnetic magnetic order combines the best of antiferromagnets and ferromagnets exhibiting spin splitting and particular spin transport properties and torques [4]. Here we demonstrate the spin splitting in RuO₂ and CrSb [5] and analyze particular symmetries of the Hall signal in the altermagnet hematite where we can also quantify altermagnetic domains by XMCD & XMLD imaging [6].

Finally we show that the spin splitting also manifests in the magnonic band structure leading to altermagnetic spin transport in insulating d-wave altermagnets [7].

References:

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Abstract for IAS Quantum Forum on Altermagnetism and Beyond (August 10-13, 2026)

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