

Altermagnetism imaged and controlled down to the nanoscale in MnTe

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Altermagnetism is a newly identified class of magnets which combines properties from both ferromagnets and antiferromagnets, making them highly promising candidates for spintronic applications^[1,2]. We recently demonstrated the spin split nature of the altermagnetic electronic band structure in MnTe^[3]. In this work, we demonstrate that the unique resultant properties of altermagnets can be used to image them in unprecedented details, and also to control them in unique ways.

Utilising a combination of linearly and circularly polarised x-rays, in a single instrument, we generate a full Neel vector map of the magnetic domain in MnTe, showing all 6 domain types and revealing vortices and their vorticity. In addition, we utilise a combination of patterning and field cooling to nucleate single domains of our choosing from the micron to nanoscale. We also show generation and control of the position and vorticity of single vortices. These experiments showcase the unique properties of altermagnets and also provide a platform for the next stages of research and application^[4].

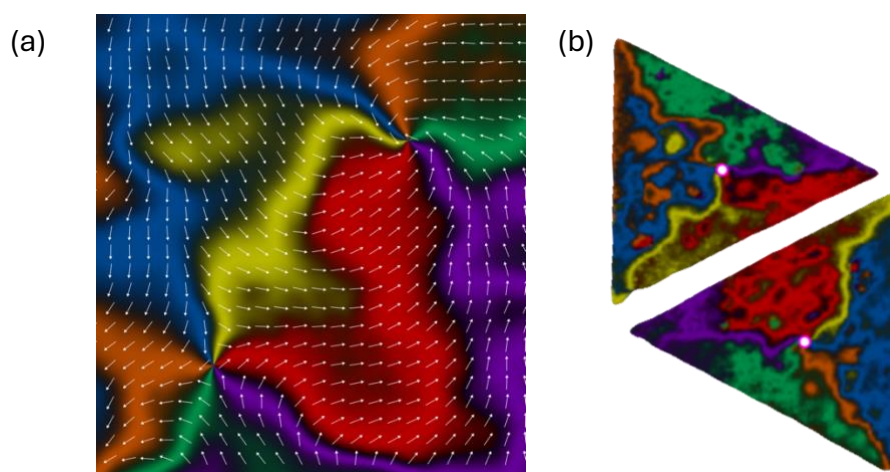


Figure1 – Altermagnetic domain structure in open space (a) showing a vortex antivortex pair and (b) in micro-fabricated field-cooled triangles showing single vortices with opposite vorticity. Adapted from [4].

References

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