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[641] Phase Transitions and Magnetic Order in a Twisted Form of the Kagome Artificial Spin Ice

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Artificial spin ices are arrays of strongly-correlated nanomagnets, which provide a valuable platform to study phase transitions. The kagome artificial spin ice is a highly frustrated example that undergoes two separate ordering transitions. We show how rotating each nanomagnet in the kagome lattice about its centre allows us to access a rich phase diagram. Using a combination of magnetic force microscopy to characterise the as-grown states and x-ray photoemission electron microscopy to observe the thermally-active states, we determine how ordering proceeds in the different arrays. We find that the rotation maps from a spin ice sector near hexagonal geometries to a ferromagnetic phase, and then to a flux closed state.

Theoretical Work

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