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[607] Tunable Berry Curvature Through Magnetic Phase Competition in a Topological Kagome Magnet

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Using muon spin-rotation experiments and density functional theory calculations, we present evidence for competing magnetic orders in a topological kagome magnet $\text{Co}_3\text{Sn}_2\text{S}_2$ [1]. Our results show that while the sample exhibits an out-of-plane ferromagnetic ground state, an in-plane antiferromagnetic state appears at temperatures above 90 K. Strikingly, the reduction of the anomalous Hall conductivity above 90 K linearly follows the disappearance of the volume fraction of the ferromagnetic state. We further show that the competition of these magnetic phases is tunable through applying either an external magnetic field or hydrostatic pressure. Our results taken together suggest that the magnetic competition drives the thermal and quantum evolution of Berry curvature field in $\text{Co}_3\text{Sn}_2\text{S}_2$, thus tuning its topological state.

[1]Guguchia et.al., arXiv:1904.09353(2019).

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