

Negative thermal expansion in the plateau state of a magnetically-frustrated spinel

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Abstract:

The CdCr_2O_4 is a frustrated magnetic insulator that shows a large one-half magnetization plateau. In this seminar, first, I will explain the origin of the plateau. Then, I will discuss the negative thermal expansion observed at the onset of the magnetization plateau [1]. On the experimental side, dilatometry provides a precise phase diagram in a magnetic field of up to 30 Tesla. These measurements revealed a large negative thermal expansion associated with the collinear half-magnetization plateau for magnetic fields above 27 Tesla. The resulting phase diagram is compared with a microscopic theory for spin-lattice coupling, and the origin of the negative thermal expansion is identified as a large negative change in magnetization with temperature, coming from a nearly localized band of spin excitations in the plateau phase.

Reference:

[1] Rossi *et al.*, Phys. Rev. Lett. **123**, 027205 (2019).