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Magnetothermal observables of geometrically frustrated systems: The case of Fe_2P-like layered structures[1] JUAN MANUEL FLOREZ, Technical University Federico Santa Maria and Massachusetts Institute of Technology, OSCAR ANDRES NEGRETE, PATRICIO VARGAS, Technical University Federico Santa Maria, CAROLINE A. ROSS, Massachusetts Institute of Technology — We study a Fe_2P-like structured material composed by alternating layers of distorted-Kagome and segmented-triangular lattices. The system is modeled as a stacked Heisenberg structure of mixed AFM/FM couplings, and the magnetothermal properties are calculated by using a Monte Carlo simulations framework. We focus on the question of whether the system could present or not a double-transition-like behavior as a consequence of an intermediate ordered state, which gives rise to a thermal delaying of the spin disorder after the planar 120° ordering of the Kagome layers is already broken. This double transition could be observed, e.g., in Fe_2P-like Iron-pnictides if the Fe-triangles behave like an effective spin center. In a more general case however, FM and AFM intra-triangular interactions lead to different magnetic specific heat sceneries, where the observable peaks evidence an opposed behavior as the strength of the couplings increases: FM promotes the shrinking of the paramagnetic-like zone of the phase-diagram; AFM boosts the global spin disorder but also triggers a competition between the canted orderings of the triangular and the Kagome lattices, which is evidenced through a doubly-bifurcated phase-diagram.

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