174 Magnetothermal observables of geometrically frustrated systems: The case of Fe_2P-like layered structures

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Geometrically frustrated materials provide us with a rich source of exotic physics as a consequence of a series of still not well understood phenomena[1] associated with local and long-range frustration, topological spin-ordering, spin liquids, competing spin phases, among others, which besides to lead us to new strong-correlated system physics, they convey the possibility of creating new materials with interesting properties. In this opportunity we study a Fe_2P-like structured material composed by alternating layers of distorted-Kagome and segmented-triangular lattices. The Fig.1 shows a top view of the Cr layers intercalated with the Fe ones. The spins system is modeled as a stacked Heisenberg structure of mixed couplings (FM/AFM) and the magnetothermal properties are calculated by using classical Monte Carlo simulations.

We are focused in this work on responding the question of whether the system could present or not a double-transition-like behavior as a consequence of an intermediate state that gives rise to a delaying of the thermal disorder. This double transition was already shown to be the case when the triangles behave like an effective spin center [1], i.e., under the so-called trimer approximation for the Fe sites (FeCrAs-like materials). In this case however, we have studied the structure by considering the triangular lattice with all its spin degrees of freedom and when they are coupled either in a FM or AFM configuration. We have found particular regimes, as represented through the magnetic phase-diagram, where the system actually evidences a double transition behavior.

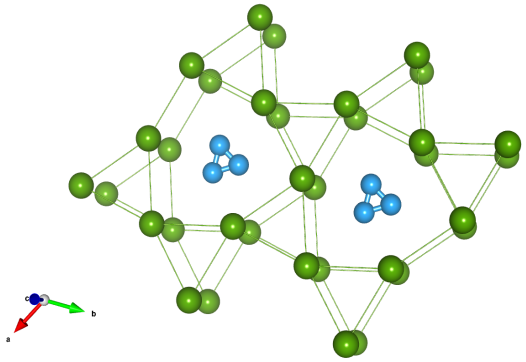

Fig. 1 *Bilayer of a distorted-Kagome lattice sandwiching a segmented-triangular one.*

References

[1] Wu W, McCollam A, Swainson I, Rourke P.M.C.,Rancourt D.G. and Julian S.R. 2009 *Europhys. Lett.* 85 17009.
[2] J.M. Florez et al 2013 *J. Phys.: Condens. Matter* 25 226004