Influence of spin-orbit interactions on the electronic structure and magnetic properties of IrMn alloys

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— We will present a theoretical study of the electronic and magnetic properties of non-collinear antiferromagnetic metals with strong spin-orbit interactions, focusing on the particular case of the IrMn alloy. IrMn alloys are important antiferromagnetic materials often used as the pinning layer in spin-valve structures. Their electronic structure has so far not been extensively studied; in particular the influence of spin-orbit interactions which are strong in this material has not yet been addressed. We start from ab initio calculations for ordered IrMn$_3$ crystals, and analyze the relationships between band degeneracy, non-collinearity of the Mn spins, and the large spin-orbit coupling of Ir. We will also study the spin wave spectra in the ordered IrMn$_3$, and finally comment on the influence of transport currents on magnetization structure and dynamics in antiferromagnets in general, and non-collinear systems in particular.

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