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Theory of the evolution of magnetic order in $Fe_{1+y}Te$ compounds with increasing interstitial iron[1] SAMUEL DUCATMAN, RAFAEL FERNANDES, NATALIA PERKINS, University of Minnesota: Twin Cities — We examine the influence of the excess of interstitial Fe on the magnetic properties of $Fe_{1+y}Te$ compounds. We assume in our model that some of the Fe orbitals give rise to localized magnetic moments. These moments interact with each other via exchange interactions as well as biquadratic interactions that favor a collinear double-stripe state, corresponding to the ordering vectors $(\pm\pi/2, \pm\pi/2)$. The remaining Fe orbitals are assumed to be itinerant, giving rise to the Fermi surface displaying nesting features at momenta $(\pi, 0) / (0, \pi)$. Increasing the amount of itinerant electrons due to excess Fe, y, leads to changes in the Fermi surface and to the suppression of its nesting properties. As a result, due to the Hund's coupling between the itinerant and localized moments, increasing y leads to modifications in the local moments' exchange interactions via the multi-orbital generalization of the long-range Ruderman-Kittel-Kasuya-Yosida (RKKY) interaction. We computed the RKKY corrections and minimized the resulting effective exchange Hamiltonian. We find the excess electrons change the classical magnetic ground state from a double-stripe state to an incommensurate spiral, consistent with the experimental observations.

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