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Nearly unfrustrated stripe antiferromagnetism in the pnictides as a consequence of orbital ordering induced by degenerate double exchange WEICHENG LV, FRANK KRÜGER, PHILIP PHILLIPS, Department of Physics, University of Illinois — We propose a local-itinerant theory to explain the anisotropic electronic and magnetic properties of the iron pnictides. The localized spins are described by an isotropic, strongly frustrated J_1-J_2 Heisenberg model, forming a $(\pi, 0)$ stripe antiferromagnetic ground state. We further introduce a strong Hund's coupling between the local moments and the itinerant bands of the degenerate d_{xz} and d_{yz} orbitals. Due to the kinetic energies gained by hopping along the ferromagnetic direction, the electrons form an orbitally ordered nematic state. By calculating the spin-wave dispersion in the presence of both superexchange and double exchange, we find that the orbital order leads to a stabilization of the stripe antiferromagnetism and to a dramatic increase of the spin-wave energies at (π, π) of the competing Néel order. The spectra are in good agreement with recent neutron scattering data and suggest a strong anisotropy of the magnetic exchanges on the level of an effective spin-only model.

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