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Properties of Spin-Waves in Iron Pnictides[1] JIAN KANG, Department of Physics and Astronomy, Johns Hopkins University, Baltimore MD 21218, VLADIMIR CVETKOVIC, Department of Physics and Astronomy, University of California, Riverside, CA 92521, ZLATKO TESANOVIC, Department of Physics and Astronomy, Johns Hopkins University, Baltimore, MD 21218 — The spectrum of spin density-wave (SDW) fluctuation at zero temperature is studied within a multiband Hubbard-like Model. It is assumed that the formation of the SDW is driven by a short range interaction in a particle-hole channel. The mean-field solution reveals that the ground state is an itinerant, antiferromagnetically ordered phase, with staggered magnetic moment modulated at a wave vector M and a partially gapped Fermi surface, consisting of several disconnected pockets. A familiar Hubbard-Stratonovich transformation is used to obtain the effective action for this SDW state and the quantum fluctuations around the mean-field SDW solution are analyzed for realistic band structure of iron pnictides. In particular, we find that the damping is greatly enhanced by the inter-pocket decay of a spin-wave when its momentum reaches a critical value. We compare our theoretical results with the neutron scattering experiments and discuss interplay of SDW and superconductivity.

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