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Magnetism in Fe_4Al_{13} and related FeAl intermetallics JI CHI, YANG LI, WEIPING GOU, V. GORUGANTI, K. D. D. RATHNAYAKA, JOSEPH H. ROSS, JR., Department of Physics, Texas A&M University — We report the results of an experimental study of FeAl alloys, including Fe_4Al_{13}, $FeAl_2$ and Fe_2Al_5. By using NMR, dc magnetic susceptibility, and specific heat, we found that Fe_4Al_{13} and Fe_2Al_5 are non-magnetic with some dilute magnetic moments, while $FeAl_2$ can be characterized as a concentrated local moment system. Fe_4Al_{13} is a decagonal quasicrystal approximant with 102 atoms in its unit cell. The ^{27}Al NMR spin-lattice relaxation indicates a very narrow pseudogap in the electronic density of states $[g(E)]$ in the vicinity of the Fermi energy. The observations could be fit assuming a parabolic variation of $g(E)$, consistent with observations in other quasicrystals and approximants. NMR lineshape measurements also agree with this analysis, and show that the system is dilute-magnetic, in strong contrast to the $FeAl_2$ ordered intermetallic. We use specific heat to analyze the dilute moment density. This work was supported by the Robert A. Welch Foundation, Grant No. A-1526, by the National Science Foundation (DMR-0103455), and by Texas A&M University through the Telecommunications and Informatics Task Force.

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