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**Low Ordered Magnetic Moment in Fe-As High-$T_c$ Superconductors by Violation of Hund's Rule**[1] JOSE RODRIGUEZ, California State University at Los Angeles, EDWARD REZAYI, California State Univeristy at Los Angeles — We study by exact diagonalization the $J_0$-$J_1$-$J_2$ model over the square lattice that Si and Abrahams introduced recently to describe magnetism in the newly discovered iron-arsenic class of high-$T_c$ superconductors. The case of maximum frustration between the nearest-neighbor and the next-nearest-neighbor Heisenberg exchange terms, $J_2 = |J_1|/2$, over a 4 by 4 square lattice with periodic boundary conditions is focused on. Each site hosts two Fe orbitals. Hidden long-range antiferromagnetic order can appear in the absence of Hund's rule coupling, $J_0 = 0$. It shows no net ordered magnetic moment. The ordered collinear/SDW moment steadily increases from zero as Hund's rule coupling turns on: $J_0 < 0$. This result compares well with recent determinations of a low ordered magnetic moment for the insulating parent compounds of Fe-As based high-$T_c$ superconductors by elastic neutron scattering. Our numerical results are also consistent with a quantum phase transition at intermediate Hund's rule coupling, $J_0 = -2|J_1|$, that separates the latter hidden-order state from a more familiar frustrated magnetic state that obeys Hund's rule.

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