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Paramagnetic Semiconductor to itinerant Ferromagnet in $\mathbf{Fe_{1-x}Co_xS_2}$ SONG GUO, Dept. of Physics and Astronomy, Louisiana State University, JOHN DITUSA, Dept. of Physics and Astronomy, Louisiana State University, DAVID YOUNG, Dept. of Physics and Astronomy, Louisiana State University, ROBIN MACALUSO, Dept. of Chemistry, Louisiana State University, DANA BROWNE, Dept. of Physics and Astronomy, Louisiana State University, NATHAN HENDERSON, Dept. of Chemistry, Louisiana State University, JULIA CHAN, Dept. of Chemistry, Louisiana State University — Carrier doping of "fool's gold", the paramagnetic insulator FeS_2 by partial substitution of Co for Fe, results in an insulator-to-metal transition at $x \leq 0.001$. Magnetization and susceptibility measurements for samples with Co substitution beyond x 0.01 reveal the emergence of a highly itinerant ferromagnet with no discontinuous changes with x, field, or temperature (T) suggesting either a continuous crossover or quantum phase transition to ferromagnetism. For $x \leq 0.01$ and low-T, the conductivity decreases with smaller T and displays a positive magnetoconductance. Samples which order magnetically show similar magnetoconductance, but with a minimum in conductivity near T_c. We conclude that either Kondo or magnetic polaron effects are responsible for these low-T anomalies. Specific heat measurements display extraordinarily large carrier masses that diverge logarithmically or with a small power law at low-T close to the ferromagnetic critical concentration, similar to the behavior near quantum critical points.

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