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The strongly paramagnetic-to-spin polarized ferromagnetic transition in $Fe_{1-x}Co_xS_2$ SONG GUO, JOHN DITUSA, DAVID YOUNG, JULIA CHAN, LOUISIANA STATE UNIVERSITY TEAM — Carrier doping of fools gold, the paramagnetic insulator FeS_2, by way of Co substitution for Fe, results in a insulator-to-metal transition at $x \leq 0.001$. Further Co substitution beyond x 0.035 produces an itinerant and fully spin polarized ferromagnet by way of either a crossover or quantum phase transition. In order to explore the thermodynamics of this magnetic semiconductor near the paramagnetic-to- ferromagnetic phase transition the specific heat of $Fe_{1-x}Co_xS_2$ (x=0.045,0.03,0.005) was measured for temperatures down to 0.1 K. Our $x = 0.045$ sample displayed a logarithmic like divergence of $C/T = \gamma$ in zero field which saturates to a Fermi liquid like constant below 0.5 K. For x=0.03 at zero field, the enhancement of γ is extended down to 0.3K while for x=0.005 the logarithmic-like divergence continues down to the lowest temperature measured. For this last sample, γ can be enhanced by the application of small magnetic fields ($H < 0.15$ T) while higher fields tend to suppress γ in all of our samples.

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