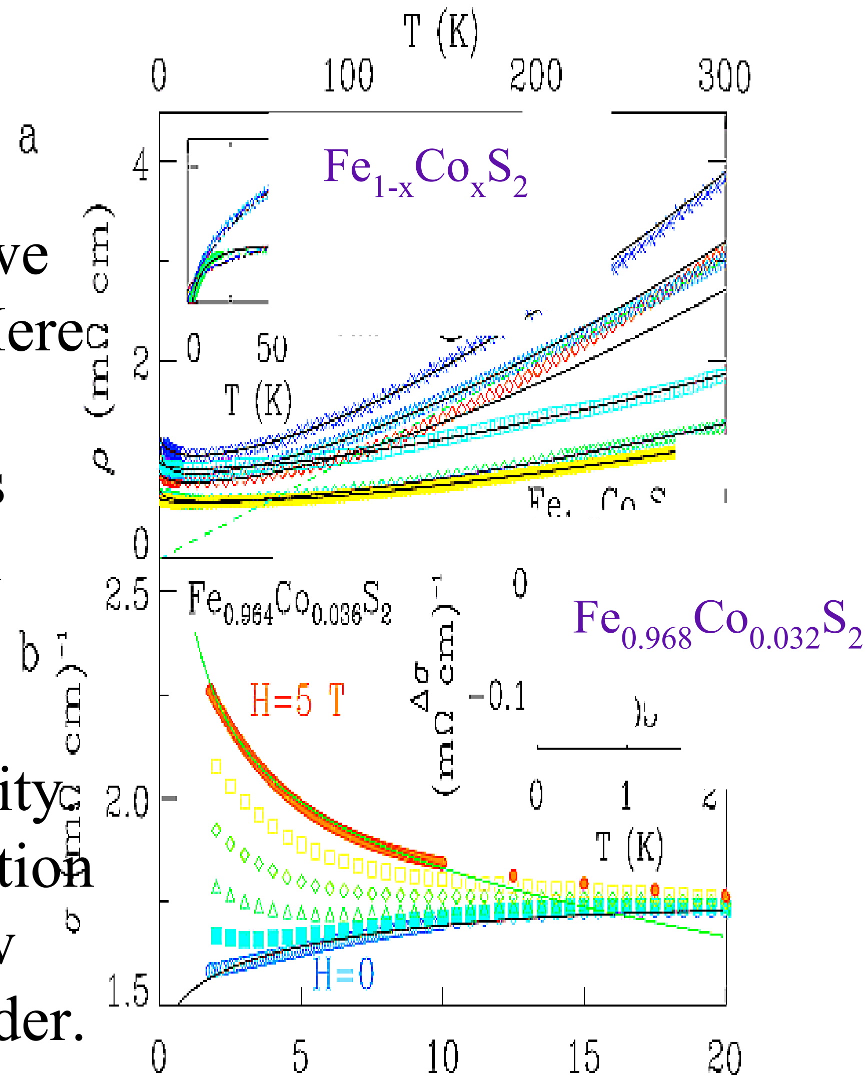
Quantum Critical Behavior in Magnetic Semiconductors,

John F. DiTusa, Louisiana State University, DMR 0103892

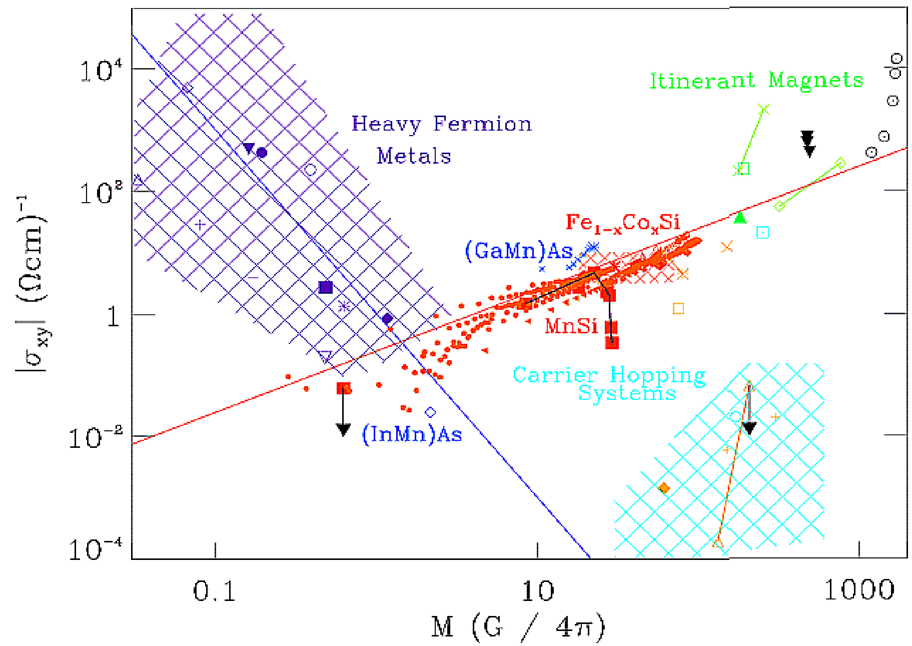
Metals do not conform to the well established properties of Fermi Liquids near magnetic instabilities. This realization is challenging the way in which we think about magnetic metals. Here we show that a magnetic *semiconductor*, $Fe_{1-x}Co_xS_2$, has many features in common with these marginal-Fermi-Liquids including the nearly linear temperature-dependent resistivity. In b we display a new contribution to the conductivity due to a low carrier concentration and disorder.



Large Anomalous Hall Effect in a Silicon-Based Magnetic Semiconductor

John F. DiTusa, Louisiana State University, DMR-0103892

Magnetic Semiconductors are attracting high interest because of their potential use for spintronics. We have shown that a transition metal monosilicide $Fe_{1-x}Co_xSi$, a bulk metallic magnet derived from doping the narrow gap semiconductor FeSi, shares the very high anomalous Hall conductance of (GaMn)As. This similarity demonstrates that it is productive to consider transition metal monosilicides as a potential alternatives to the Mn doped II-V and II-VI semiconductors for spintronics.



Education: Undergraduate students Robert Anderson, Jakob Duran, Jon Hanson, Jon Hefner (computer science), Dung Lee, Andrew Morrow, Margaret Reaves (Chem E), Christopher Weaver, and Matthew Wolboldt all contributed to the research.

Dung Lee is presently attending graduate school in Medical Physics, Margret Reaves in Chemical Engineering. Song Guo is a graduate student performing his thesis research with support from this grant.