Abstract Submitted
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A Semimetal Model of the Normal State Susceptibility and Transport Properties of Ba($Fe_{1-x}Co_x$)$_2As_2$ Superconductors BRIAN SALES, ATHENA SEFAT, MICHAEL MCGUIRE, DAVID MANDRUS, Oak Ridge National Laboratory — A simple two-band 3D model of a semimetal is constructed to see which normal state features of the Ba($Fe_{1-x}Co_x$)$_2As_2$ superconductors can be qualitatively understood within this framework. The model is able to account in a semiquantitative fashion for the measured magnetic susceptibility, Hall, and Seebeck data, and the low temperature Sommerfeld coefficient for 0 <x<0.3 with only 3 parameters for all x. The purpose of the model is not to fit the data but to provide a simple starting point for thinking about the physics of these interesting materials. Although many of the static magnetic properties, such as the increase of the magnetic susceptibility with temperature, are reproduced by the model, none of the spin-fluctuation dynamics are addressed. A general conclusion from the model is that the magnetic susceptibility of most semimetals should increase with temperatures. This is indeed found to be the case for two well-known semimetals Bi and $TiSe_2$. Research supported by the US DOE, Office of Basic Energy Sciences, Division of Materials Sciences and Engineering.

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