Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

A new approach to determine bulk spin polarization applied to $\mathbf{Co_{(1-x)}Fe_xS_2}$ JONATHAN TAYLOR, SEAN GIBLIN, STFC, CLAUDIA UTFEILD, Departmemt of Phyics Univerity of Bristol, JONATHAN DUFFY, Departmemt of Phyics Univerity of Warwick, STEVEN DUGDALE, Department of Physics University of Bristol, JUDE LAVEROCK, Department of Physics, University of Bristol, C. LEIGHTON, M. MANNO, Department of Chemical Engineering and Materials Science, University of Minnesota, M. ITOU, Y. SAKURAI, Japan Synchrotron Radiation Research Institute, SPring-8 — We report on a new method to determine the degree of bulk spin polarization in single crystal $Co_{(1-x)}Fe_xS_2$, by modeling magnetic Compton scattering with *ab initio* calculations. Spin-dependent Compton profiles were measured for CoS_2 and $Co_{0.9}Fe_{0.1}S_2$, along four and three different crystallographic directions respectively. The *ab initio* calculations were then refined by rigidly shifting the bands to provide the best fit between the calculated and experimental directional profiles for each sample. The bulk spin polarizations, P, corresponding to the spin-polarized density of states at the Fermi level, were then extracted from the *refined* calculations. The values were found to be $P = -72 \pm 6\%$ and $P = 18 \pm 7\%$ for CoS_2 and $Co_{0.9}Fe_{0.1}S_2$ respectively. Furthermore, determinations of P weighted by the Fermi velocity (v_F or v_F^2) were obtained, permitting a rigorous comparison with other experimental data and highlighting the experimental dependence of P on v_F.

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Date submitted: 04 Jan 2010 Electronic form version 1.4