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Structural and orientation dependence of the anomalous Hall effect in cobalt crystals ERIC ROMAN, IVO SOUZA, University of California, Berkeley — Co undergoes a structural phase transition at 660 K from a ferromagnetic hcp phase to a ferromagnetic fcc phase. We present a first-principles study of the anomalous Hall conductivity (AHC) in hcp, fcc, and fct cobalt crystals. We find that the AHC in the fcc phase is about half that of the hcp phase, in good agreement with experiment. [1] By expressing the AHC as the Kramers-Kronig transform of the magnetic circular dichroism (MCD) spectrum, we relate the change in the AHC to differences between the infrared MCD spectra of the two phases. In particular, there is a large, negative spin-flip contribution in fcc, which is absent in hcp. We also describe the effect of tetragonal distortions on the AHC of Co, by studying its evolution along the fcc-bcc Bain path. These distortions alter the dependence of the AHC on the magnetization direction, an effect which is also significant for the orbital moment. [2]

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[2]O. Hjortstam, K. Baberschke, J. M. Wills, B. Johannson, and O. Eriksson, Phys. Rev. B **55**, 15026 (1997).

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