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Commensurate antiferromagnetic ordering in $\text{Ba}(\text{Fe}_{1-x}\text{Co}_x)_2\text{As}_2$ determined by x-ray resonant magnetic scattering at the Fe K edge¹

M.G. KIM, A. KREYSSIG, Y.B. LEE, Ames Laboratory and Dep. of Physics and Astronomy, Iowa State University, Ames, J.W. KIM, Advanced Photon Source, Argonne National Laboratory, D.K. PRATT, A. THALER, S.L. BUD'KO, P.C. CANFIELD, B.N. HARMON, R.J. MCQUEENEY, A.I. GOLDMAN, Ames Laboratory and Dep. of Physics and Astronomy, Iowa State University, Ames — We describe x-ray resonant magnetic diffraction measurements at the Fe K edge of both the parent BaFe_2As_2 and superconducting $\text{Ba}(\text{Fe}_{0.953}\text{Co}_{0.047})_2\text{As}_2$ compounds. From these high-resolution measurements we conclude that the magnetic structure is commensurate for both compositions. The energy spectrum of the resonant scattering is in reasonable agreement with theoretical calculation using the full-potential linear augmented plane-wave method with a local density functional. The calculation suggests that the resonant scattering at the Fe K edge in the σ -to- π scattering channel arises from dipole allowed transitions from the core $1s$ states to the unoccupied $4p$ states that are spin polarized due to hybridization with the $3d$ states close to the Fermi energy.

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