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Neutron diffraction study of the development of incommensurate magnetic order in Ba($Fe_{1-x}M_x$)As_2 (M = Co, Ni, Cu)[1] R.J. MCQUEENEY, M.-G. KIM, D.K. PRATT, Ames Laboratory, Iowa State University, Ames, IA 50011, T.W. HEITMANN, The Missouri University Research Reactor, University of Missouri, Columbia, MO 65211, J. LAMSAL, S.N. KHAN, Y.B. LEE, G.S. TUCKER, A. THALER, S. RAN, S.L. BUD'KO, P.C. CANFIELD, D.D. JOHNSON, B.N. HARMON, A. KREYSSIG, A.I. GOLDMAN, Ames Laboratory, Iowa State University, Ames, IA 50011 — We employ neutron diffraction and electronic structure calculations using both virtual crystal and coherent potential approximations to investigate the conditions for incommensurate magnetism in several electron-doped compounds Ba($Fe_{1-x}M_x$)As_2 with M =Co, Ni, Cu. Incommensurate order is observed for M = Co and Ni with $x \approx 0.06$ and 0.03, respectively. Assuming each Co (Ni) ion donates one (two) additional electrons, the appearance of incommensurate magnetism in the Co and Ni doped systems occurs at similar electron concentrations. For M = Cu, Cu should donate three electrons and one expects that incommensurate magnetism will appear at $x \approx 0.02$. However, we find that the magnetism remains commensurate until it disappears at $x \approx 0.05$. Thus, Cu doping behaves differently than either Co or Ni, as can be explained from the electronic structure.

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Robert McQueeney
Iowa State University

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