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Competing magnetic ground states in $Ba(Fe_{1-x}Cr_x)_2As_2$[1] K. MARTY, M.D. LUMSDEN, A.D. CHRISTIANSON, C. WANG, M. MATSUDA, H. CAO, ORNL, L. VANBEBBER, University of Tennessee, J.L. ZARESTKY, ORNL and Ames Laboratory, D.J. SINGH, A.S. SEFAT, ORNL — Understanding the origin of unconventional superconductivity is a great challenge of condensed matter physics. In the so called 122 family, doping in the conductive layer (i.e. on the Fe site) of the $BaFe_2As_2$ iron pnictide parent compound leads to superconductivity for almost any transition metal, except for Cr and Mn. The absence of superconductivity in these cases remains an unresolved issue. We report here neutron diffraction measurements of $Ba(Fe_{1-x}Cr_x)_2As_2$ for concentrations up to x=0.47. The results show that Cr doping stabilizes magnetism across the phase diagram with a competing magnetic order favoured at high Cr-doping, in contrast to the other superconducting $Ba(Fe_{1-x}TM_x)_2As_2$.

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