Magnetic and Structural Phase Diagram of $\text{Ba}_{1-x}\text{K}_x\text{Fe}_2\text{As}_2$

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western University, Illinois, USA, EUGENE GOREMYCHKIN, AZIZ DAOUD-
ALADINE, ISIS, Rutherford Appleton Laboratory, UK — It is well known that
the partial substitution of Ba by K in $\text{Ba}_{1-x}\text{K}_x\text{Fe}_2\text{As}_2$ causes a steep suppression
of both the antiferromagnetic and tetragonal-orthorhombic transitions, leading to
the onset of superconductivity over a large substitution range peaking at 38 K for
$x = 0.4$. We report high resolution neutron powder diffraction results, which show
that the magnetic and structural transitions are coincident over the entire phase
diagram, in contrast to $\text{Ba(Fe}_{1-x}\text{,Co}_x\text{)}_2\text{As}_2$. Volume discontinuities show that the
combined transitions are first-order. The superconducting phase diagram has been
refined with greater precision and a narrow region of phase coexistence have been
delineated.

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