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The upper critical field of $NaFe_{1-x}Co_xAs$ superconductors SAMAN GHANNADZADEH, JACK D. WRIGHT, FRANCESCA R. FORONDA, STEPHEN J. BLUNDELL, SIMON J. CLARKE, University of Oxford, PAUL A. GODDARD, University of Warwick — Measurement of the upper critical field H_{c2} is a crucial part of the experimental effort to understand unconventional superconductivity. Studying the temperature dependence of H_{c2} and the interplay between the various pair-breaking mechanisms may hint towards the underlying pair-forming interaction. H_{c2} and its anisotropy are also sensitive to the cooper-pair symmetry, as well as the underlying dimensionality and electronic structure of the system. Here, we present the results of upper critical field measurements on the 111 system $NaFe_{1-x}Co_xAs$ in fields up to 45 T, across the phase diagram from the parent to the over-doped compound. We show that a multi-band model is required to describe H_{c2}. We find the in-plane critical field to be strongly dominated by paramagnetic pair-breaking. In the parent compound the paramagnetic limit is shown to be equal to the BCS value; however addition of Co leads to a significant enhancement of the paramagnetic limit above the BCS value, most likely due to a combination of spin-orbit and strong-coupling effects.

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