Specific Heat to 35 T in P-doped and Co-doped BaFe$_2$As$_2$: Evidence for Nodes or Not?\textsuperscript{1} G.R. STEWART, J.S. KIM, P.J. HIRSCHFELD, Physics, University of Florida, F. RONNING, K. GOFRYK, MPA-10, Los Alamos National Laboratory, A.S. SEFAT, MST Division, Oak Ridge National Laboratory, S. KASAHARA, T. SHIBAUCHI, T. TERASHIMA, Y. MATSUDA, Physics, Kyoto University — We have measured the low temperature specific heat of annealed single crystal Ba(Fe$_{0.955}$Co$_{0.045}$)$_2$As$_2$, unannealed single crystal BaFe$_2$(As$_{0.7}$P$_{0.3}$)$_2$, and other BaFe$_2$As$_2$ derivatives in fields to 35 T. We report contrasting behavior, with the underdoped Co sample exhibiting behavior (specific heat $\gamma \sim H^{0.7}$) essentially up to $H_{c2}$ similar to the Volovik effect prediction ($\gamma \sim H^{*0.5}$) for nodal behavior for fields $H < 0.1H_{c2}$. In contrast, $\gamma$ up to 35 T ($2/3$ of $H_{c2}$) in BaFe$_2$(As$_{0.7}$P$_{0.3}$)$_2$ exhibits linear with field dependence, consistent with fully gapped behavior but inconsistent with indications of nodal behavior from other measurements. Possible explanations, and up-to-date measurements will be presented.

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