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Anomalous scaling behavior of the Specific Heat jump ΔC vs. T_c in the Fe-based superconductors YUNKYU BANG, Department of Physics, Chonnam National University, Kwangju 500-757, Korea, G.R. STEWART, Physics Department, University of Florida, Gainesville, FL 32611-8440 — So called BNC scaling ($\Delta C \sim T_c^3$) – Bud'ko, Ni, and Canfield, PRB, 79, 220516 (2009)) – has been observed in a wide range of the Fe-based superconducting compounds such as $Ba(Fe_{1-x},Co_x)_2As_2$, $Ba(Fe_{1-x},Ni_x)_2As_2$, $BaFe_2(AsP)_2$, and $Ba_{1-x}Na_xFe_2As_2$. More recently, however, Canfield and coworkers reported that the $Ba_{1-x}K_xFe_2As_2$ compound severely deviates from this scaling when $x>0.7$ and argued that this is an indication of the Lifshitz transition in the $Ba_{1-x}K_xFe_2As_2$ compound at higher hole-doping. In this presentation, we propose a theory that the BNC scaling as well as its strong deviation, as observed in $Ba_{1-x}K_xFe_2As_2$, are an intrinsic property of the multiband superconductor mediated by a dominant interband pairing potential as realized in the sign-changing S-wave state.

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