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London penetration depth in heavily over-doped $\mathbf{Ba(Fe_{1-x}Co_x)_2As_2}$ JASON MURPHY, H. KIM, M.A. TANATA, A. THALER, P.C. CANFIELD, The Ames Laboratory, U. WELP, W.K. KWOK, Argonne National Laboratory, R. PROZOROV, The Ames Laboratory — The low-temperature variation of London penetration depth, $\Delta\lambda(T)$, has been previously studied in heavily over-doped $Ba(Fe_{1-x}Ni_x)_2As_2$ [1] and the authors suggested the development of line nodes. Similar conclusion was made from thermal conductivity measurements in $Ba(Fe_{1-x}Co_x)_2As_2$ [2]. However, $\Delta\lambda(T)$ in this system has only been measured for $x \leq x = 0.102$ [3], which is not far enough from optimal doping. Here we report tunnel - diode resonator (TDR) measurements in heavily overdoped single crystals of $Ba(Fe_{1-x}Co_x)_2As_2$ with Co content of $x = 0.108$ (T_c=14.8 K) and $x = 0.127$ (T_c=9 K. We found a robust power-law behavior of $\Delta\lambda = AT^n$ with $n = 2.5$ and $n = 2.11$ respectively. To test whether the nodes are symmetry imposed or accidental, samples were irradiated with heavy ions. The produced disorder, leads to a decrease in T_c and of the exponent n. These results effects will be discussed in a context of unconventional pairing in Fe-based superconductors.

[1] C. Martin *et. al.*, Phys. Rev. B **81**, 060505 (2010).
[2] J.-Ph. Reid *et. al.*, Phys. Rev. B **82**, 064501 (2010).
[3] R.T. Gordon et.al. Phys. Rev. B **82**, 054507 (2010).

Jason Murphy
The Ames Laboratory

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