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Investigation of extended and localised states in a high-temperature superconducting ceramic.

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from the intercept; and B_0, (the proximity breakdown field), from the slope of the line. Returning to the current and field independent expressions for U_0 (equation A.6), and B_0 characteristic parameters, L_c and d_N, can be estimated.

It is still unclear at this stage if $\Gamma_0(J,B)$ also must include the $Log[J_c/J]$ dependence. However, as mentioned above, values for the activation energy found from the exponential term, should be consistent with the approach above.

APPENDIX B

TEMPERATURE DEPENDENCE OF NORMAL–STATE RESISTIVITY

This appendix is included to illustrate the dependence of the normal–state resistance, discussed in section 3.2. As mentioned extensively in the main body of the text, the lack of oxygen stoichiometry, (δ), can cause very large changes in the characteristic temperature dependent resistivity curve, especially for the YBCO system. The presence of thermal fluctuations also contribute to a rounding of the transition, and may still be prevalent for temperatures as high as $2T_c(0)$

Figures B.1 and B.2, are a linear fit ($A + BT$), and quadratic fit, ($A + BT + CT^2$) to the resistance data, respectively. From figure B.1 it is evident that a linear temperature dependence is not a good approximation, especially as the temperature nears the transition region. The quadratic fit is a vast improvement, and this is evident in the Least Squares Error, which is a factor of 10 better that for the linear case. The importance of an accurate temperature dependence for the resistivity, must be stressed, as $w_N(T)$ is the starting point of all the analysis. Any error due to a temperature shift, (of even the smallest amount), will be magnified in parameters such as $\alpha_q(T)$ and especially $\Gamma_\varphi(T,B)$ where typical values are of the order of micro–volts.

APPENDIX B

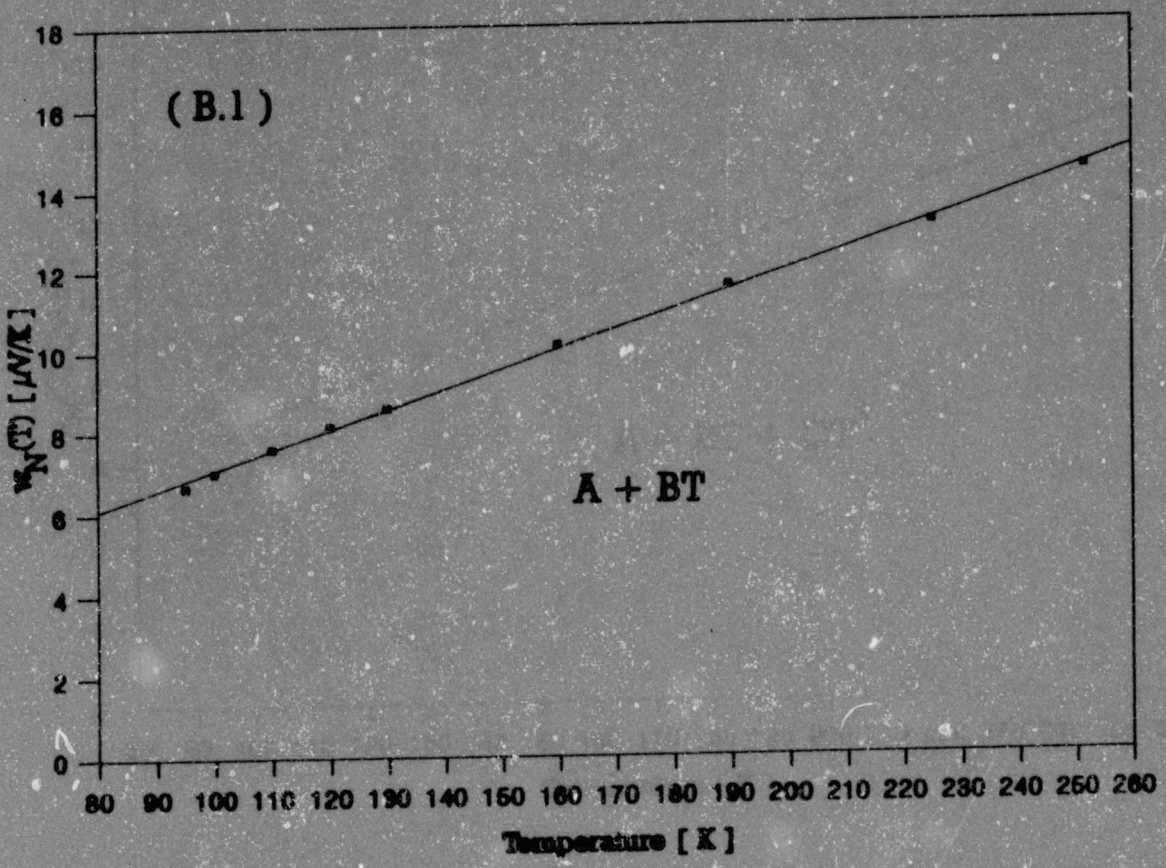

Figure B.1 Linear fit of the form A + BT to the normal–state, $w_N(T)$, behaviour. Near the onset of transition it is evident that the fit does not describe the data very well.

APPENDIX B

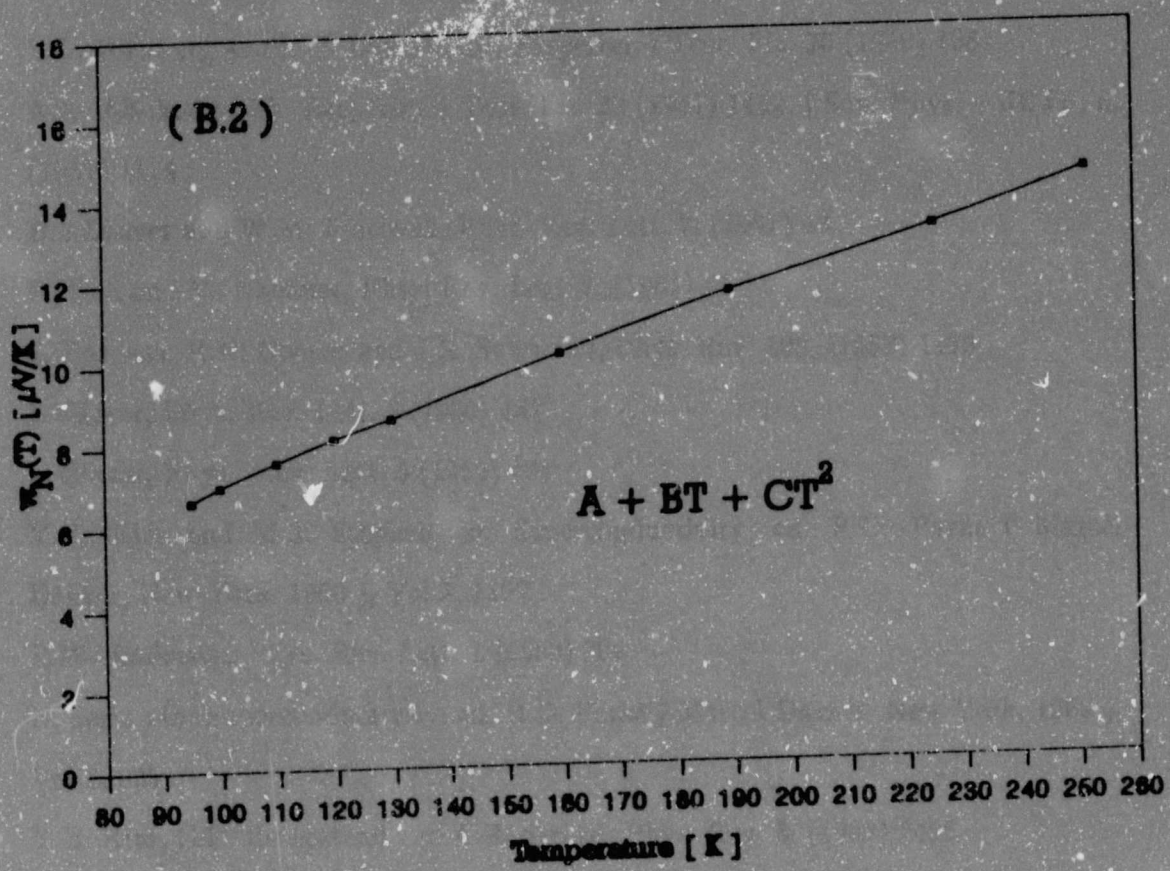

Figure B.2 Quadratic Fit of the form $A + BT + CT^2$, to $w_N(T)$. The data is well described in the region of interest, i.e. near onset of transition. LSQ error for quadratic fit is a factor of 10 better than for the linear case.

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