Relaxation phenomena in the adiabatic phase transition of
Type I superconductor particles

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The first order phase transition of a Type I superconductor involves thermal and
electrodynamic relaxation processes of the control variables for which the time of the
electrodynamic relaxation is three orders of magnitude faster than the thermal relaxation.
[1] In the first order adiabatic phase transition of macroscopic specimens, collective
averaging renders relaxation time differences of the control variables unobservable and
the phase transition isentropic. In the first order adiabatic phase transition of mesoscopic
particles, coherence renders time differences of the control variables observable and, with
profound consequence, the phase transition non-isentropic. [2-5] In addition to a
theoretical discussion, presented are particulars of how the relaxation processes of the
control variables for first order adiabatic phase transitions in both the macroscopic and
mesoscopic size regimes will be experimentally investigated in the near future utilizing
techniques developed by S.V. Dubonos. [6]


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[5] J. Bardeen, Private Letter Communication to P.D. Keefe, Loomis Laboratory of Physics,