

Answer on Question #51557, Physics, Solid State Physics

Calculate the limiting value of the magnetic field for which Nb will act as a superconductor at 4 K. Take $B_{ac}(0)$ as 1970 Oe and T_c for Nb to be 9.25 K.

Solution

According to Meissner effect

$$B(T) = B_{ac}(0) \left(1 - \frac{T^2}{T_c^2} \right) \quad (1)$$

where $T = 4K$, $T_c = 9.25K$; $B_{ac}(0) = 1970 \text{tesla}$

Then

$$B(4) = 1970 \left(1 - \frac{4^2}{9.25^2} \right) = 1601.6 \text{tesla} \quad (2)$$

Answer: $B(4) = 1601.6 \text{tesla}$