Answer on Question #51242, 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 Tc for Nb to be 9.25 K.

Solution

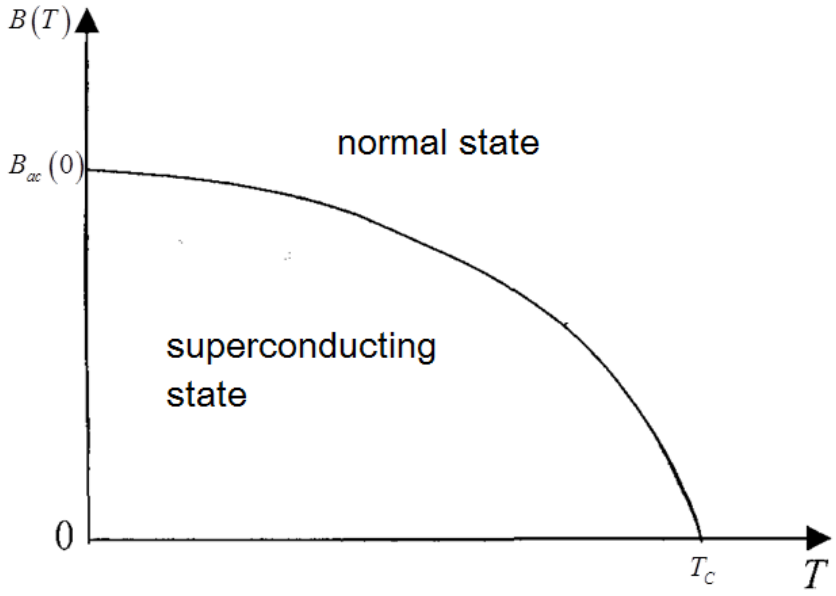

Fig.1

According to Meissner effect dependence of the magnetic field on the temperature is given by Eq.(1) (see Fig.1)

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

where $T = 4K$, $T_C = 9.25K$; $B_{ac}(0) = 1970Oe$

Then

$$B(T=4) = 1970\left(1-\frac{4^2}{9.25^2}\right) = 1601.6Oe \tag{2}$$

Answer: $B(T=4) = 1601.6Oe$