

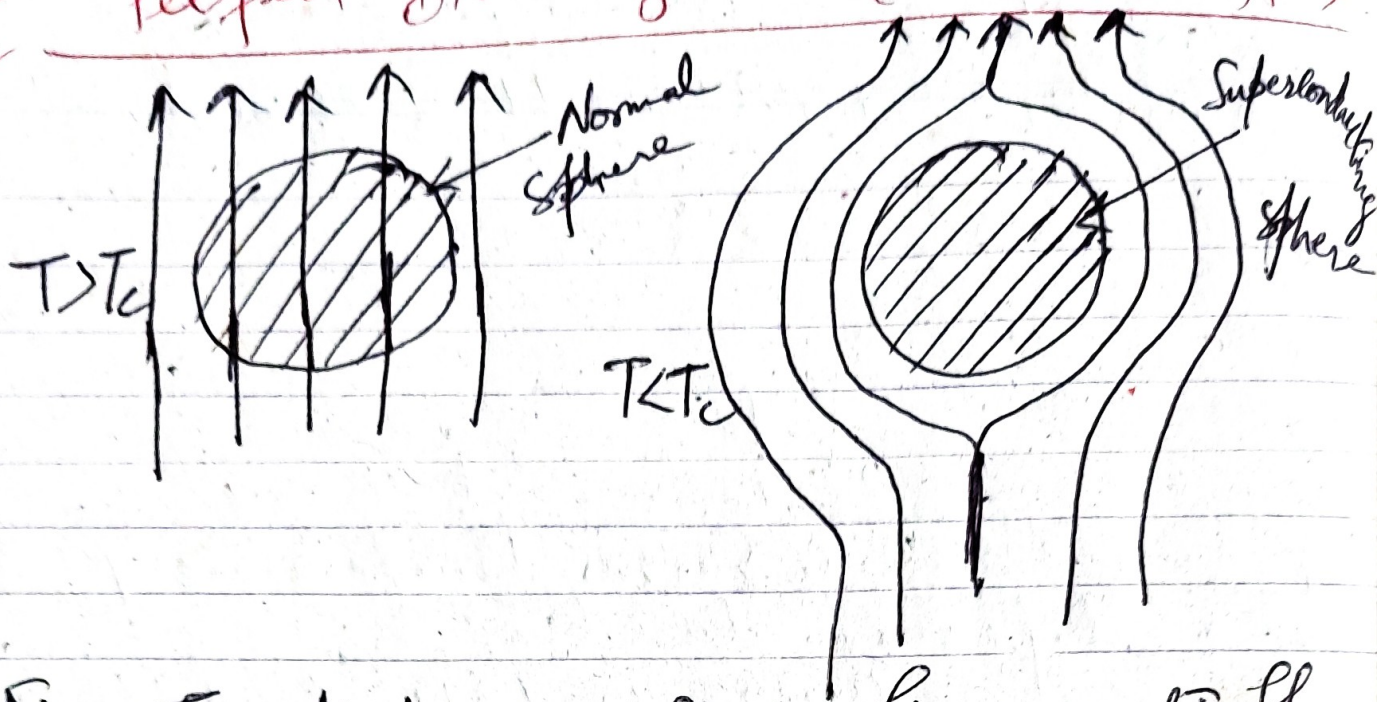


Fig: The Meissner effect: The magnetic flux is expelled from a superconductor i.e., for $T < T_c$.

For superconductors, as the temperature is lowered to T_c , the flux is suddenly and completely expelled below temperatures below the critical temp i.e., T_c . This effect is reversible.

The magnetic induction inside the substance is given by

$$B = \mu_0 (H + M) = \mu_0 (1 + \chi) H \quad \text{--- (1)}$$

Since $B = 0$ in the superconducting state;

$$M = -H \quad \text{--- (2)}$$

i.e., the magnetization is equal to and opposed to H . The medium is therefore diamagnetic; and the susceptibility is $\chi = -1$.

This is referred to as perfect diamagnetism.

Magnetization curve for a superconductor $\rightarrow$ For (2) $M = -H$