

SS-10 SUPERCONDUCTIVITY

In this experiment the magnetization of a typical type I and type II superconductor (Pb and $\text{Pb}_{85}\text{In}_{15}$) are measured at 4.2 K as a function of applied magnetic field. In addition the I-V characteristic of the type II superconductor is explored at various applied magnetic field strengths.

Pb: Measure the magnetization of the Pb sphere from $H=0$ to beyond H_c at 4.2 K. Discuss the shape of the magnetization curve in terms of demagnetization effects. By measuring $H_c(T)$ at lower temperatures, an estimate of T_c can be made.

$\text{Pb}_{85}\text{In}_{15}$: a) Measure the magnetization of the $\text{Pb}_{85}\text{In}_{15}$ sphere to H_{c2} at 4.2 K. Observations should be made for one complete irreversible cycle of the magnetization curve. Measure H_{c1} , H_{c2} , and H_c . Calculate the Ginsburg-Landau parameter κ several ways.
b) At 4.2 K measure the I-V characteristic of the short straight wire sample of $\text{Pb}_{85}\text{In}_{15}$ in a transverse magnetic field. Discuss the origin of the finite resistance observed below H_{c2} .

References:

- Rose-Innes, Low-Temperature Techniques
Lynton, Superconductivity
Rose-Innes and Rhoderick, Introduction to Superconductivity