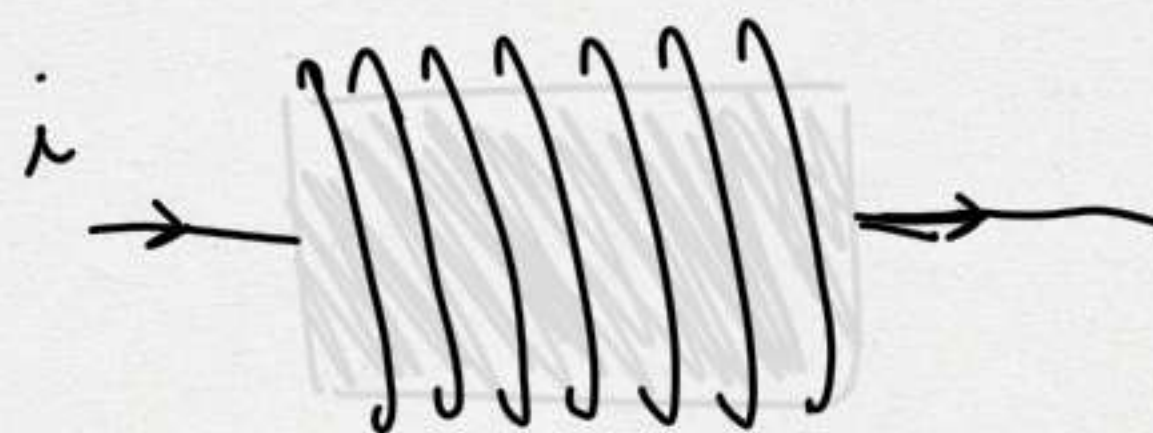


$$\vec{B}_0 = \mu_0 n i \hat{x} \Rightarrow B_0 = \mu_0 n i$$

$$\vec{H} \equiv \frac{\vec{B}_0}{\mu_0}, \quad H \equiv \frac{B_0}{\mu_0} = n i$$



$$\boxed{B = \kappa_m B_0}, \quad \kappa_m = \mu_r \quad \text{PERMEABILITÀ MAGNETICA RELATIVA}$$

$$B = \kappa_m \mu_0 n i \equiv \mu n i, \quad \mu \equiv \mu_0 \kappa_m \quad \text{P.M. ASSOLUTA}$$

$$[\mu] = [\mu_0] = \frac{T \cdot m}{A} \quad (\epsilon = \epsilon_0 \epsilon_r)$$

$$B = \kappa_m B_0 = \kappa_m \mu_0 H = \mu H$$

$$(D = \epsilon E)$$

$$\vec{B} = \frac{\mu_0 i}{4\pi} \oint_{\text{SPIRA}} \frac{d\vec{\ell} \times \hat{r}}{r^2} \longrightarrow \frac{\mu i}{4\pi} \oint_{\text{SPIRA}} \frac{d\vec{\ell} \times \hat{r}}{r^2}, \quad \oint_C \vec{B} \cdot d\vec{s} = \mu_0 i \longrightarrow \mu i$$

AMPERE - LAPLACE

AMPERE

$$B - B_0 = \kappa_m B_0 - B_0 = (\kappa_m - 1) B_0 \equiv \chi_m B_0 = \chi_m \mu_0 H$$

$$\chi_m \equiv \kappa_m - 1 \quad \text{SUSCETTIVITÀ MAGNETICA}$$

$$\chi_m H = M \quad \text{MAGNETIZZAZIONE DEL MATERIALE}$$

$$B - B_0 = \chi_m \mu_0 H \Rightarrow B = \chi_m \mu_0 H + B_0 = \chi_m \mu_0 H + \mu_0 H = \mu_0 (\underbrace{\chi_m H}_M + H) \Rightarrow$$

$$B = \mu_0 (M + H) \longrightarrow \vec{B} = \mu_0 (\vec{H} + \vec{M})$$

$$B = B_0 + \chi_m B_0 = \mu_0 n i + \boxed{\mu_0 \chi_m n i} = \mu_0 n i + \boxed{\mu_0 M l_m}, \quad l_m = \chi_m i$$



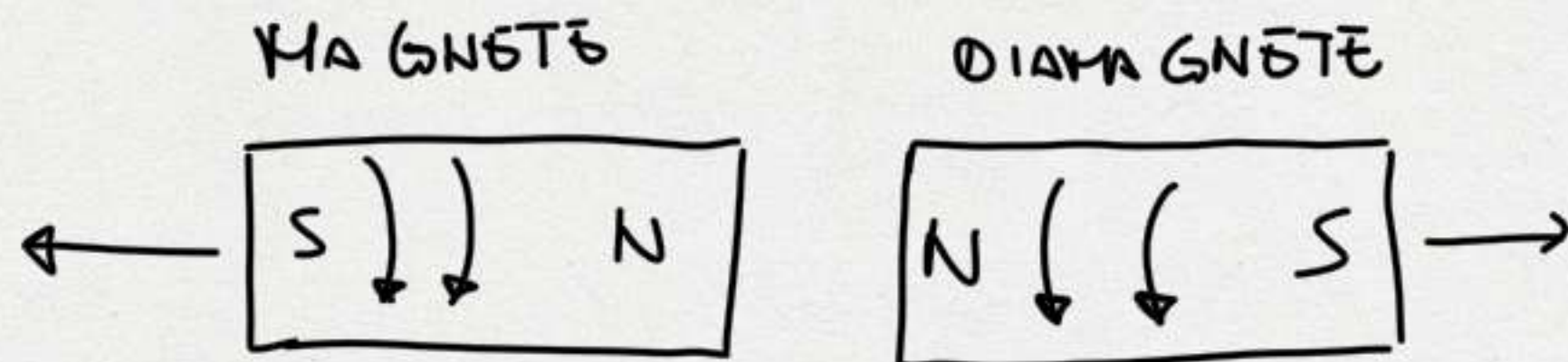
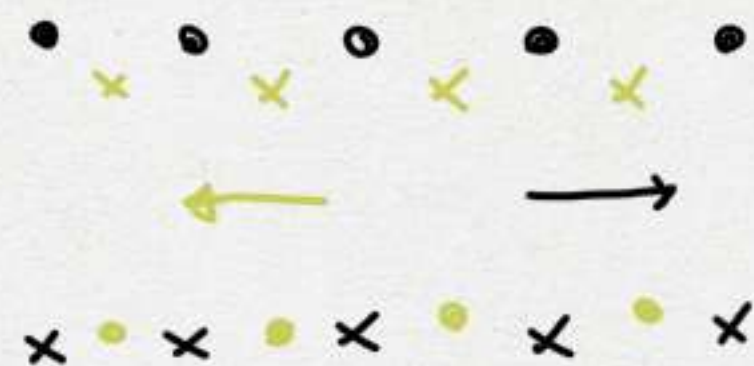
DIAMAGNETISCHE

$$\langle \vec{m} \rangle = -\alpha_e \vec{H}, \quad \alpha_e > 0, \quad m = \frac{N}{V}$$

$$\vec{M} = m \langle \vec{m} \rangle = -m \alpha_e \vec{H} = \chi_m \vec{H}, \quad \chi_m < 0 \Rightarrow \kappa_m < 1$$

$$\vec{B} = \vec{B}_0 + \chi_m \vec{B}_0 \Rightarrow B < B_0, \quad \chi_m \sim -10^{-8} \div -10^{-5}$$

$$\vec{B} = \mu_0 n \hat{x} + \mu_0 m \hat{x}$$



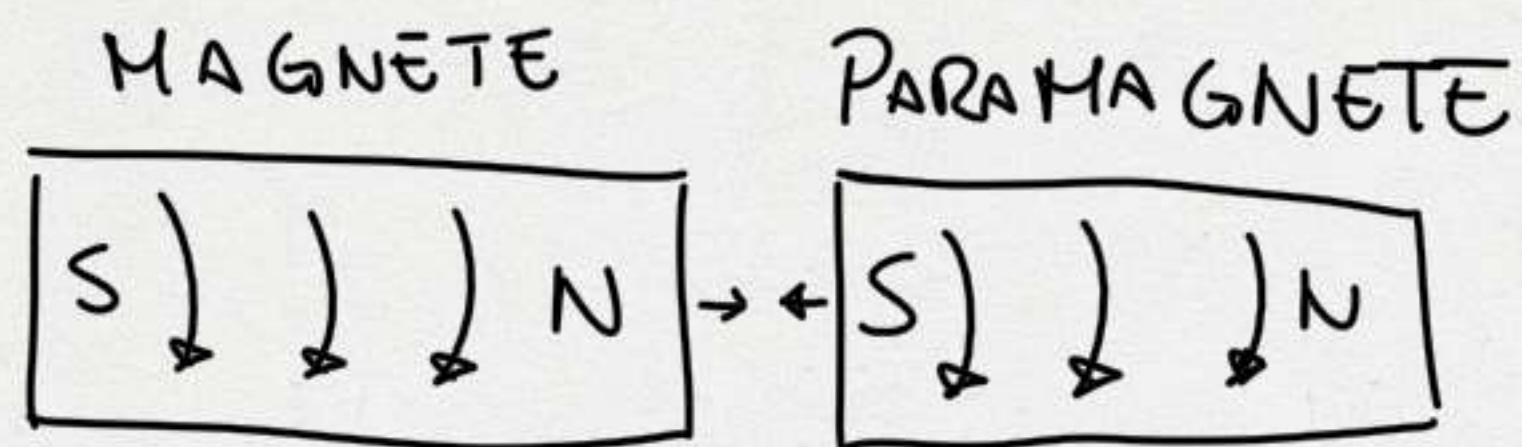
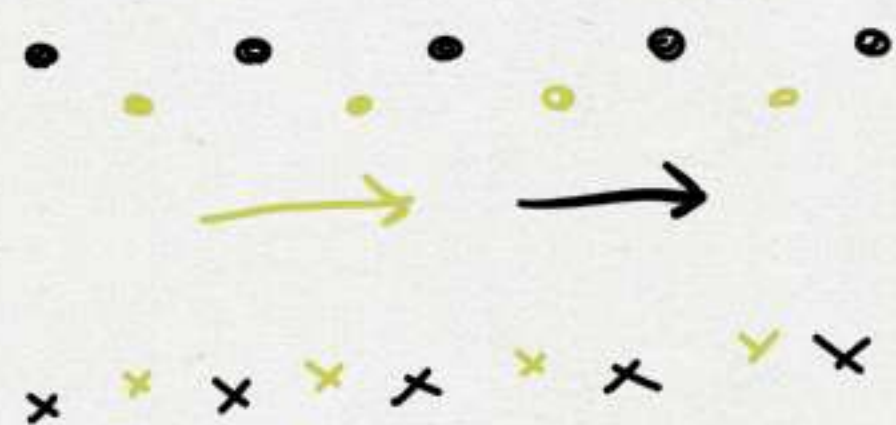
PARAMAGNETICHE

$$\langle m \rangle = \frac{\alpha_m}{T} \vec{H}, \quad \alpha_m > 0$$

$$\vec{M} = N \frac{\alpha_m}{T} \vec{H} = \chi_m \vec{H}, \quad \chi_m > 0, \quad \mu_m > 1$$

$$\vec{B} = \vec{B}_0 + \chi_m \vec{B}_0 \Rightarrow B > B_0, \quad \chi_m \sim \frac{1}{T} \text{ LEGGE DI CURIE}$$

$$\chi_m \sim 10^{-5}$$

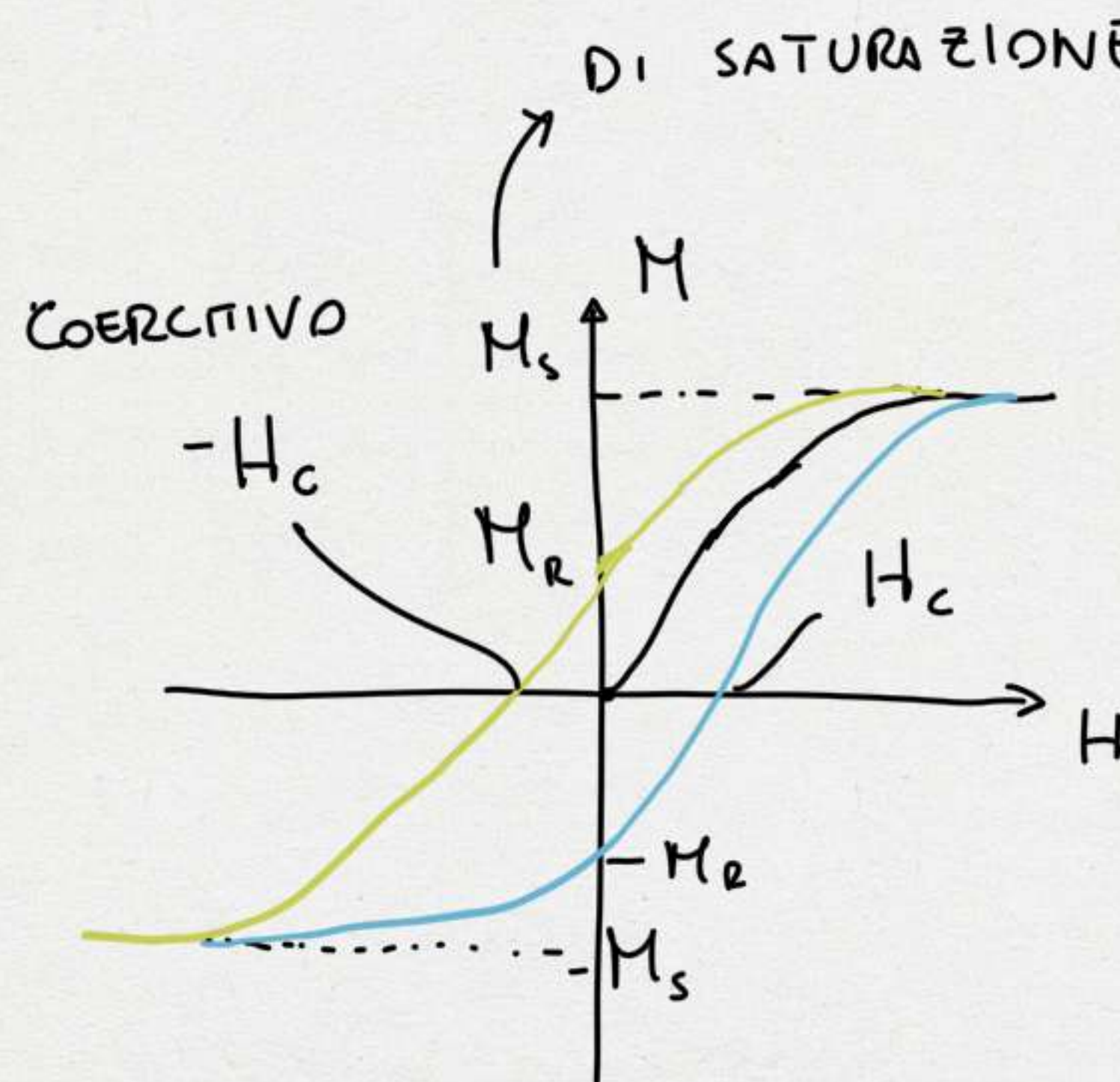
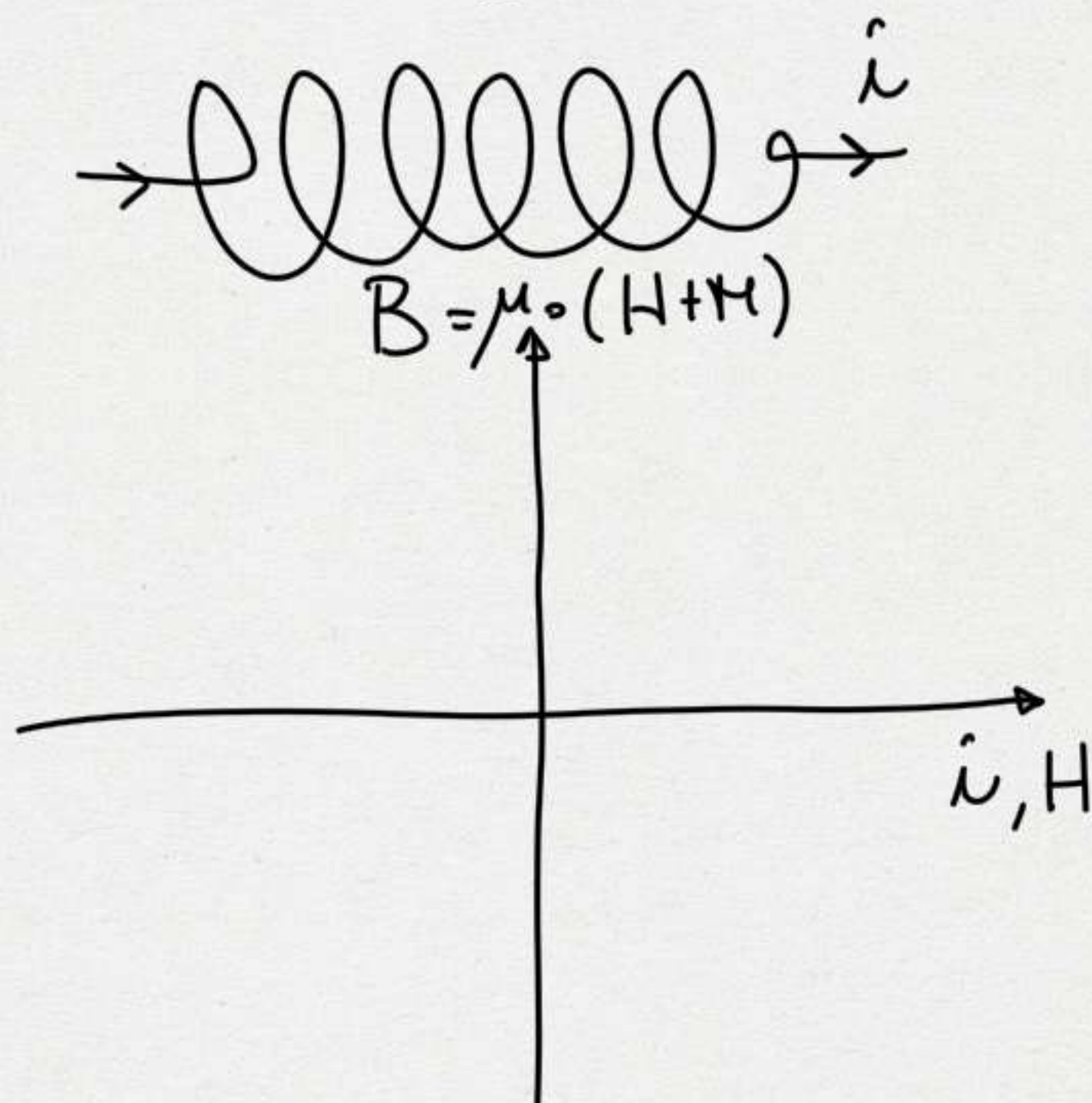


FERROMAGNETI

$$\chi_m \sim \kappa_m \sim 10^3 - 10^4 > 0$$

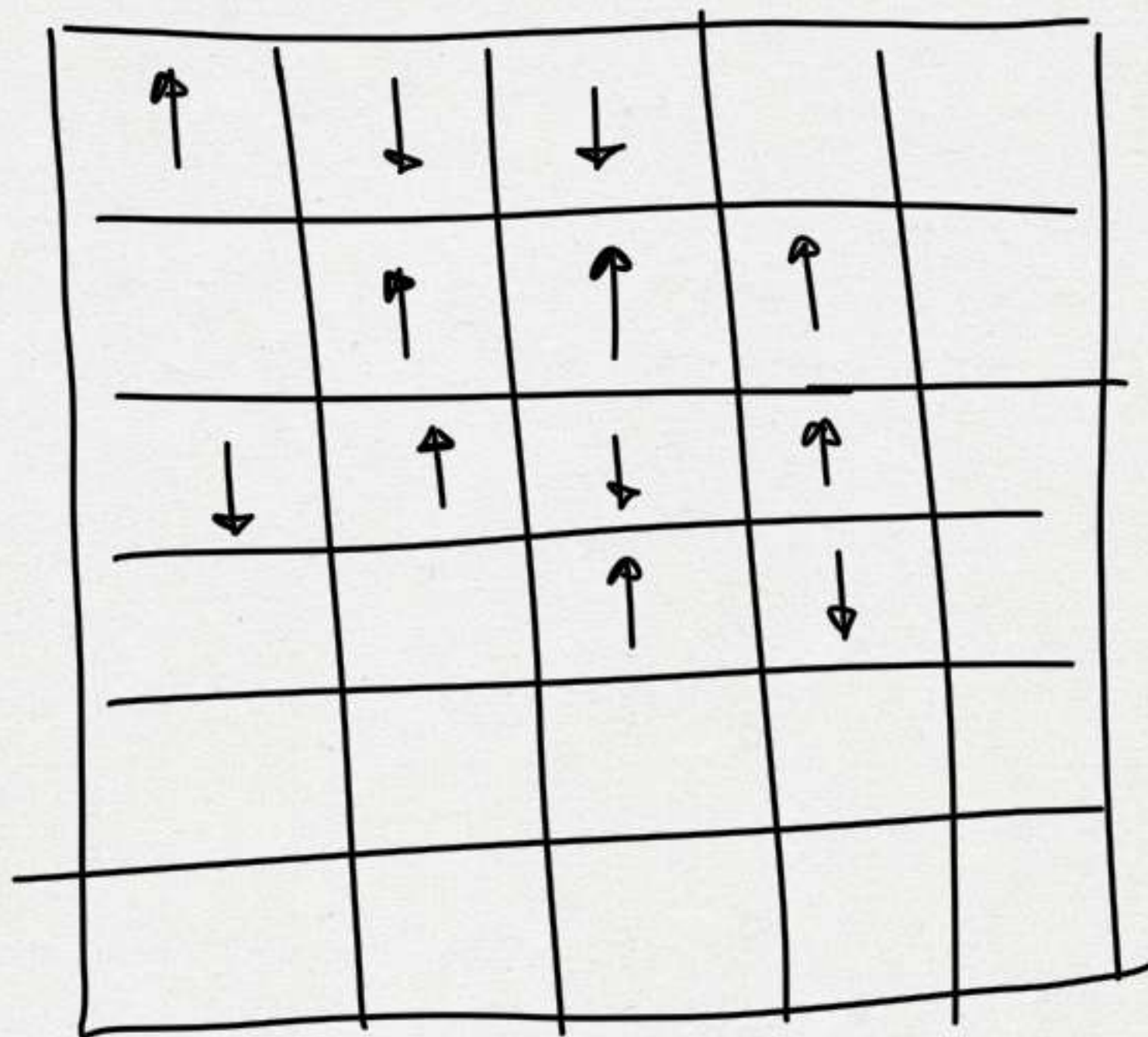
$$T < T_c \quad \text{F.M.}$$

$T > T_c$ PARAMAGNETE, T_c T DI CURIE / CRITICA



CURVA DI
ISTERESI

MODELLO DI ISING



$T > T_c$ P.M.

$T < T_c$ F.M.