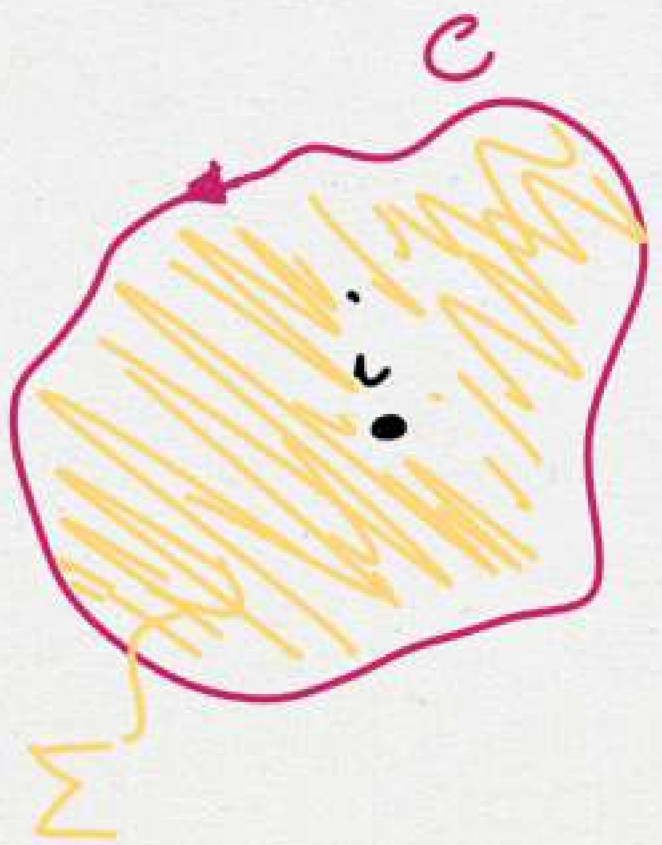
$$\boxed{\oint_C \vec{B} \cdot d\vec{s} = \mu_0 \sum_k i_k}$$

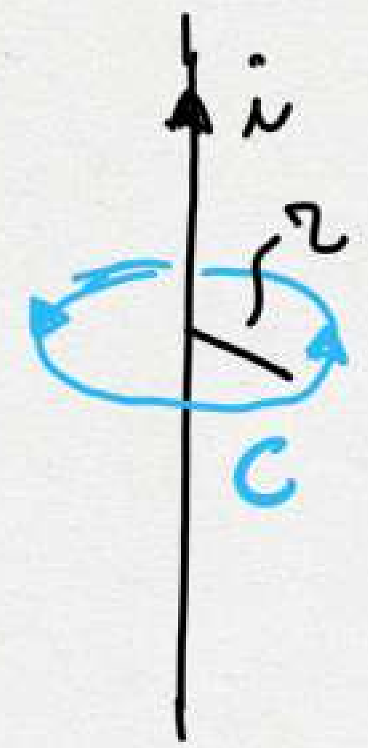


$$\oint_C \vec{B} \cdot d\vec{s} = \mu_0 i = \mu_0 \int_\Sigma \vec{J} \cdot \hat{n}\, d\Sigma$$

$$\oint_C \vec{B} \cdot d\vec{s} \underset{\text{STOKES}}{=} \int_{\Sigma(C)} \overline{\vec{\nabla} \times \vec{B}} \cdot \hat{n}\, d\Sigma = \int_{\Sigma(C)} \overline{\mu_0 \vec{J}} \cdot \hat{n}\, d\Sigma \implies$$

$$\boxed{\vec{\nabla} \times \vec{B} = \mu_0 \vec{J}}$$

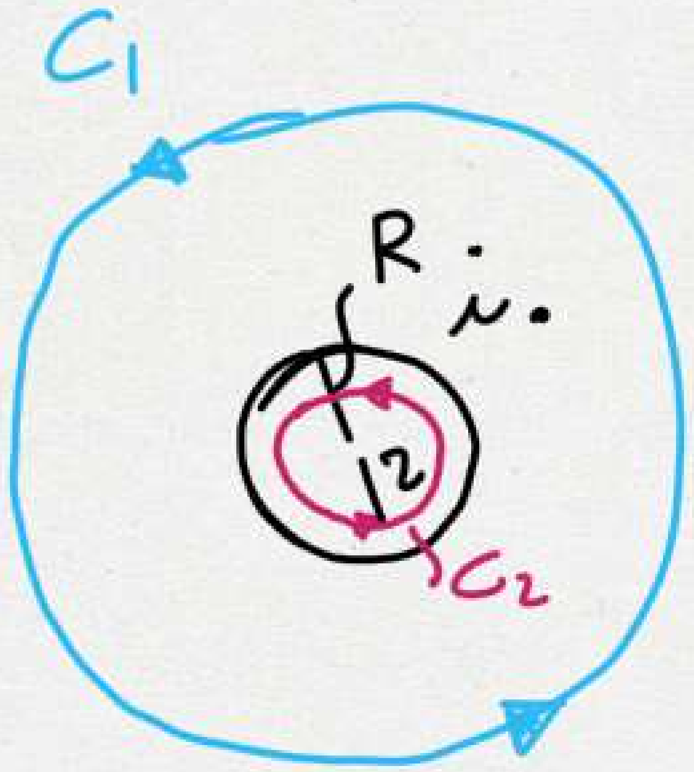
$$\vec{\nabla} \times \vec{E} = 0$$



$$\vec{B}(\vec{r}) = \frac{\mu_0 i}{2\pi r}\hat{\varphi}$$

$$\oint_C \vec{B}\cdot d\vec{s} = \oint_C B\,ds = B\oint_C ds = B\,2\pi r = \mu_0 i \Rightarrow$$

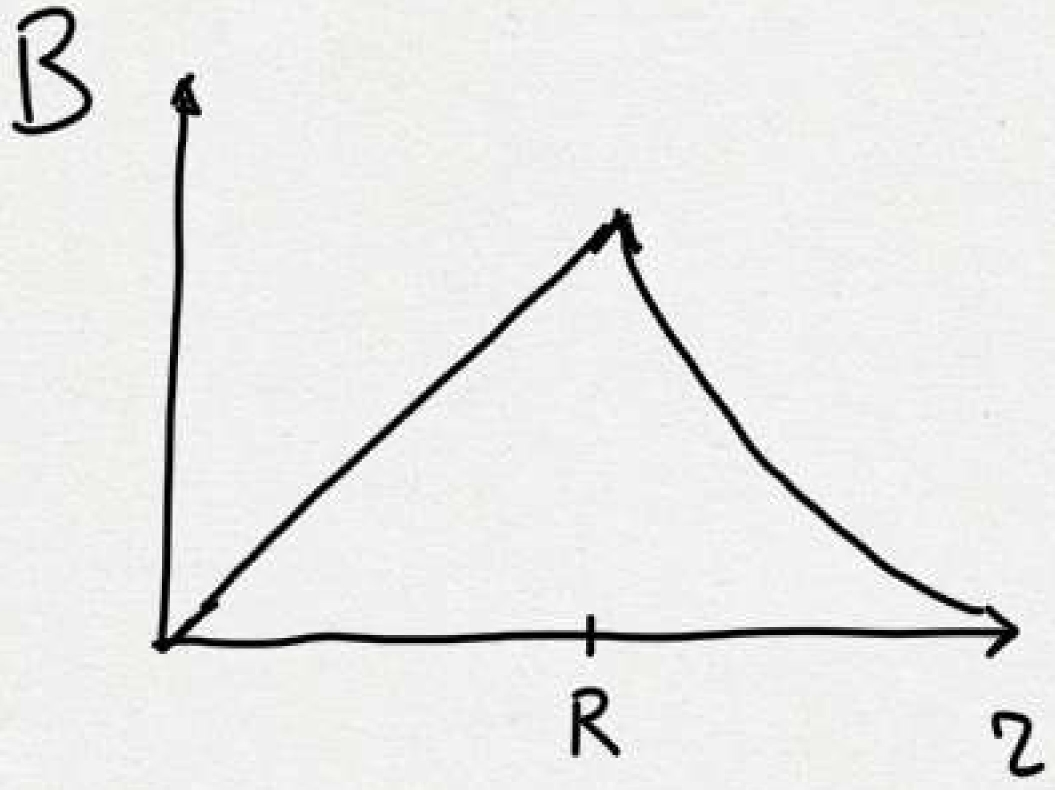
$$B = \frac{\mu_0 i}{2\pi r}$$ LEGGE DI BIOT - SAVART

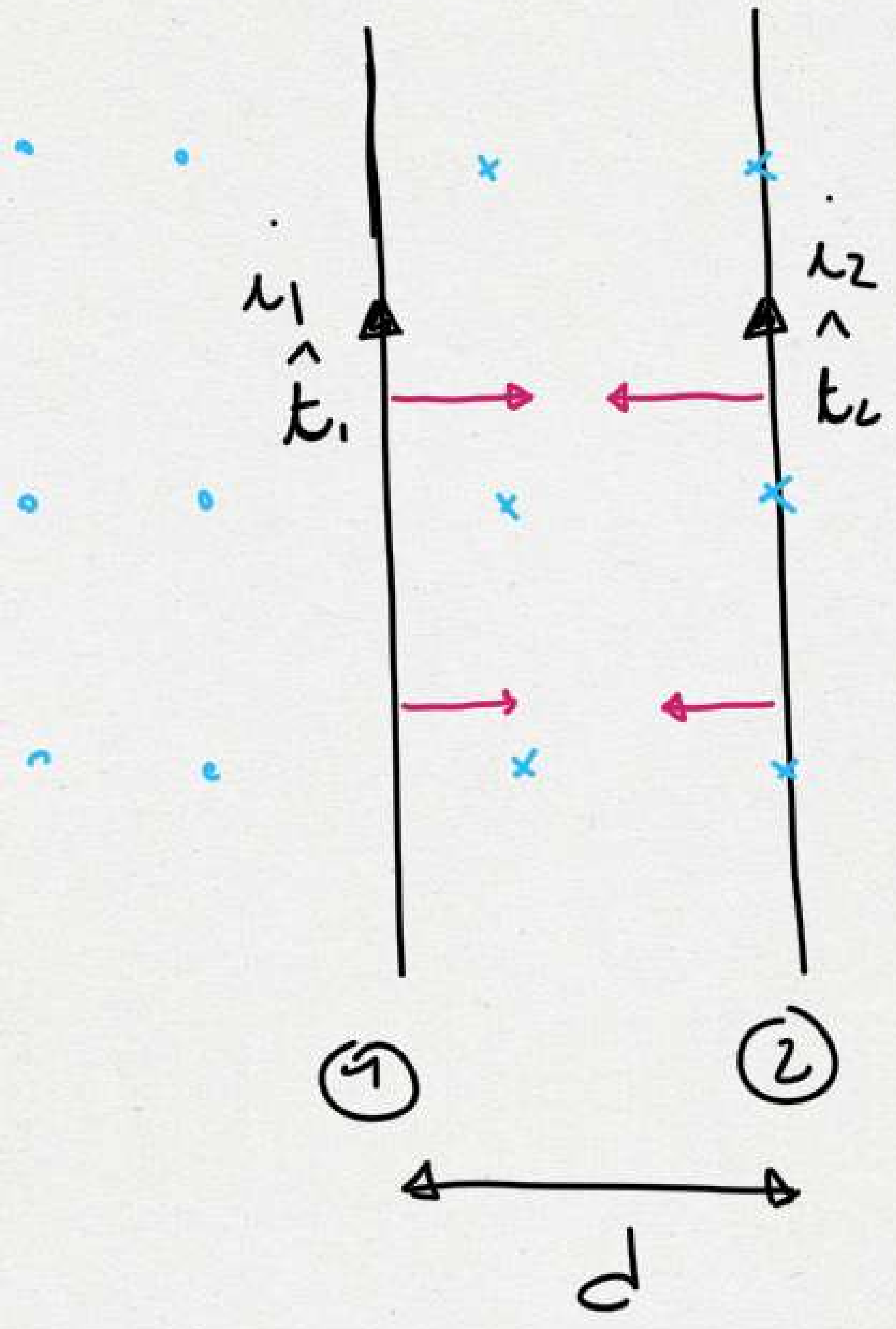


$$\oint_{C_1} \vec{B}\cdot d\vec{s} = \mu_0 i \Rightarrow B(r>R) = \frac{\mu_0 i}{2\pi r}$$

$$J = \frac{i}{\Sigma} = \frac{i}{\pi R^2}, \quad i(r) = J\,\Sigma(r) = J\pi r^2 = \frac{i\,r^2}{R^2} \Rightarrow$$

$$B\,2\pi r = \mu_0\left(\frac{i\,r^2}{R^2}\right) \Rightarrow B(r<R) = \frac{\mu_0 i r}{2\pi R^2}$$





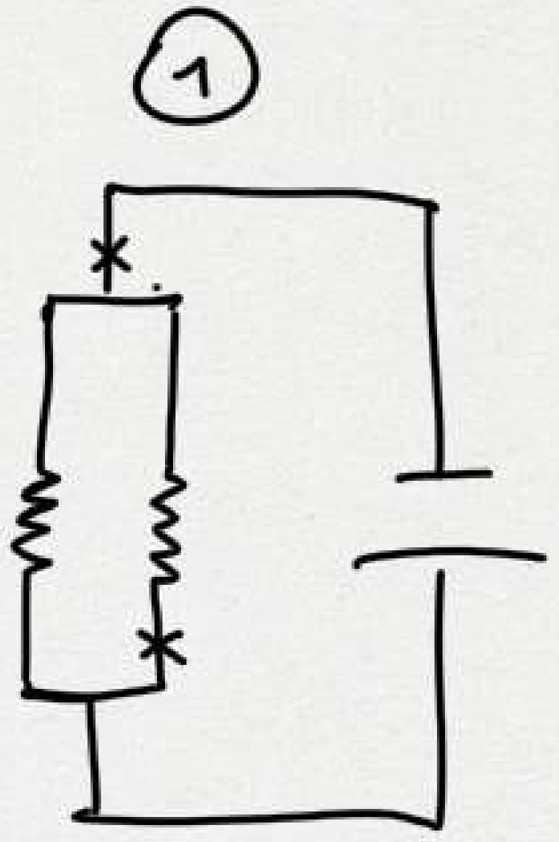
$$d\vec{F} = i\, d\vec{\ell} \times \vec{B} = i\, d\ell\, \hat{t} \times \vec{B}$$

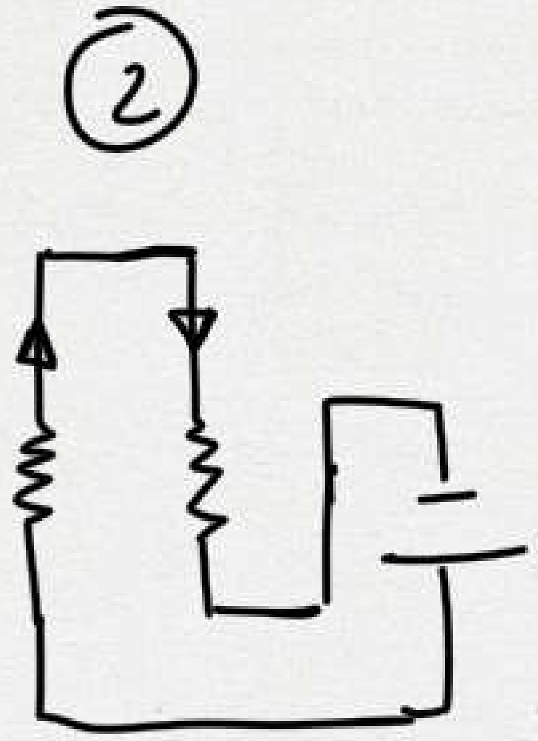
$$\downarrow$$

$$d\vec{F}_{12} = i_2\, d\ell_2\, \hat{t}_2 \times \vec{B}_1$$

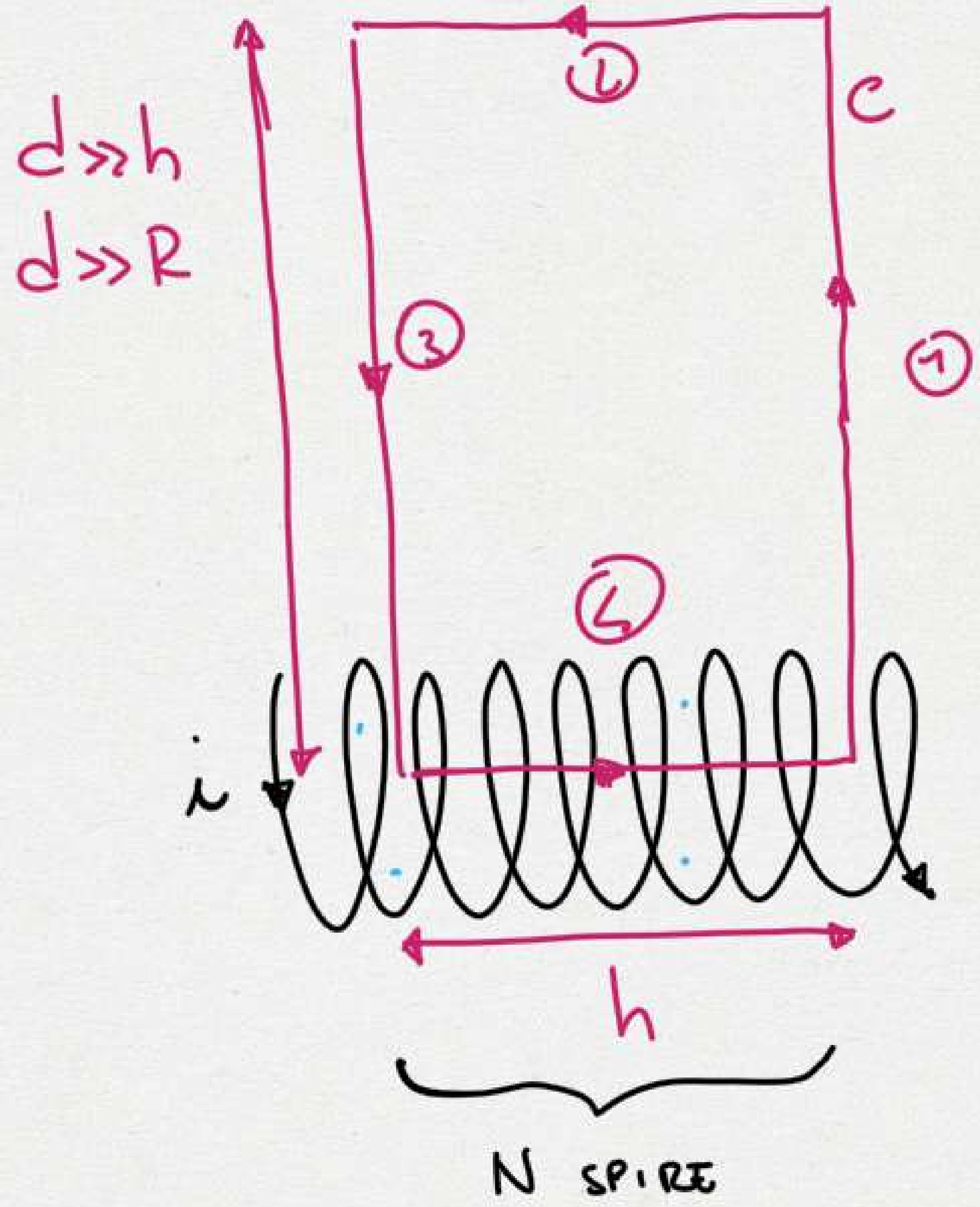
$$\vec{f}_{12} \equiv \frac{d\vec{F}_{12}}{d\ell} = i_2\, \hat{t}_2 \times \vec{B}_1 \,, \quad f_{12} = i_2 B_1 = \frac{\mu_0 i_1}{2\pi d}\, i_2$$

$$f_{21} = i_1 B_2 = \frac{\mu_0 i_2}{2\pi d}\, i_1$$





SOLENOIDE



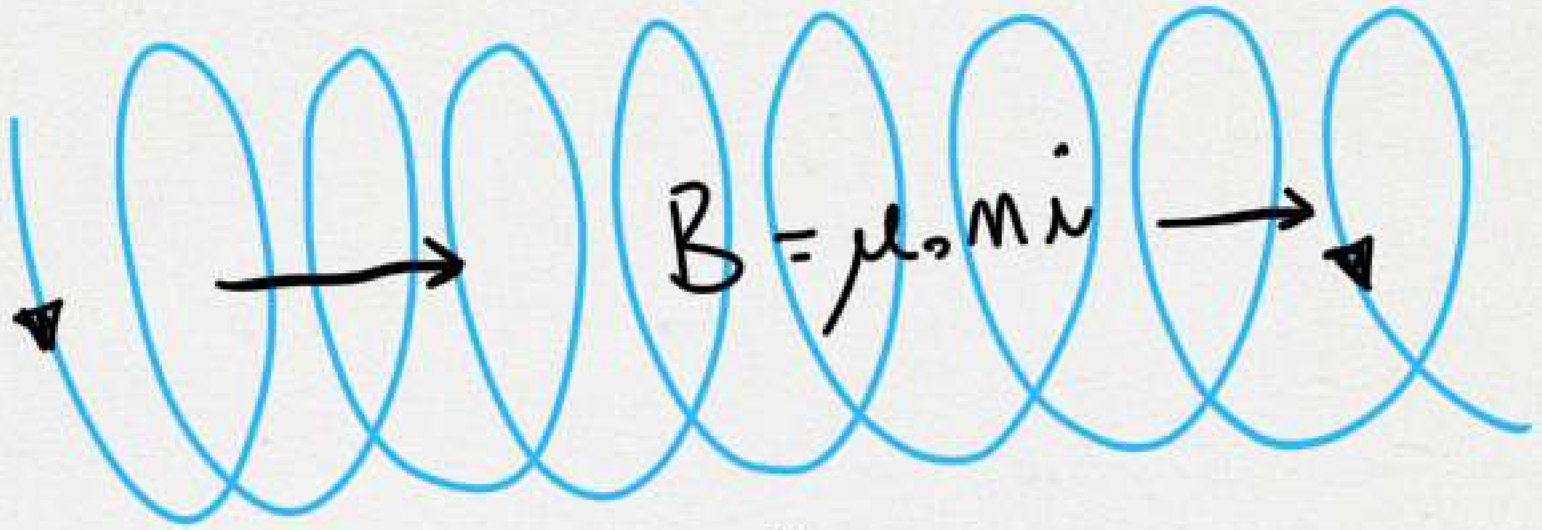
$$\oint_c \vec{B}\cdot d\vec{s} = \int_{1} + \int_{2} + \int_{3} + \int_{4} = \cancel{\int_{1}} + \cancel{\int_{3}} + \int_{4} =$$

$$= \int_{4} \vec{B}\cdot d\vec{s} = B\int_{4} ds = Bh$$

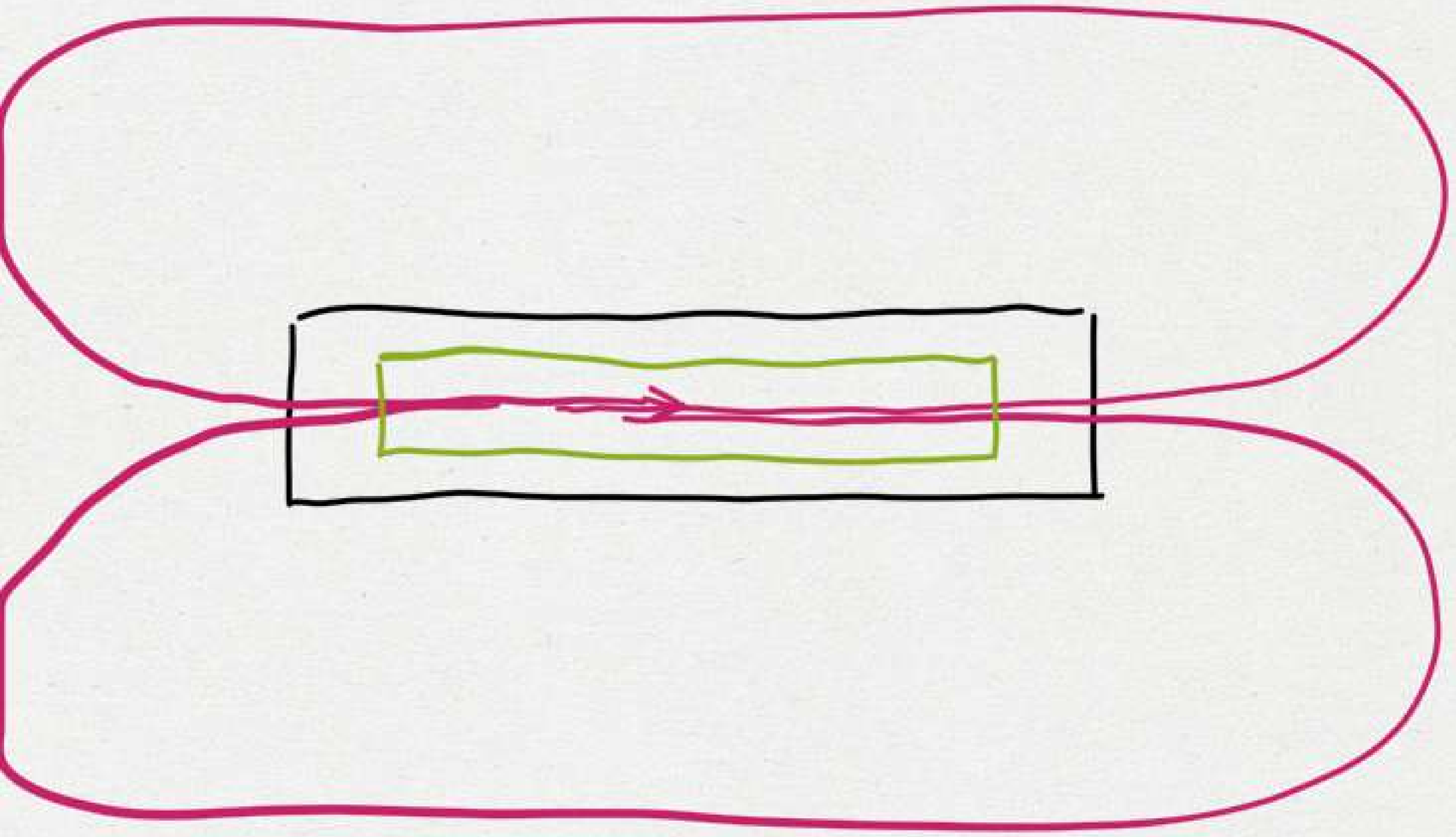
$$\mu_0 \sum_k i_k = \mu_0 N i \Rightarrow \boxed{B = \mu_0 \frac{N i}{h} \equiv \mu_0 n i}$$

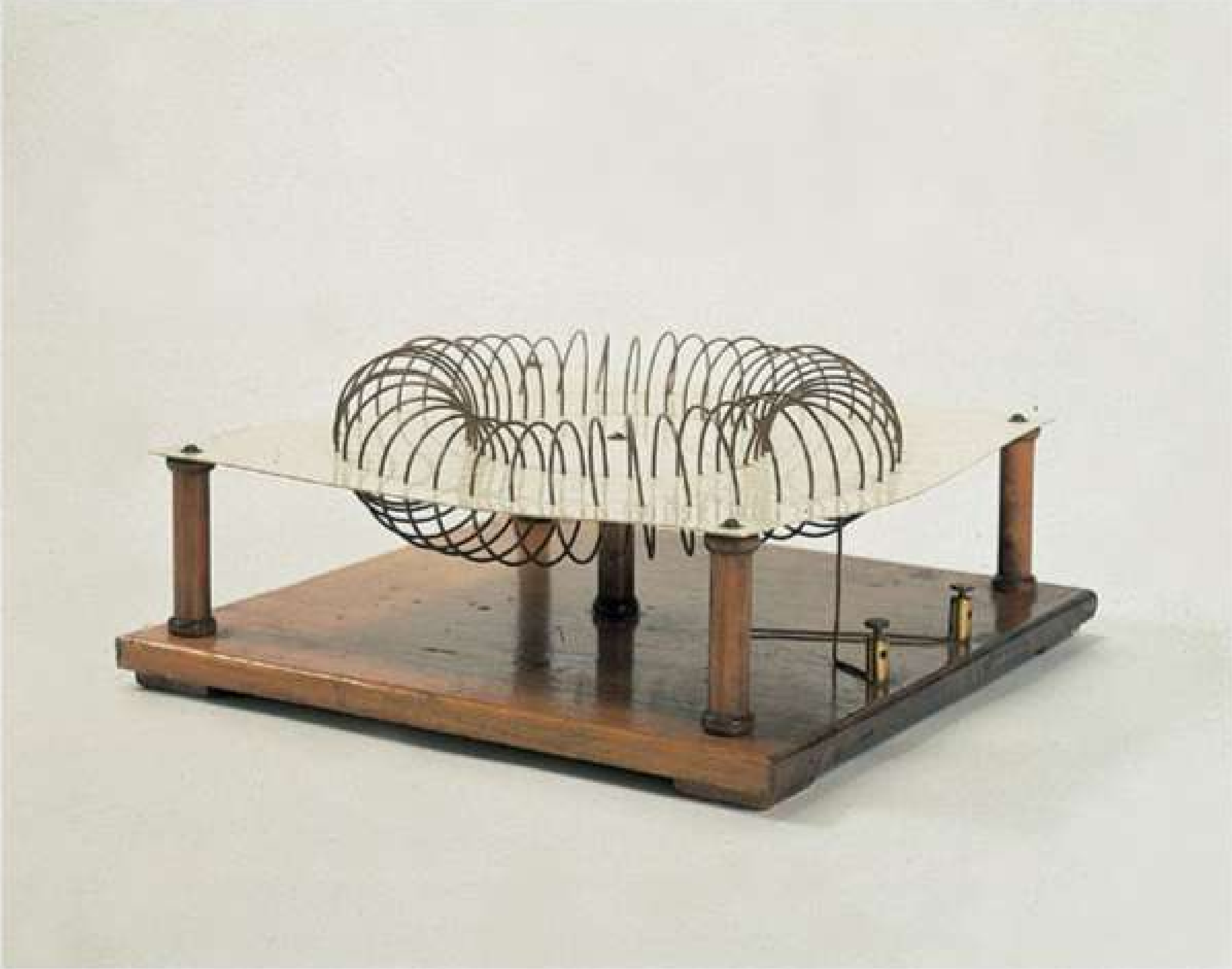
$$[n] = \frac{1}{m}$$

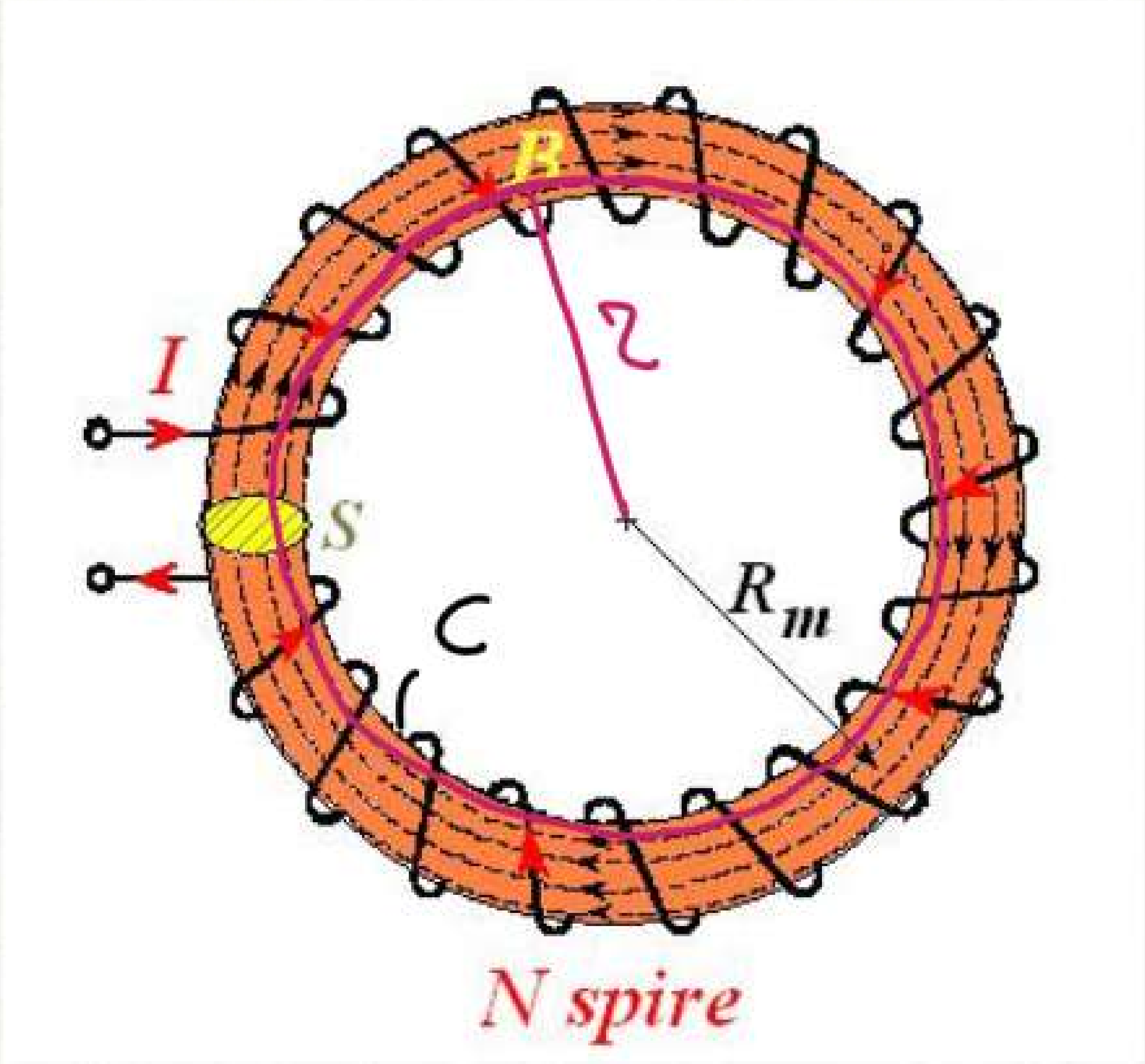
$\vec{B} = 0$



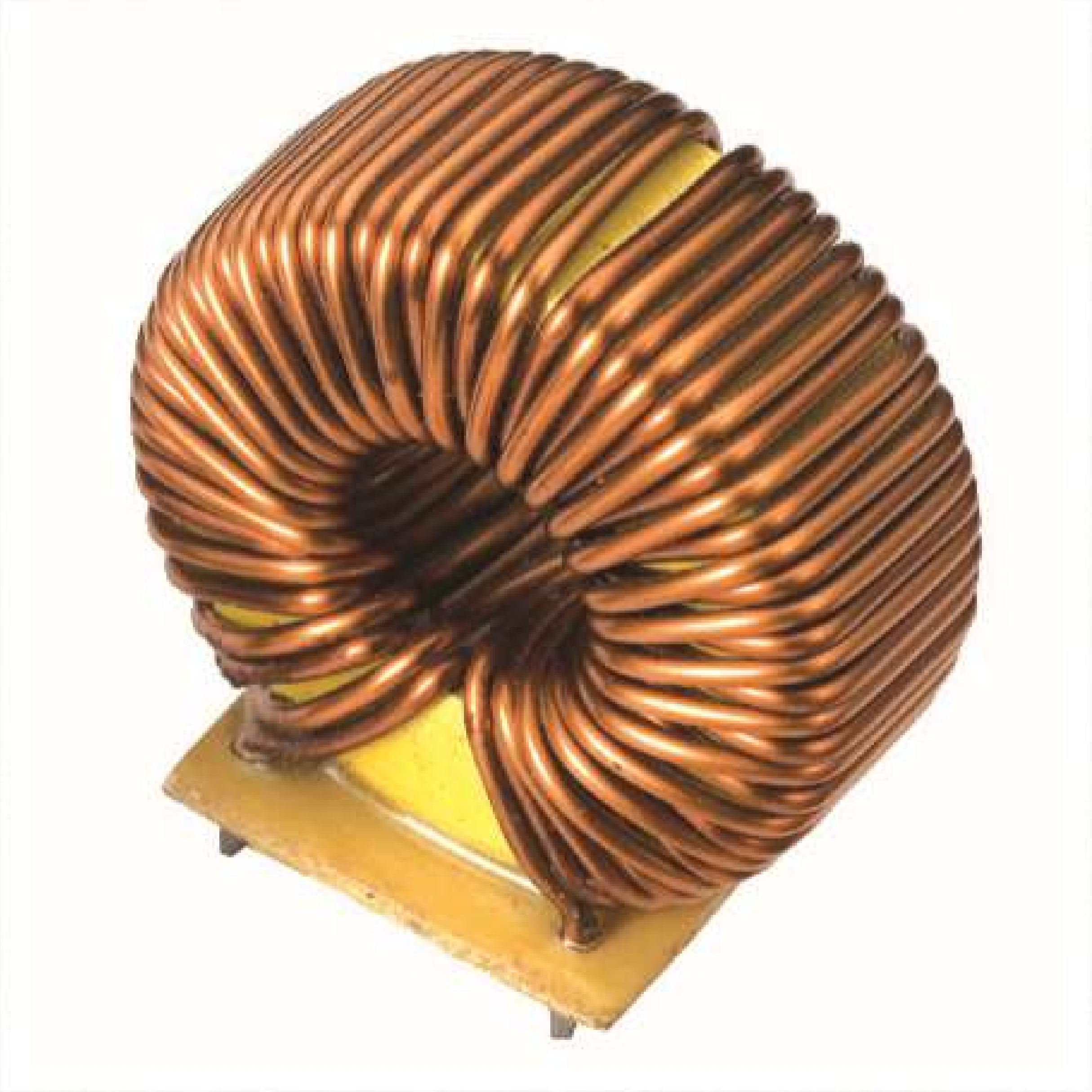
$\vec{B} = 0$



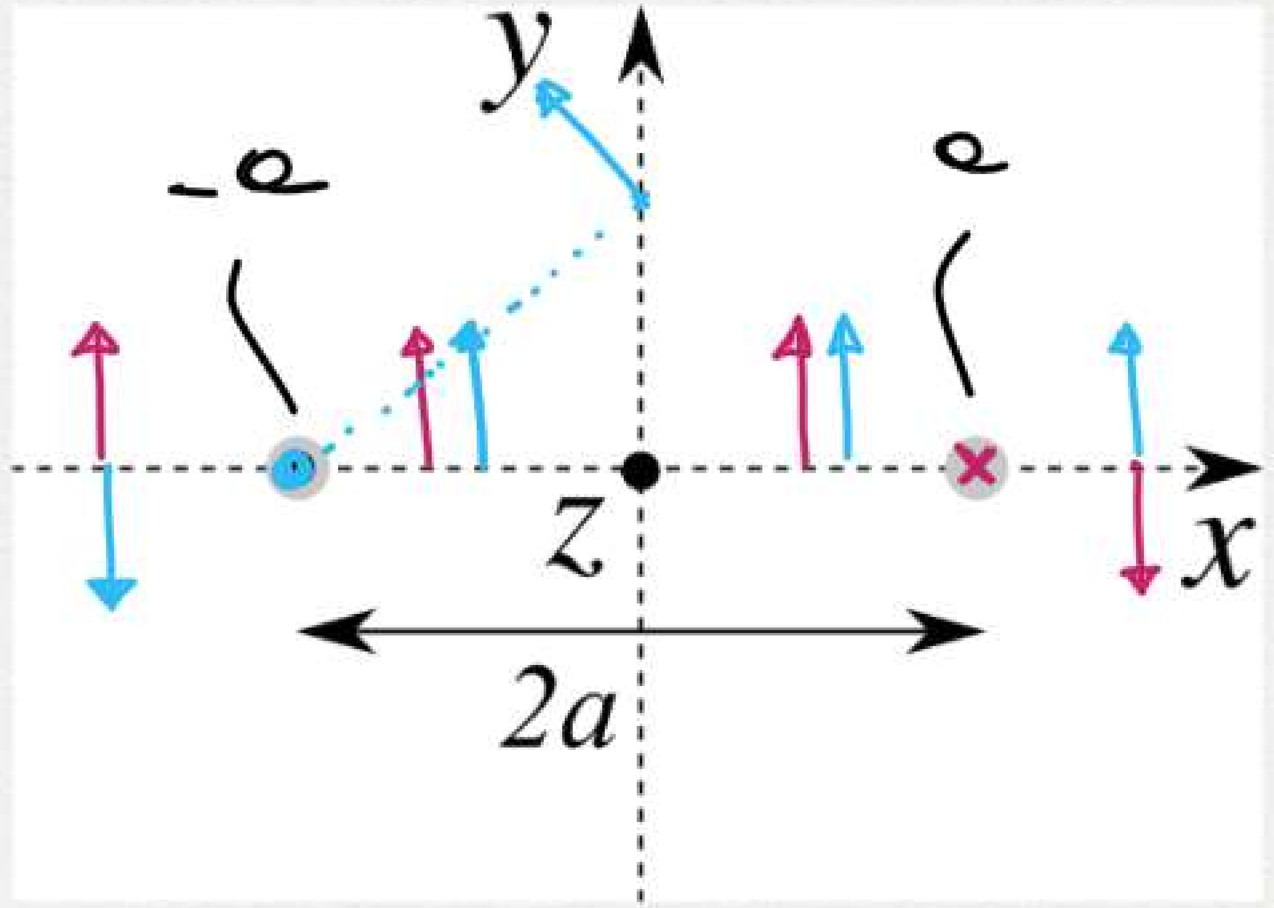




N SPIRE



$$\oint_c \vec{B}\cdot d\vec{s} = B\oint_c ds = B\,2\pi r = \mu_0 N i \Rightarrow B = \frac{\mu_0 N i}{2\pi r}$$



① CALCOLARE $\vec{B}(x,0,0)$

② CALCOLARE $\vec{B}(0,y,0)$

③ RIFARE I PUNTI ① E ② SE I FILI SONO EQUIVERSI

$$\vec{B} = \vec{B}_s + \vec{B}_D \,, \quad B(r) = \frac{\mu_0 i}{2\pi r}$$

$$r_s = x - (-a) = x + a$$

$$B_s = \frac{\mu_0 i}{2\pi |r_s|} \,, \quad \hat{B}_s = \hat{t} \times \hat{r}_s = \hat{t} \times \frac{\vec{r}_s}{r_s} = \pm \hat{y}$$

$$r_D = x - a$$

$$B_D = \frac{\mu_0 i}{2\pi |r_D|} \,, \quad \hat{B}_D = \hat{t} \times \hat{r}_D = \hat{t} \times \frac{\vec{r}_D}{r_D} = \pm \hat{y}$$

$$\vec{B}_s = \frac{\mu_0 i}{2\pi} \frac{\hat{y}}{x+a}$$

$$\vec{B}_D = -\frac{\mu_0 i}{2\pi} \frac{\hat{y}}{x-a}$$

$$\vec{B}_{TOT} = \vec{B}_s + \vec{B}_D = \vec{B}_{TOT}(x,0,0) =$$

$$= \frac{\mu_0 i \hat{y}}{2\pi} \left(\frac{1}{x+a} - \frac{1}{x-a} \right)$$