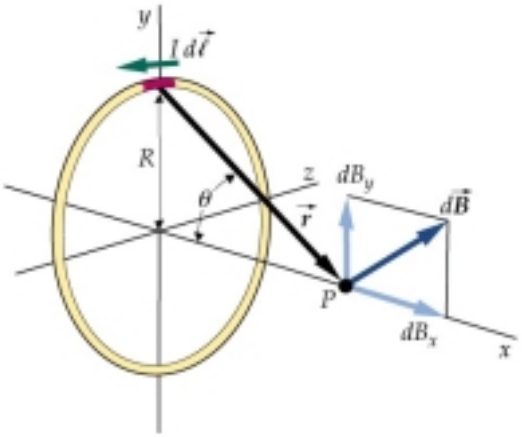
3. Camp magnètic en l'eix d'una espira circular



$$\vec{B} = \frac{\mu_0 I}{4\pi}\int \frac{d\vec{l}\times\vec{r}}{r^3} = \frac{\mu_0 I}{4\pi}\int \frac{dl}{r^2}$$

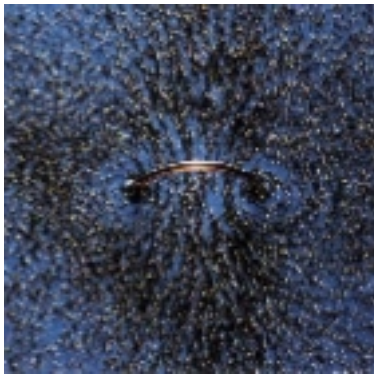
$$B_x = \frac{\mu_0 I}{4\pi}\frac{sin\theta}{r^2}\int dl = \frac{\mu_0 I}{4\pi}\frac{R/r}{x^2+R^2}2\pi R$$

$$B_x = \frac{\mu_0 I}{2}\frac{R^2}{\left(x^2+R^2\right)^{3/2}}$$

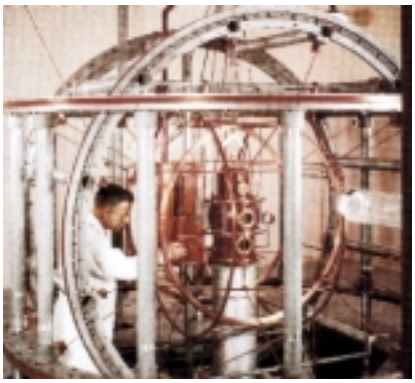
per x=0:

$$B = \frac{\mu_0 I}{2R}$$

al voltant:



exemple: bobines de Helmholtz, per aconseguir camps uniformes entremig



Bobines paral·leles, de radi R i separades d=R, amb N espires que transporten corrents iguals.

en el punt mig (x=d/2=R/2)

$$B_x = 2\frac{\mu_0 NI}{2}\frac{R^2}{\left(\left(\frac{R}{2}\right)^2+R^2\right)^{3/2}} = \left(4/5\right)^{3/2}\frac{\mu_0 NI}{R}$$