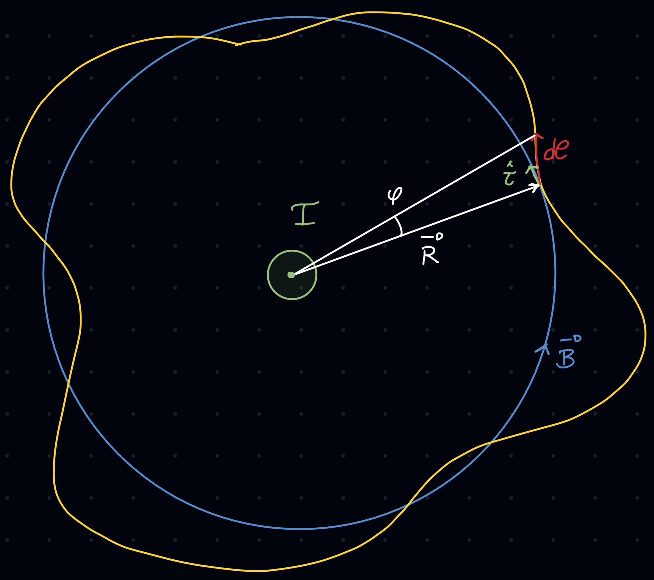
Legge di Ampère

La spira circonda il filo

Da Biot-Savart: $\vec{B} = K \cdot \frac{I}{R}\hat{\tau} = \frac{\mu_0}{2\pi}\frac{I}{R}\hat{\tau}$

campo di un filo



$\rightarrow$ circuitazione $C = \oint \vec{B}\, d\vec{\ell} = K \oint B \cdot \hat{\tau}\, d\vec{\ell}$

$\hat{\tau}\, d\vec{\ell} =$ Arco di circonferenza

$\hookrightarrow 1\,\text{Rad} = \frac{\ell}{R} \Rightarrow \ell = \text{Rad} \cdot R$

$\Rightarrow \ell = R \cdot \varphi \rightarrow \underline{\hat{\tau}\, d\vec{\ell}} = R \cdot \underline{d\varphi}$

$\rightarrow C = \frac{\mu_0}{2\pi} \oint \frac{I}{\cancel{R}} \cdot \cancel{R} \cdot d\varphi = \frac{\mu_0 I}{2\pi} \oint d\varphi$ (cost) $\rightarrow 360° = 2\pi$ (grad, Rad)

Teorema di Ampere

$\rightarrow C = \frac{\mu_0 I}{\cancel{2\pi}} \cdot \cancel{2\pi} = \mu_0 I$

Morale $\rightarrow \oint \vec{B}\, d\vec{\ell} = \mu_0 I$ Seconda legge di Maxwell campo Magnetico

INTEGRALE

$\oint_{\ell} \vec{A} \cdot d\vec{\ell} = \int_S (\vec{\nabla} \wedge \vec{A}) \cdot \hat{n}\, dS \Rightarrow \oint \vec{B} \cdot d\vec{\ell} = \mu_0 I \Rightarrow \int_S (\vec{\nabla} \wedge \vec{B})\, \hat{n}\, dS = \mu_0 I$

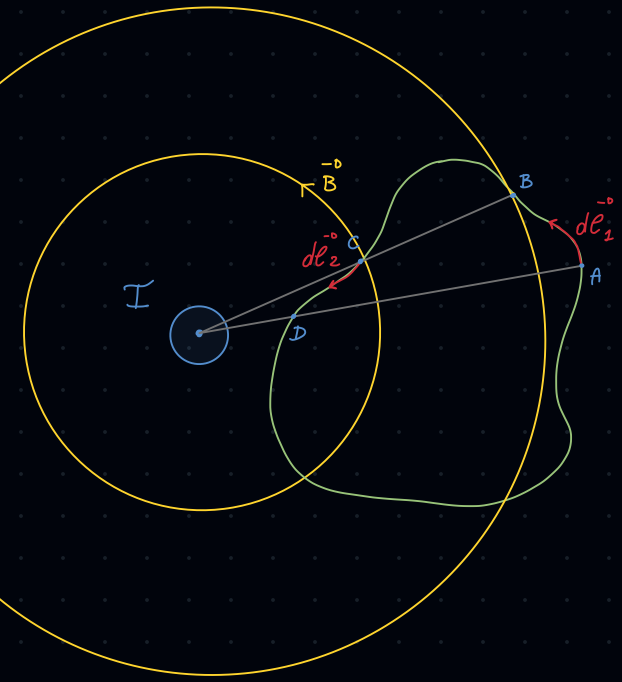
Maxwell

$I = \vec{J} \cdot S = \int_S \vec{J}\, \hat{n}\, dS \Rightarrow \cancel{\int_S} (\vec{\nabla} \wedge \vec{B})\, \cancel{\hat{n}\, dS} = \mu_0 \cancel{\int_S} \vec{J} \cdot \cancel{\hat{n}\, dS} \rightarrow \vec{\nabla} \wedge \vec{B} = \mu_0 \vec{J}$

Seconda legge di Maxwell campo Magnetico

DIFFERENZIALE

Il filo circonda la Spira



$$C = \oint \vec{B} \cdot d\vec{l} = \int_A^B \vec{B}\, d\vec{l}_1 + \int_C^D \vec{B}\, d\vec{l}_2$$

$$= \frac{\mu_0 I}{2\pi} \left[\int_A^B d\varphi - \int_C^D d\varphi \right] = \emptyset$$