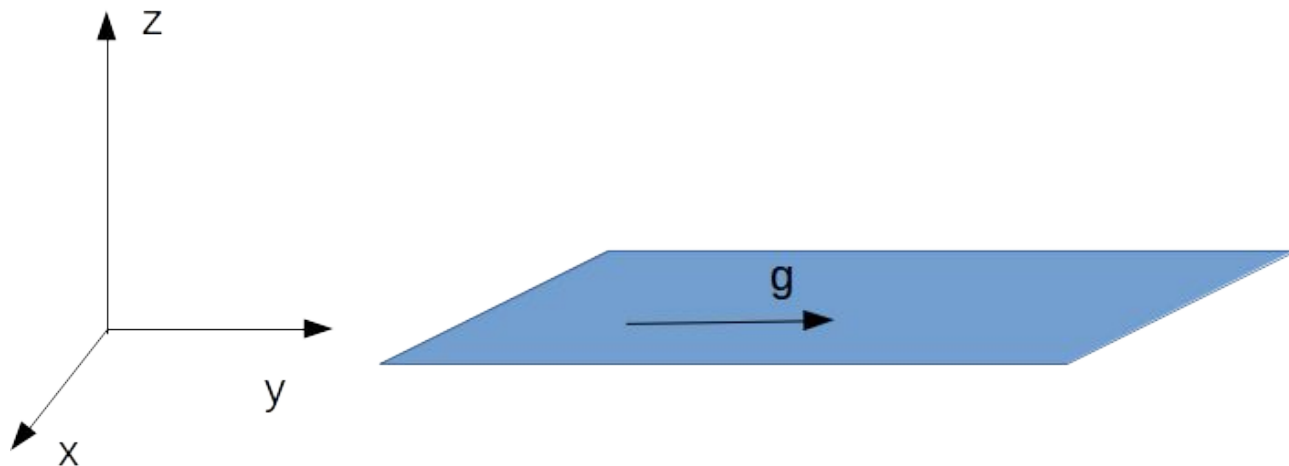


Física 3

Comentario Guía 4

Andrea Buccino

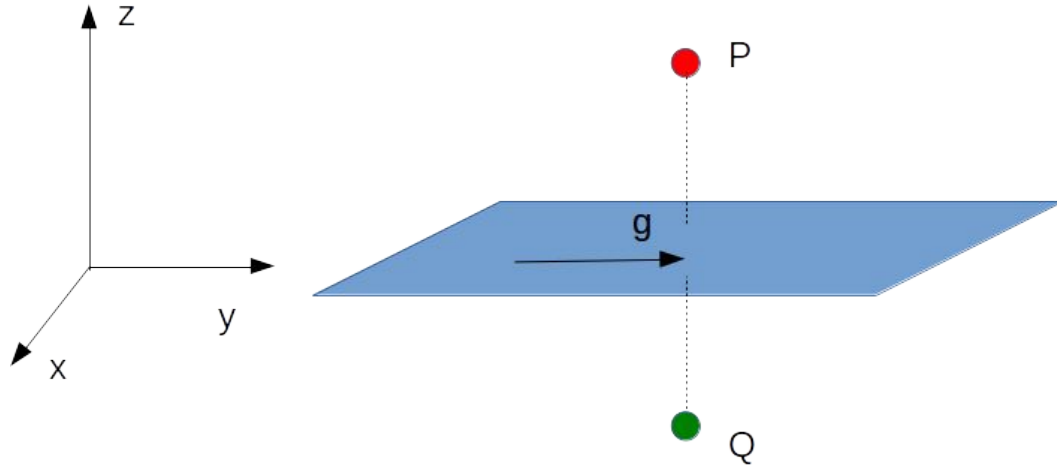
Plano magnético



Dado que es un plano infinito en x-y, el campo sólo depende de z.

$$\vec{B} = \vec{B}(z)$$

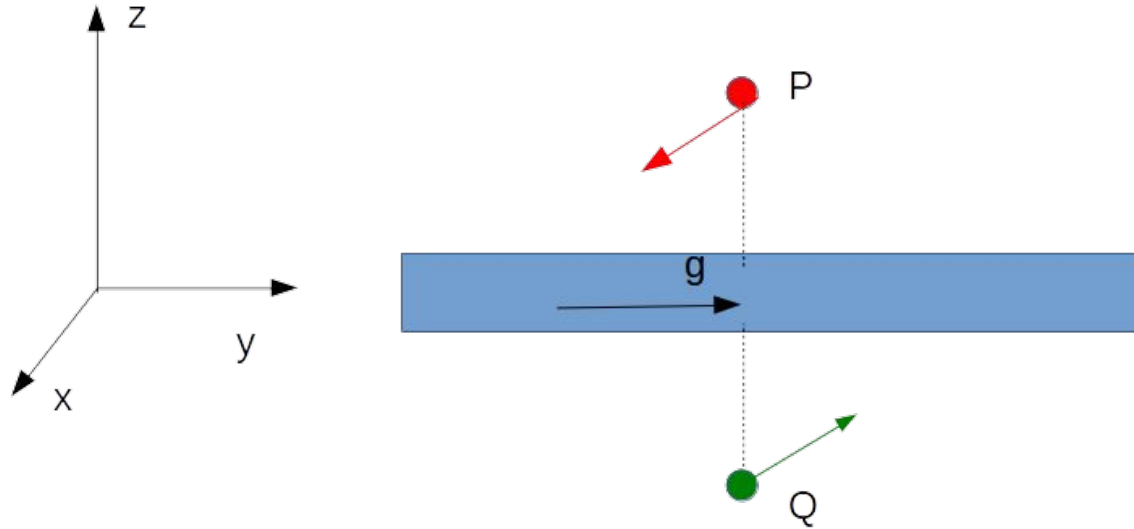
Plano magnético



Usando Biot-Savart

$$\vec{B}_P // \vec{g} \times |z_P| \hat{z} // \hat{x}$$
$$\vec{B}_Q // \vec{g} \times |z_Q| (-\hat{z}) // -\hat{x}$$

Plano magnético



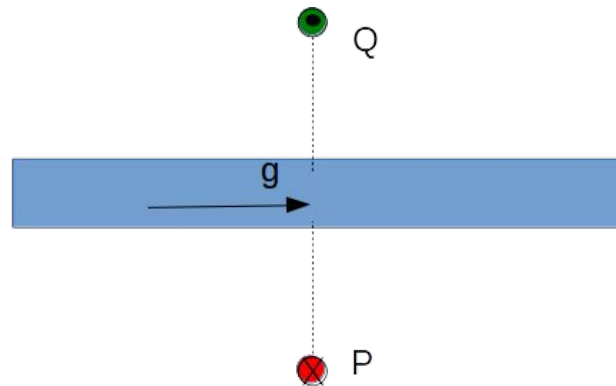
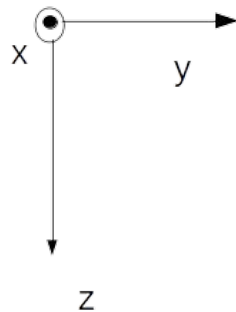
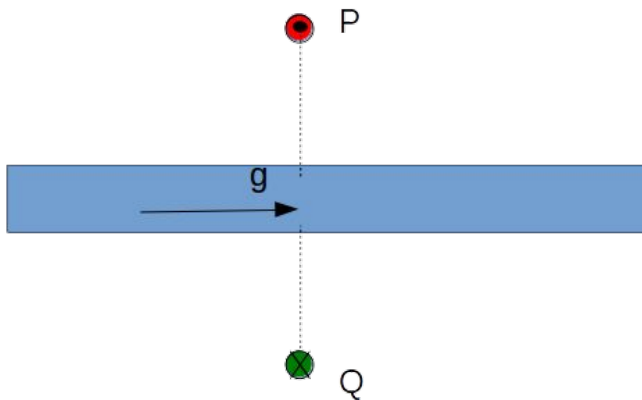
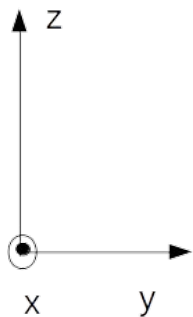
Usando Biot-Savart

$$\vec{B}_P // \vec{g} \times |z_P| \hat{z} // \hat{x}$$
$$\vec{B}_Q // \vec{g} \times |z_Q| (-\hat{z}) // -\hat{x}$$

Plano magnético

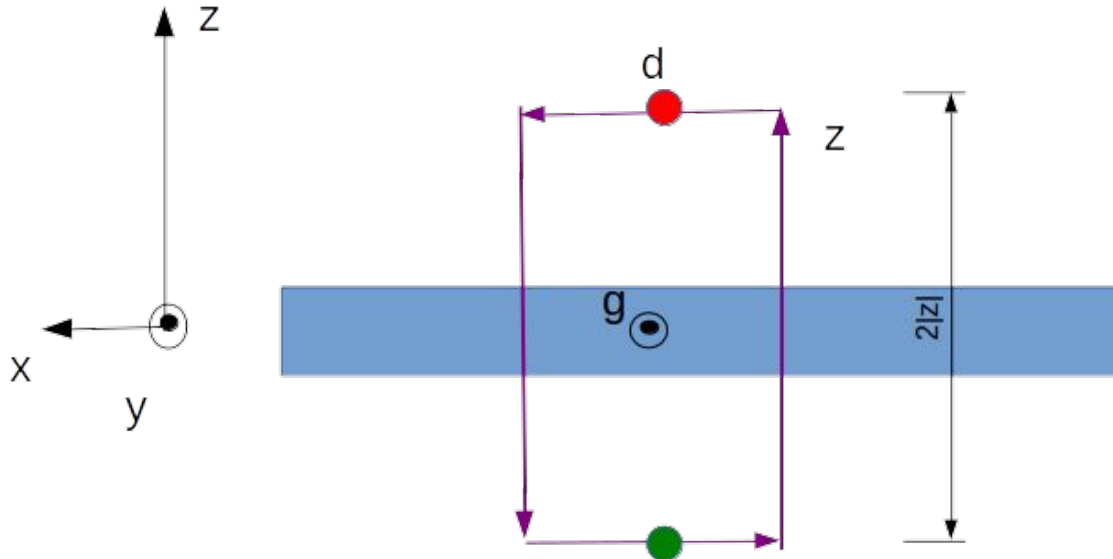
Aplicando transformaciones de simetría, invirtiendo en z

$$|\vec{B}(z_P)| = |\vec{B}(z_Q)|$$



Plano magnético

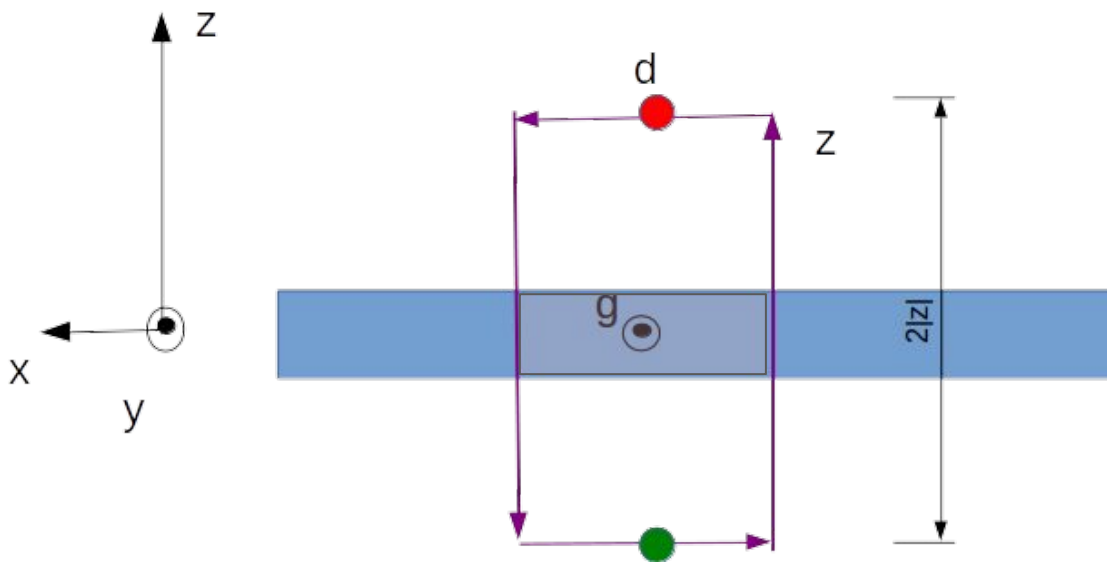
Entonces sabemos que el campo magnético tendrá componente en x y será simétrico en módulo en el eje z. Entonces planteo Ampere, de lados paralelos y perpendiculares al campo.



$$\oint \vec{B} d\vec{l} = \mu_o I_{conc}$$

Plano magnético

Entonces sabemos que el campo magnético tendrá componente en x y será simétrico en módulo en el eje z. Entonces planteo Ampere, de lados paralelos y perpendiculares al campo.

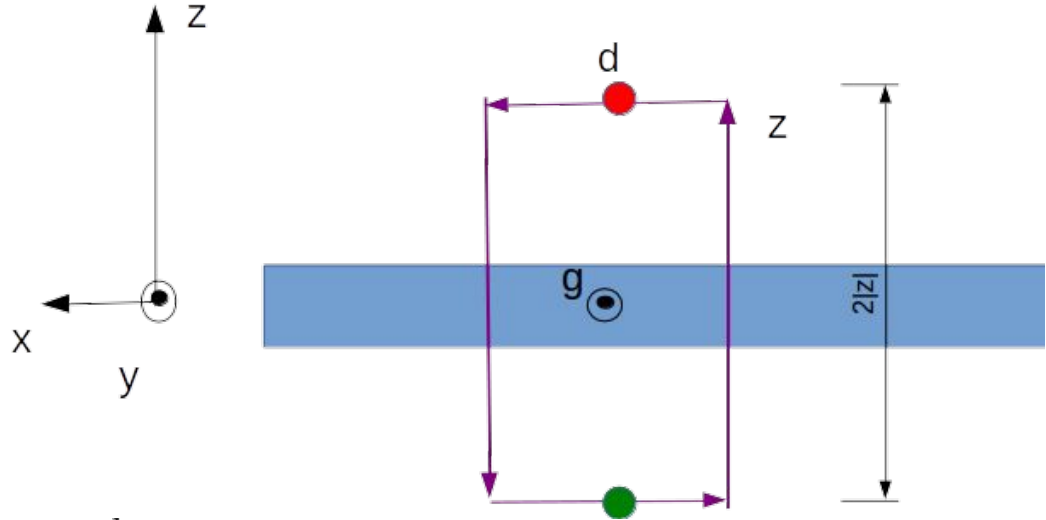


$$\oint \vec{B} d\vec{l} = \mu_o I_{conc}$$

$$I_{conc} = \int_0^d g \hat{y} \cdot dx \hat{y}$$

ojo, el ancho en z es despreciable,
el dibujo engaña!!

Plano magnético



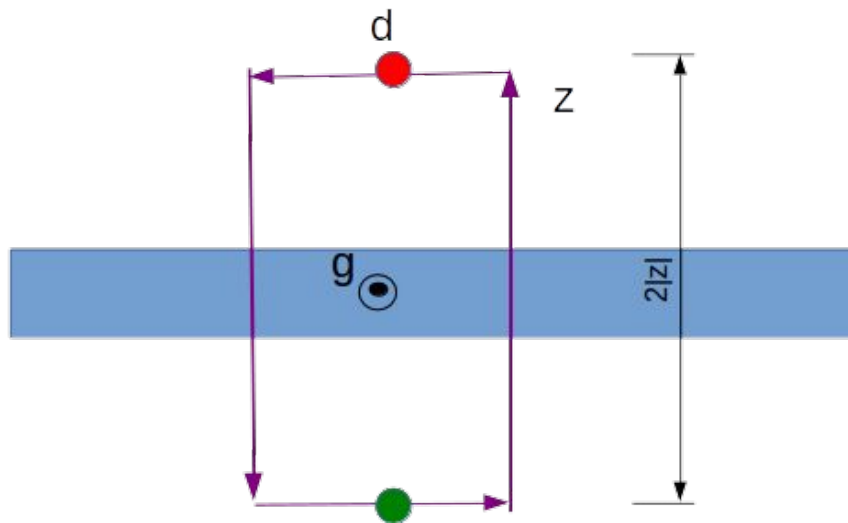
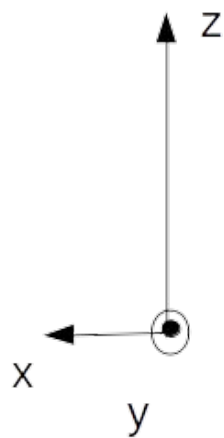
$$\oint \vec{B} d\vec{l} = \int_0^d B(|z|) \hat{x} dx \hat{x} + \int_0^d B(-|z|) \hat{x} dx (-\hat{x}) +$$

$$\int_z^{-z} B(z) \hat{x} dz \hat{z} + \int_{-z}^z B(z) \hat{x} dz (-\hat{z})$$

$$B(-|z|) = -B(|z|)$$

$$\oint \vec{B} d\vec{l} = 2B(z)d$$

Plano magnético

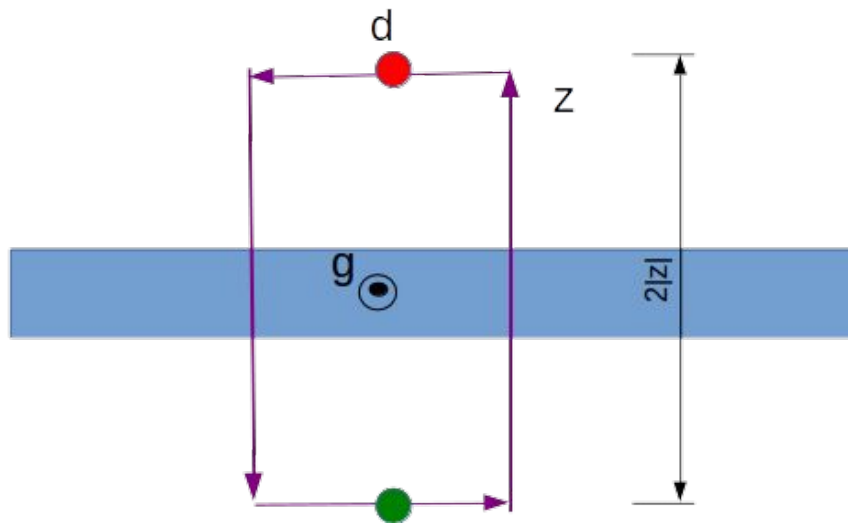
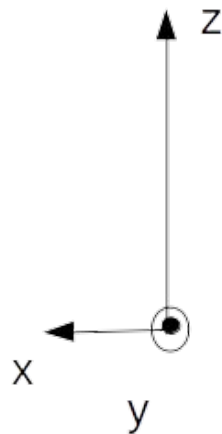


$$\oint \vec{B} d\vec{l} = 2B(z)d$$

$$\mu_0 I_{conc} = \mu_0 g d$$

$$B(z) = \frac{\mu_0 g}{2}$$

Plano magnético



$$\oint \vec{B} d\vec{l} = 2B(z)d$$

$$\mu_0 I_{conc} = \mu_0 g d$$

$$B(z) = \frac{\mu_0 g}{2}$$

$$\vec{B} = \begin{cases} \frac{\mu_0 g}{2} \hat{x} & z > 0 \\ -\frac{\mu_0 g}{2} \hat{x} & z < 0 \end{cases}$$

