Magnetismo

Historia:

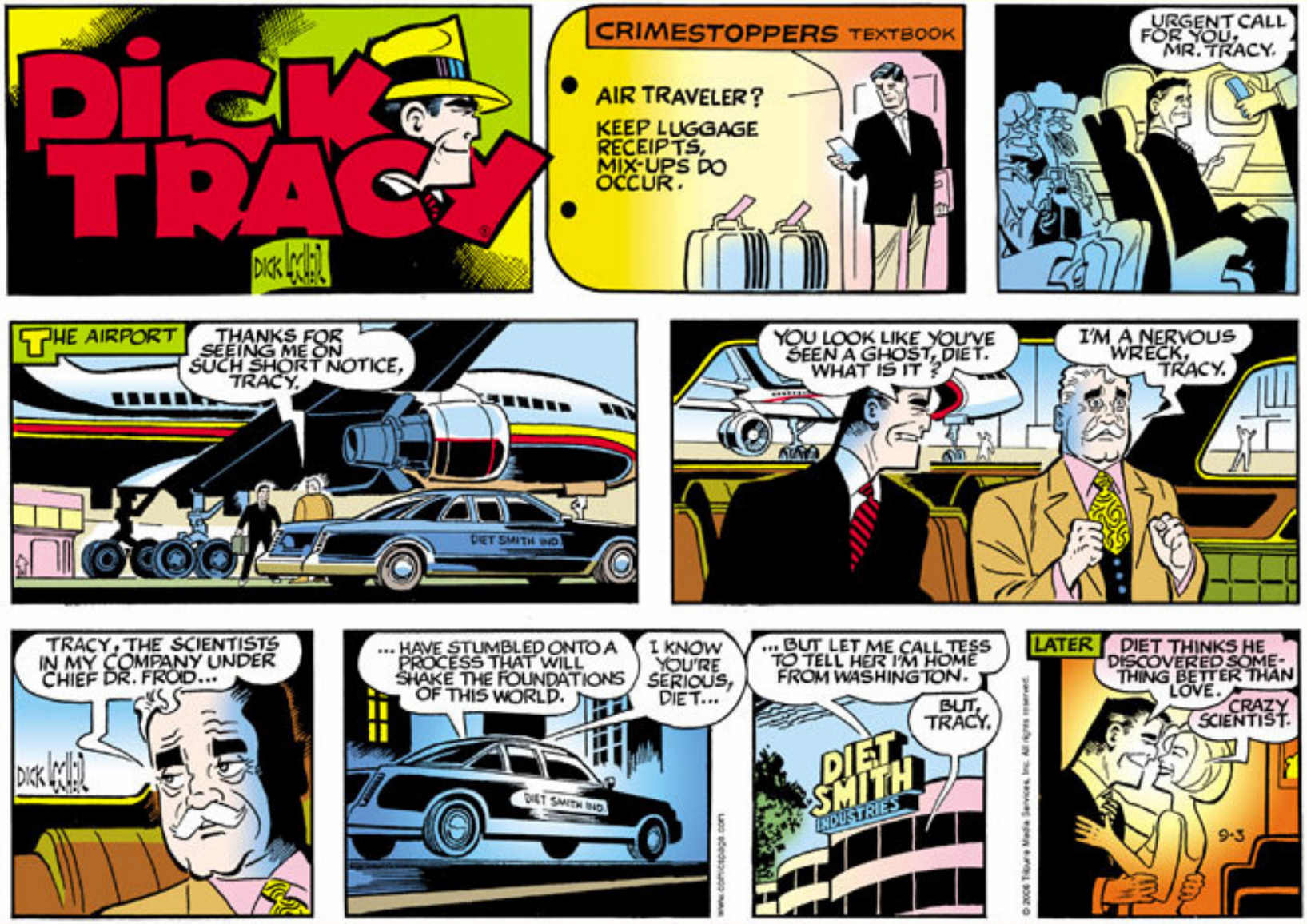
Conocido desde la antigüedad: Fe_3O_4

Otros materiales con propiedades magnéticas:

Fe, Ni, Co, acero, aleaciones especiales, cerámicas especiales.

Imanes. N  S

Aplicaciones: 1) Brújula.



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◄ 09-03-2006 Archive

The famous cartoon character, detective Dick Tracy, once said, “The nation that controls magnetism will control the universe”

If that funny paper, police office knew that electricity makes magnetism he would have likely said instead, "The nation that controls electricity will control the universe."

"He who controls magnetism controls the world."

Relación entre magnetismo y electricidad

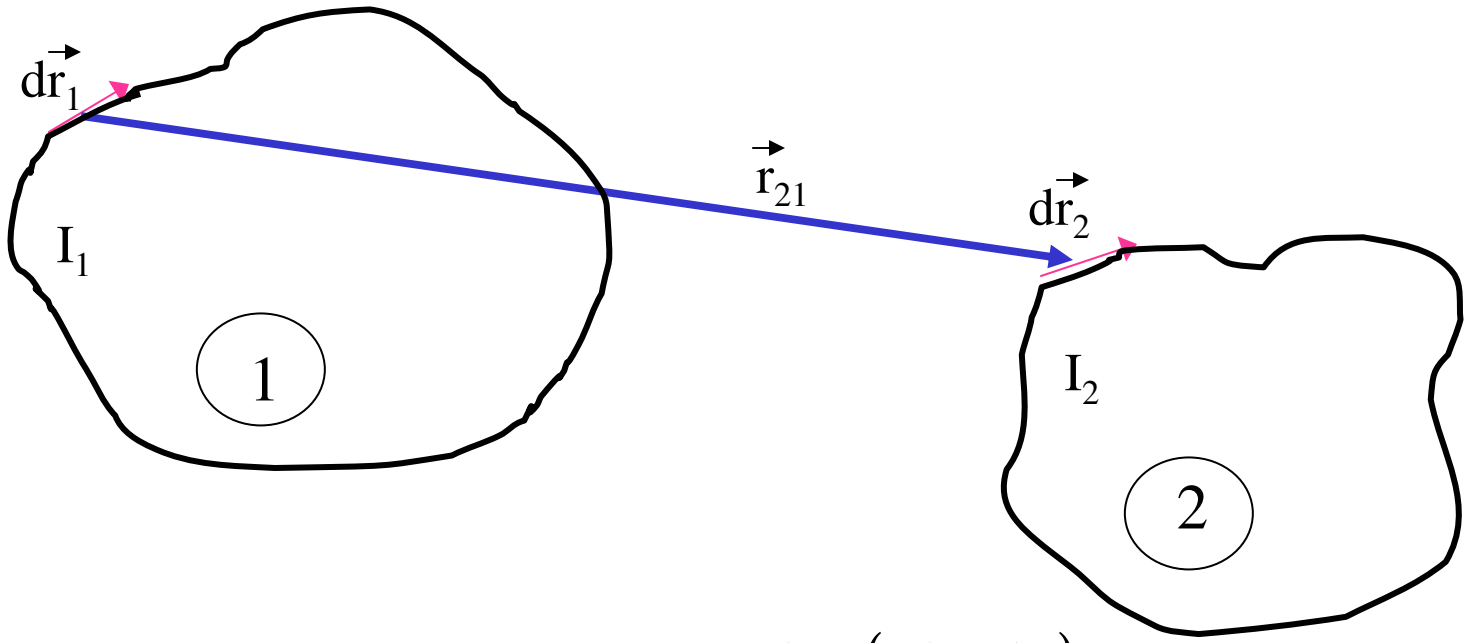
Juan Cristián Oersted. Universidad de Copenhague

Intentó desde 1812. Lo logró en 1820.

Brújula + corriente por hilo conductor

Andrés María Ampère: Fuerzas entre dos corrientes

Contribuciones de Gauss, Henry, Faraday, Maxwell



Ley de Ampère $$d^2\vec{F}_{21} = \frac{\mu_0}{4\pi} I_1 I_2 \frac{d\vec{r}_2 \times (d\vec{r}_1 \times \vec{r}_{21})}{|\vec{r}_{21}|^3}$$

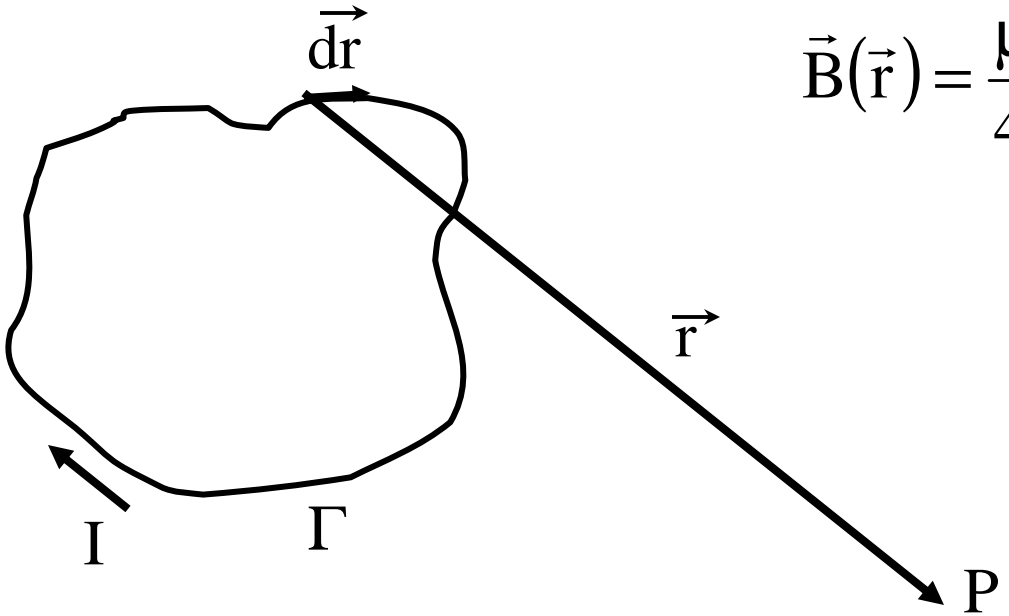
Definición: Campo magnético o inducción magnética $\vec{B}$

Ley de Ampère $$d^2\vec{F}_{21} = \frac{\mu_0}{4\pi} I_1 I_2 \frac{d\vec{r}_2 \times (d\vec{r}_1 \times \vec{r}_{21})}{|\vec{r}_{21}|^3}$$

$$d^2\vec{F}_{21} = I_2 d\vec{r}_2 \times \frac{\mu_0}{4\pi} \frac{(I_1\, d\vec{r}_1 \times \vec{r}_{21})}{|\vec{r}_{21}|^3}$$

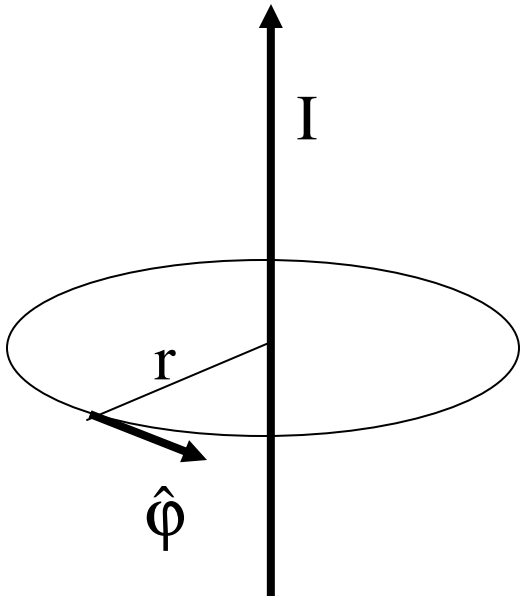
$$d^2\vec{F}_{21} = I_2 d\vec{r}_2 \times d\vec{B}_1$$

$$d\vec{B}_1 = \frac{\mu_0}{4\pi} I_1 \frac{d\vec{r}_1 \times \vec{r}_{21}}{|\vec{r}_{21}|^3} \qquad \vec{B}_1(\vec{r}_2) = \frac{\mu_0}{4\pi} I_1 \oint_{\Gamma_1} \frac{d\vec{r}_1 \times \vec{r}_{21}}{|\vec{r}_{21}|^3} \qquad [B] = [\text{Tesla}]$$



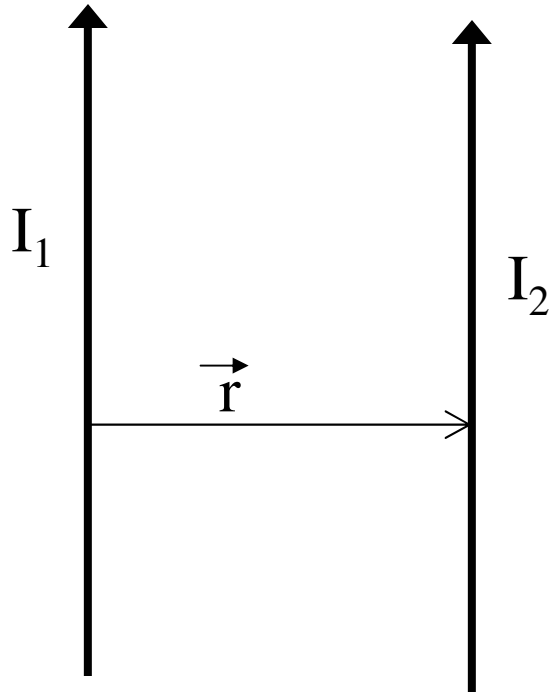
$$\vec{B}(\vec{r}) = \frac{\mu_0}{4\pi} I \oint_{\Gamma} \frac{d\vec{r} \times \vec{r}}{|\vec{r}|^3}$$

$$\vec{B}(\vec{r}) = \frac{\mu_0 I}{2\pi r}\ \hat{\varphi}$$ Ley de Biot - Savart



Regla del sacacorchos

Dos cables paralelos, corrientes I_1 e I_2



$$\vec{F} = -\frac{\mu_0 I_1 I_2}{2\pi r}\,\hat{r}$$

Circuito circular de radio a

$$\vec{B} = \frac{\mu_0 I}{2} \frac{a^2}{\left(a^2 + z^2\right)^{3/2}} \hat{k}$$

Bobina de N vueltas y n vueltas/m: N = nL