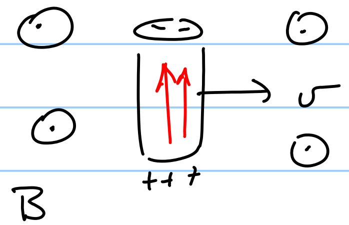
Lecture 32 April 12

Note Title 4/12/2006

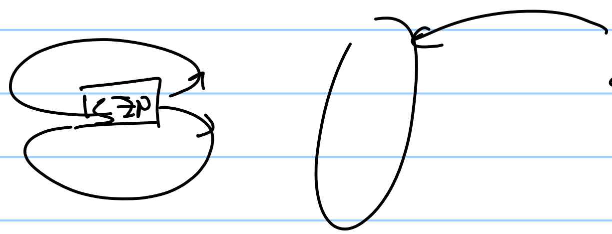


$$\vec{F} = q\vec{v}\times\vec{B} + q\vec{E} = 0$$

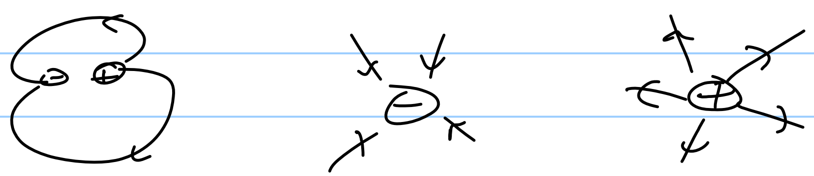
electro-static condition

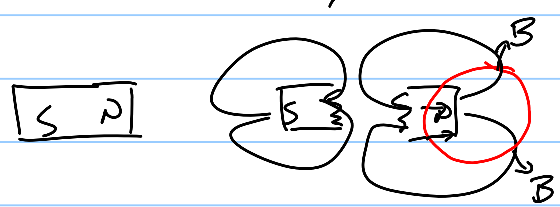
$$E = -vB$$

E in the metal



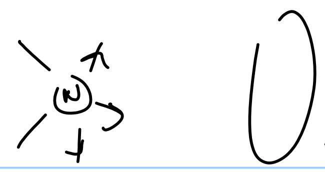
$$\mathcal{E}mf = -\frac{d\Phi_B}{dt}$$



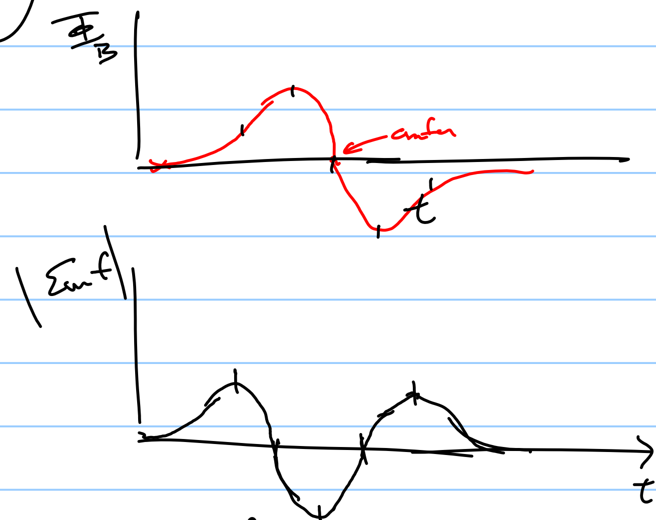


$$\vec{\nabla}\cdot\vec{B} = 0 \quad \text{div. th.}$$

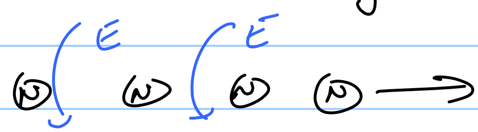
$$\oint \vec{B}\cdot d\vec{a} = \int \underbrace{\vec{\nabla}\cdot\vec{B}}_{0}\, d\tau = 0$$



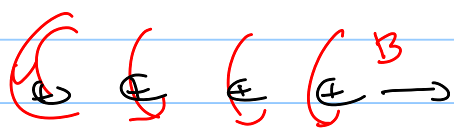
$$\mathcal{E}_{mf} = -\frac{d\Phi_B}{dt}$$



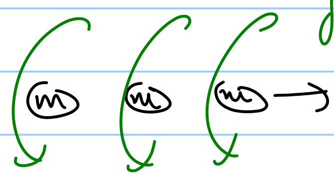
If really had mag monopoles



← DOES NOT EXIST IN NATURE



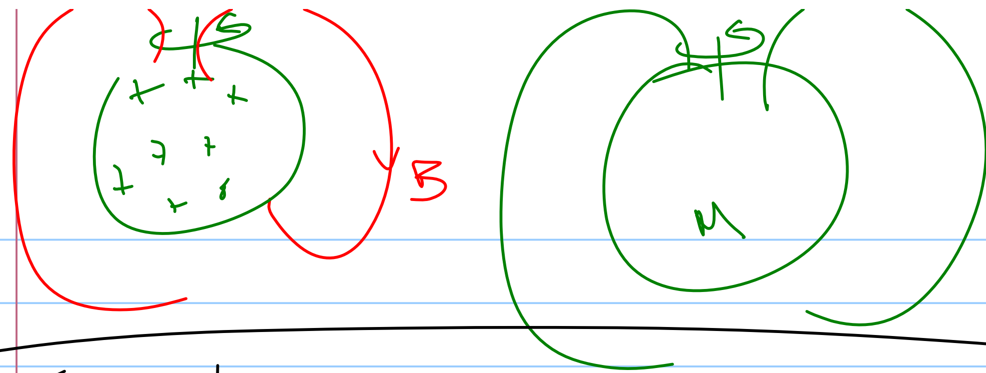
Gravity:



gravitomagnetic field

↑

Nothing to do with magnetism



Faraday's law

$$\mathcal{E}_{mf} = -\frac{d\Phi_B}{dt}$$

"

$$\oint \vec E\cdot d\vec l = \int \vec G \cdot d\vec l$$

$\vec E = \vec G$

$B(t)$

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

$$\vec\nabla\times\vec G \neq 0$$

static

$$\vec F = q\vec E + q\vec G + q\vec v\times\vec B \qquad \vec G = \vec E$$

for a spatially fixed loop or area

$$\oint \vec E\cdot d\vec l = -\frac{d}{dt}\int \vec B\cdot d\vec a \qquad \text{integral} \to \text{diff}$$

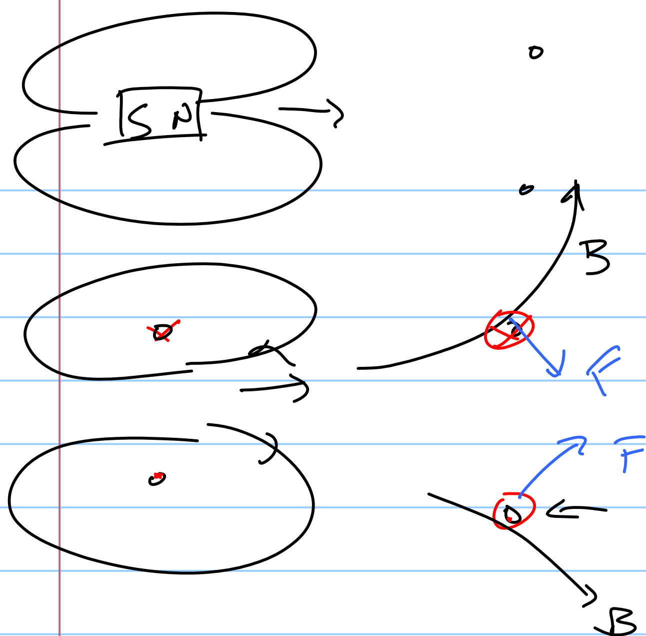
"

near 1 pt $B \simeq$ same, not spatially varying

$$\frac{d}{dt}B = \frac{\partial B}{\partial t} + \frac{\partial B}{\partial x}\overbrace{\frac{dx}{dt}}^{0} + \dots$$

$$\int \vec\nabla\times\vec E\cdot d\vec a = -\int \frac{\partial \vec B}{\partial t}\cdot da$$

$$\boxed{\vec\nabla\times\vec E = -\frac{\partial B}{\partial t}}$$ Faraday's law



$$d\vec{F} = I\, d\vec{\ell} \times \vec{B}$$

Lenz's law says current flow to generate a B that opposes the applied B