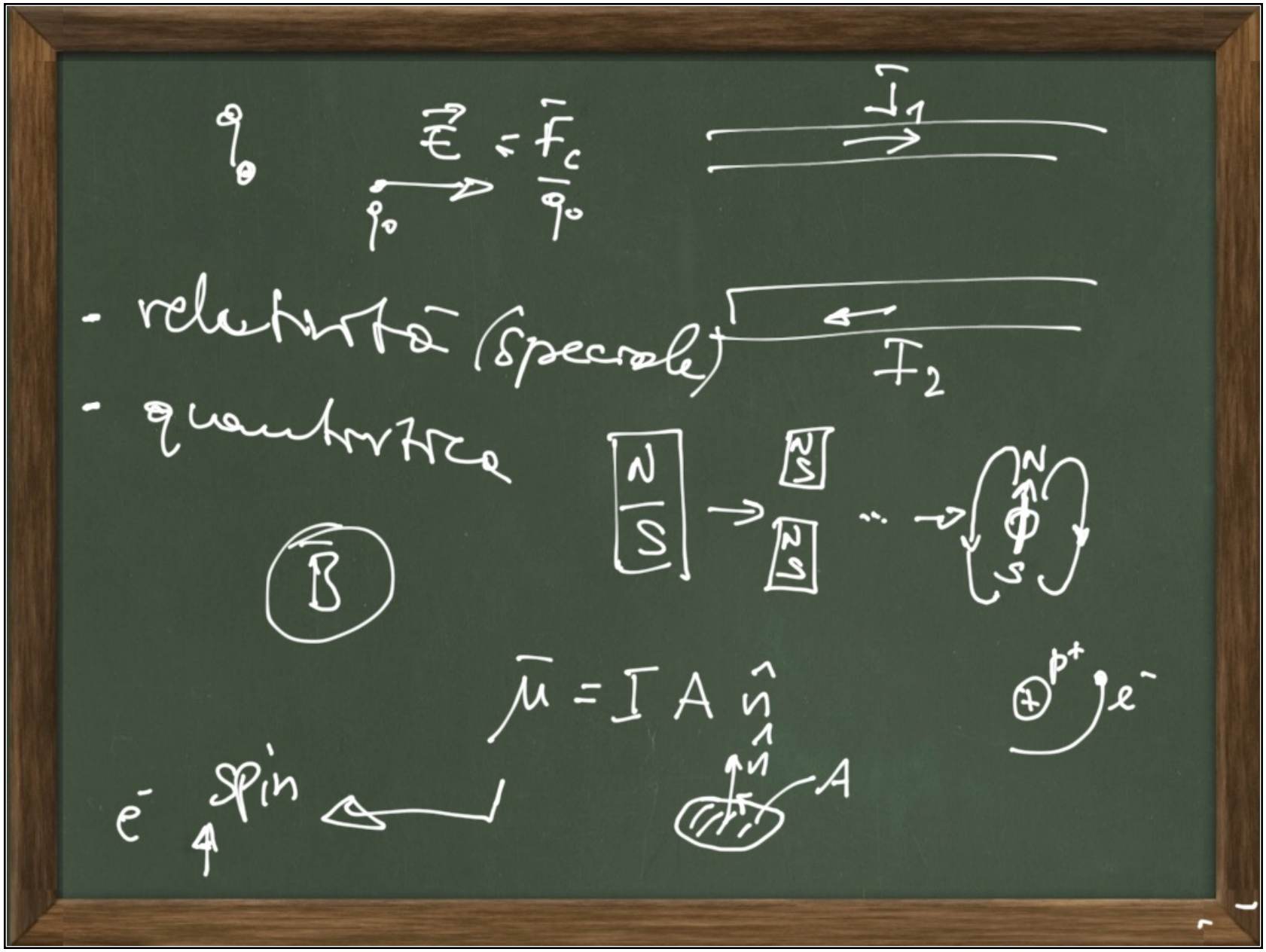
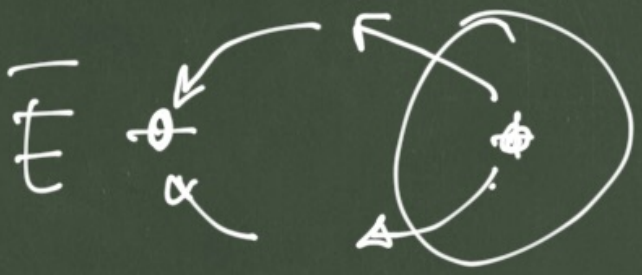
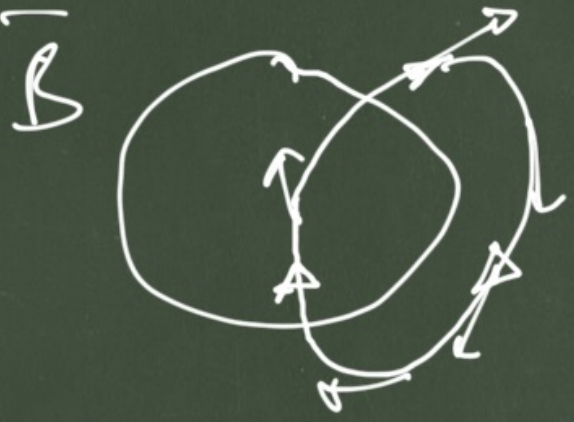

q_0
$\vec{E} = \frac{\vec{F}_c}{q_0}$
q_0
I_1
- relatività (speciale)
I_2
- quantistica
N
S
N
S
N
S
B
$\vec{\mu} = I A \hat{n}$
p^+
e^-
e^-
spin
$\hat{n}$
A

Il campo magnetico



$$\oint_S \vec{E} \cdot \vec{dA} = \frac{Q}{\varepsilon_0}$$

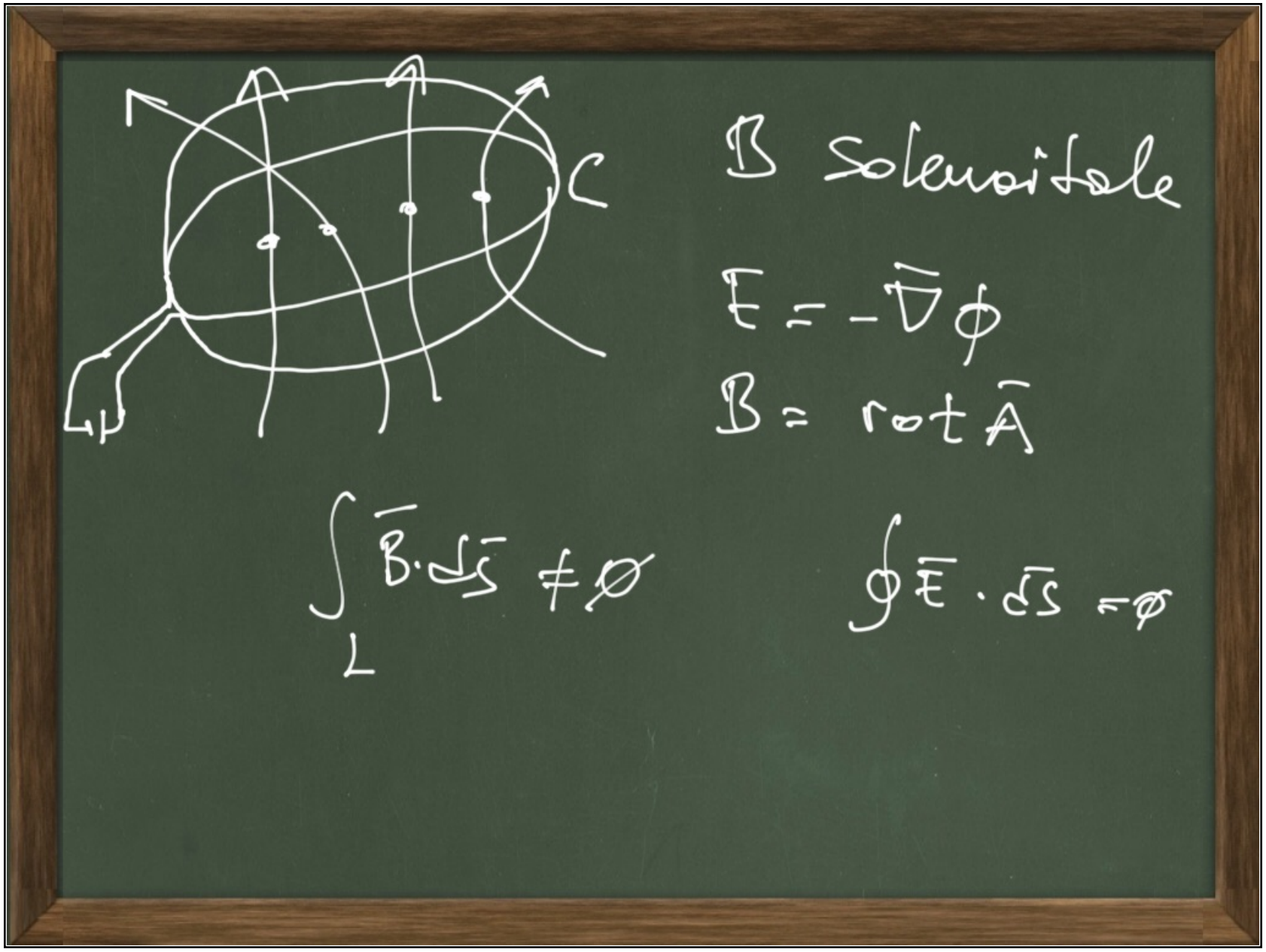


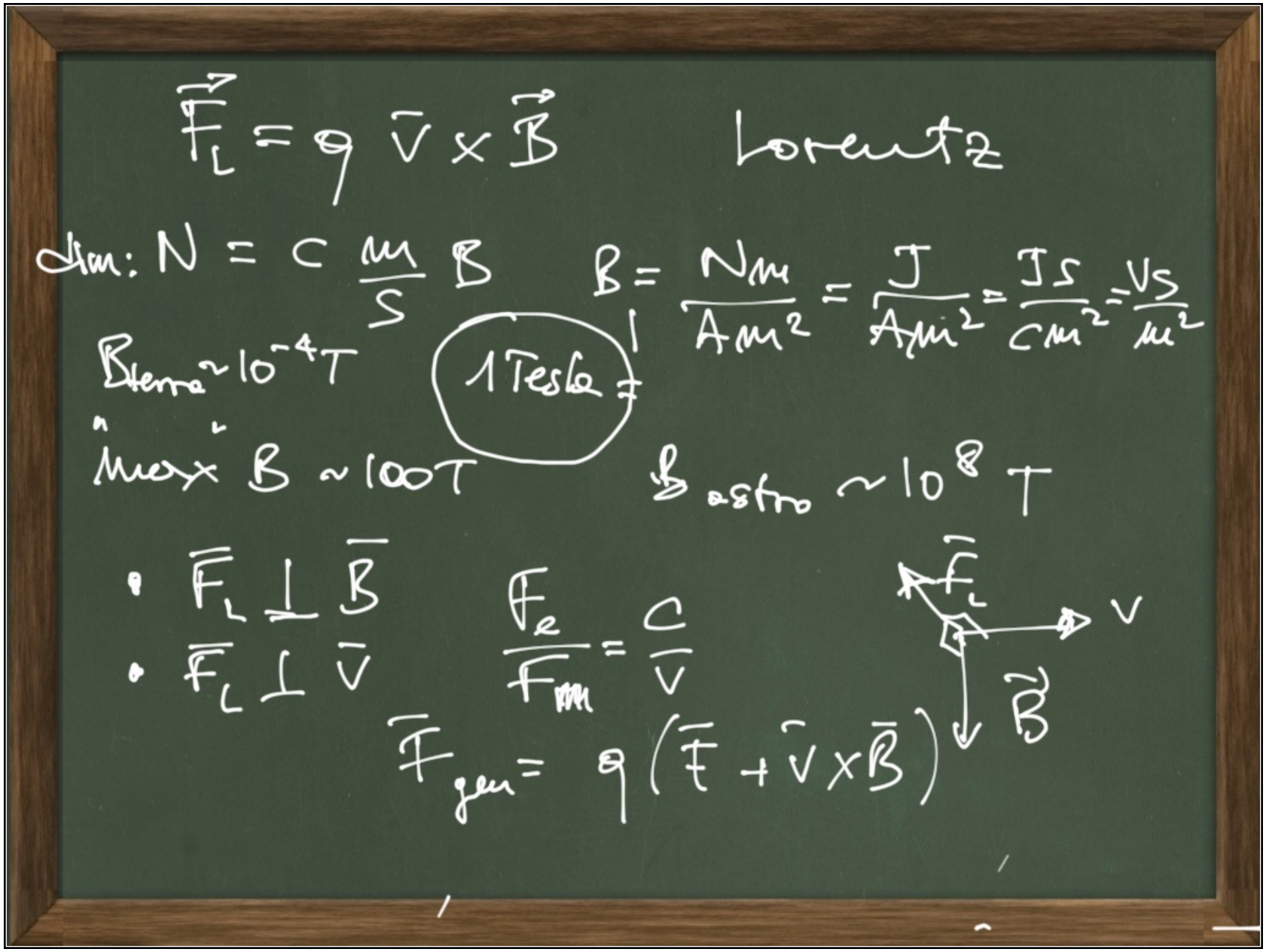
linee chiuse, flusso niente

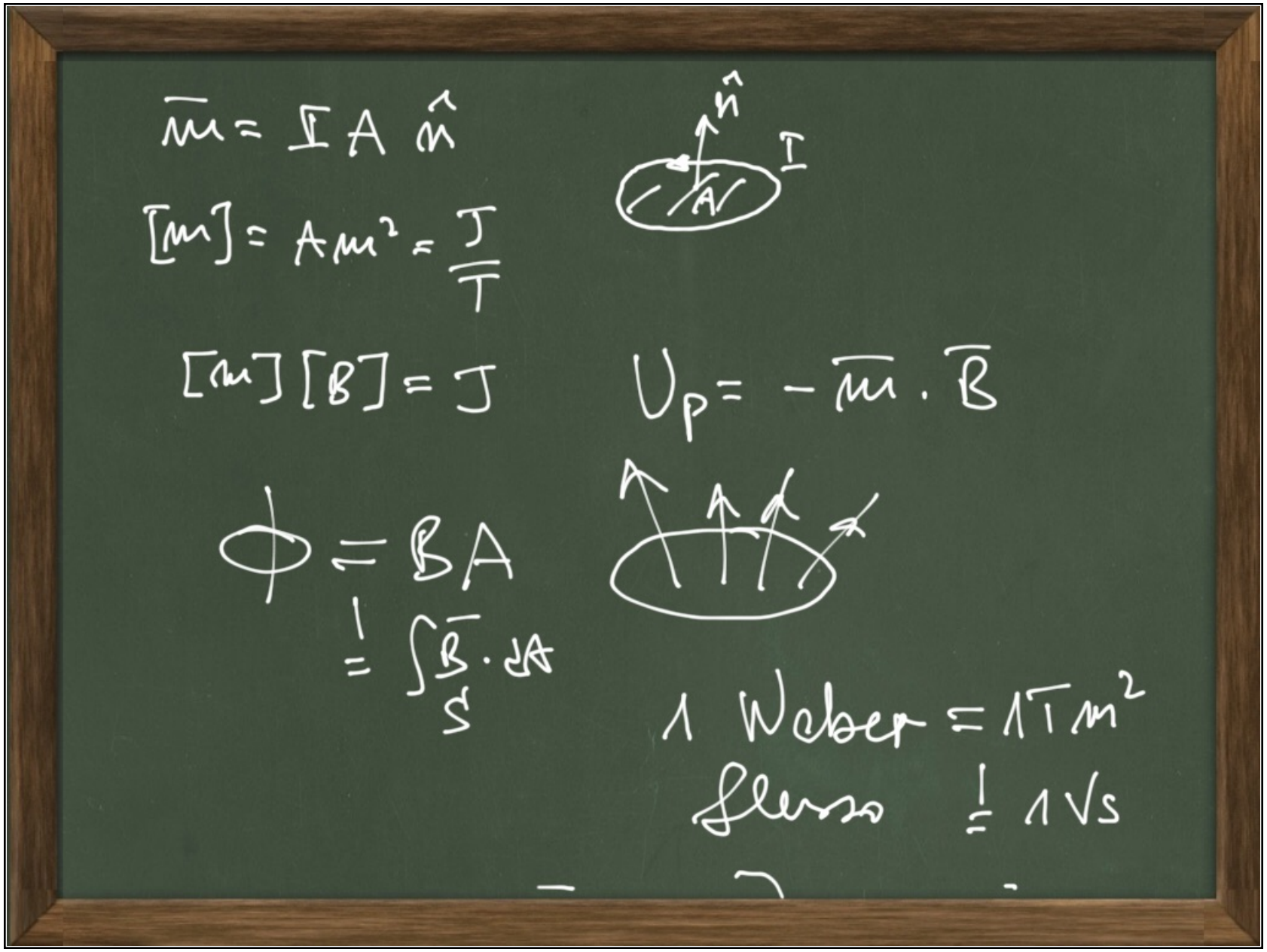
M-3

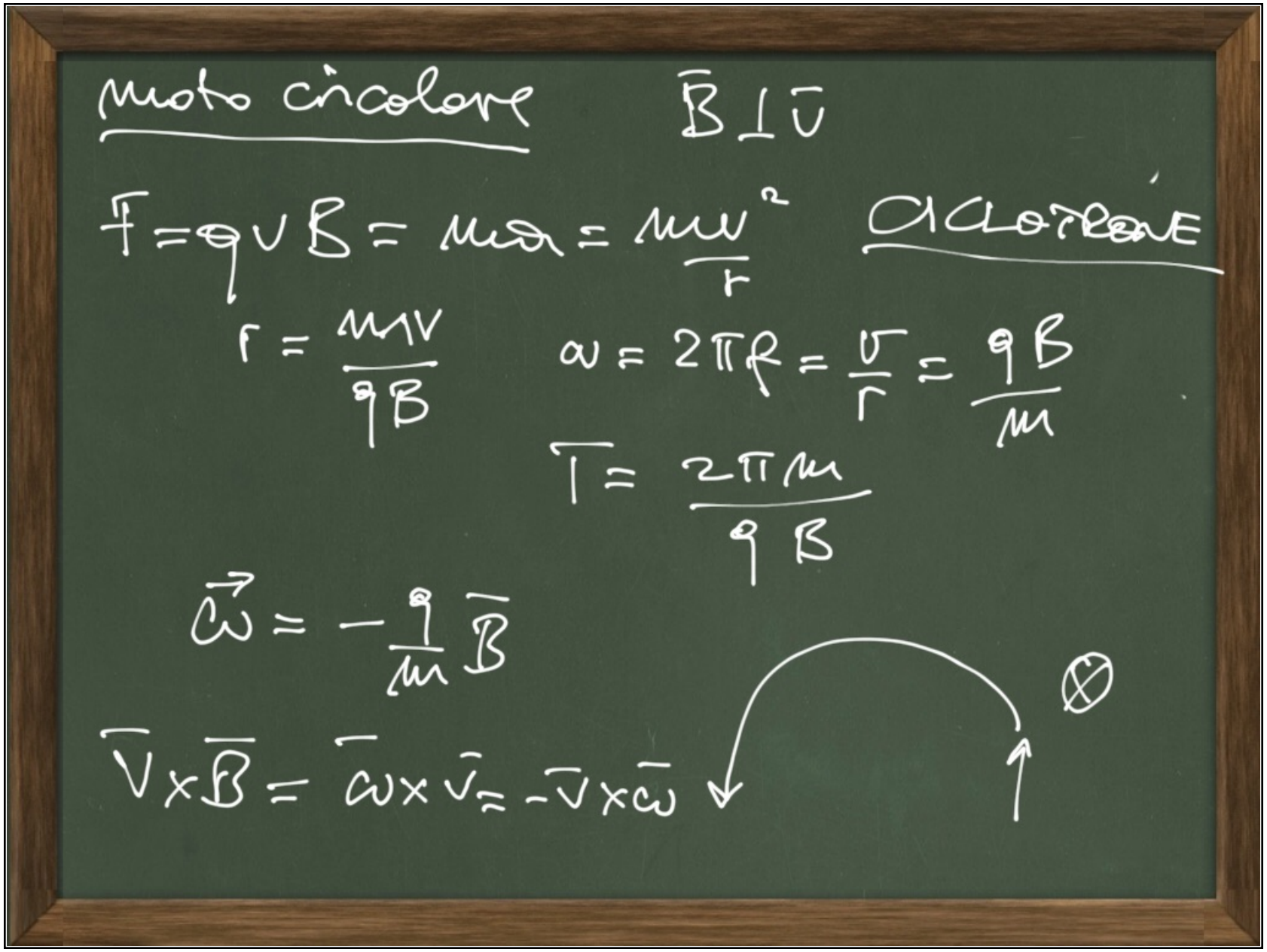
$$\oint \vec{B} \cdot \vec{dA} = 0$$

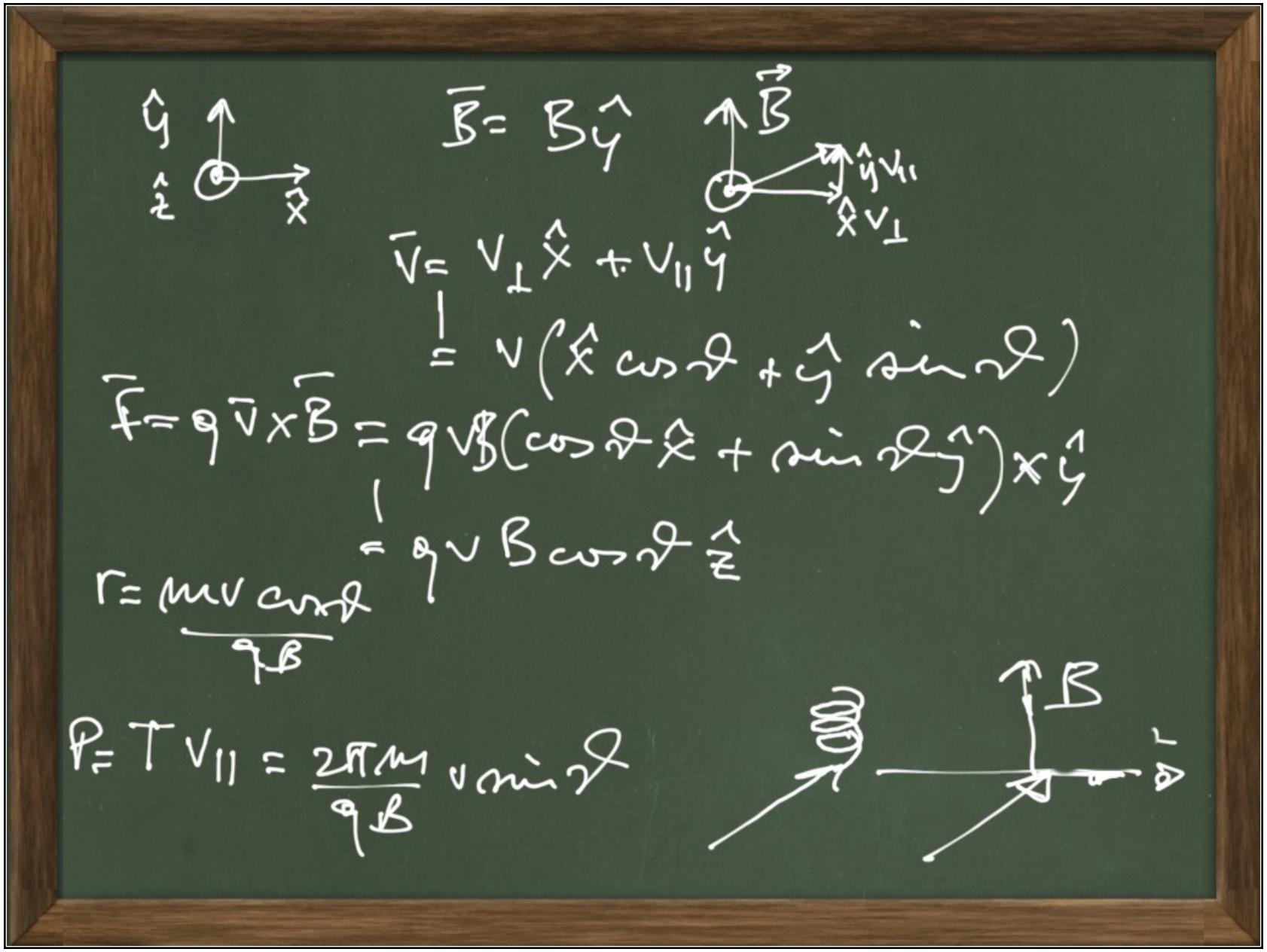
$$\text{div}\, \vec{B} = 0$$

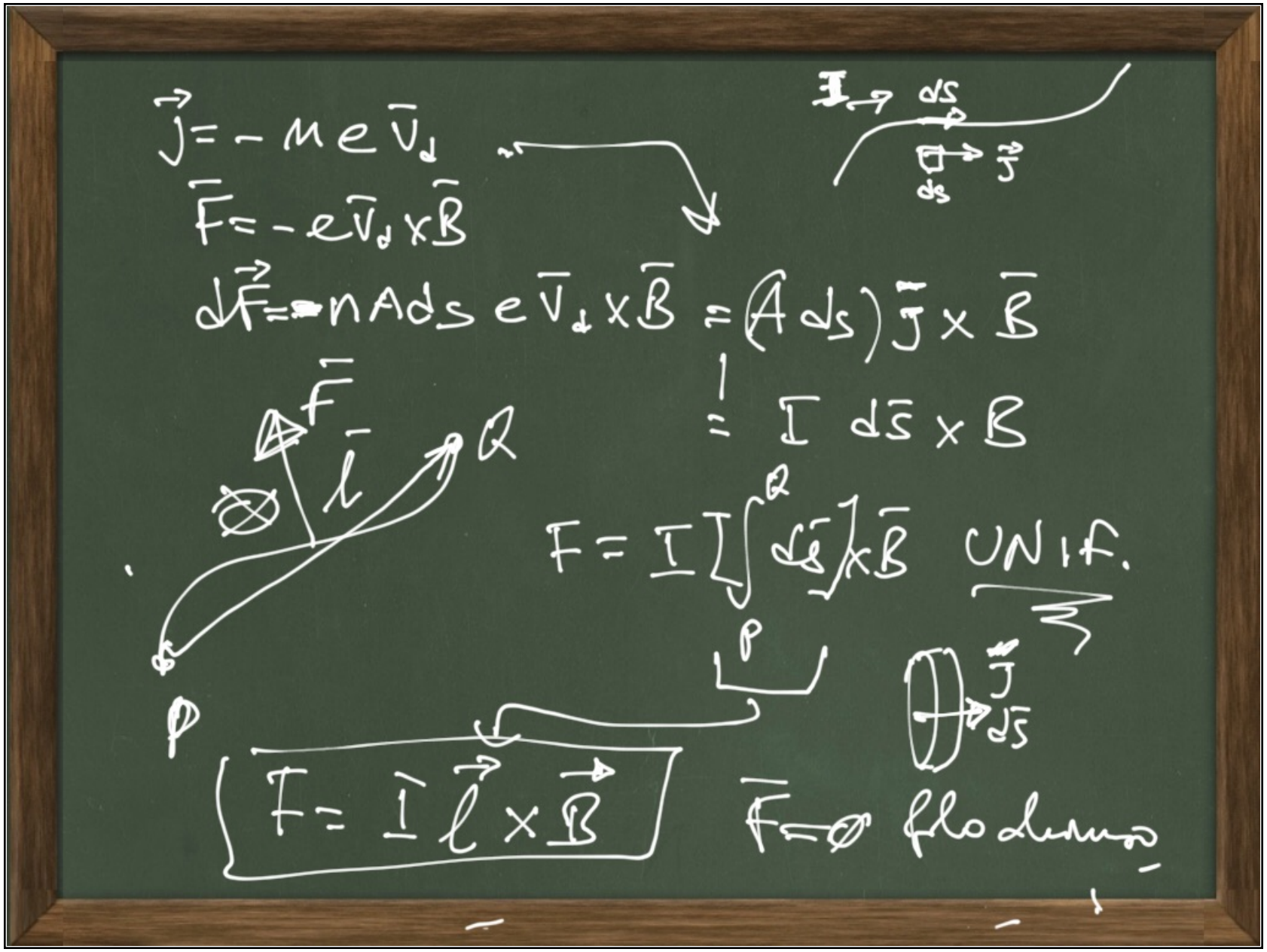

C
B solenoidale
$\bar{E} = -\bar{\nabla}\phi$
$\bar{B} = \text{rot}\,\bar{A}$
$\int_L \bar{B}\cdot d\bar{s} \neq 0$
$\oint \bar{E}\cdot d\bar{s} = 0$


$\vec{F}_L = q\,\vec{v} \times \vec{B}$ Lorentz
dim: $N = C\,\frac{m}{s}\,B$
$B = \frac{N_m}{Am^2} = \frac{J}{Am^2} = \frac{Js}{Cm^2} = \frac{Vs}{m^2}$
$B_{terra} \sim 10^{-4} T$
1 Tesla =
$B_{max} \sim 100 T$
$B_{astro} \sim 10^8 T$
$\vec{F}_L \perp \vec{B}$
$\vec{F}_L \perp \vec{v}$
$\frac{F_e}{F_m} = \frac{C}{v}$
$\vec{F}_{gen} = q(\vec{E} + \vec{v} \times \vec{B})$
$\vec{F}_L$
v
$\vec{B}$


$\vec{m} = I A \hat{n}$
$[m] = A m^2 = \frac{J}{T}$
$[m][B] = J$
$\Phi = BA$
$\stackrel{!}{=} \int_S \vec{B} \cdot d\vec{A}$
$\hat{n}$
I
A
$U_p = -\vec{m} \cdot \vec{B}$
1 Weber $= 1 T m^2$
Fluss $\stackrel{!}{=} 1 Vs$


Moto circolare
$\bar{B} \perp \bar{v}$
$F = qvB = ma = \frac{mv^2}{r}$
CICLOTRONE
$r = \frac{mv}{qB}$
$\omega = 2\pi f = \frac{v}{r} = \frac{qB}{m}$
$T = \frac{2\pi m}{qB}$
$\vec{\omega} = -\frac{q}{m}\bar{B}$
$\bar{v} \times \bar{B} = \bar{\omega} \times \bar{v} = -\bar{v} \times \bar{\omega}$


$\hat{y}$
$\hat{z}$
$\hat{x}$
$\vec{B} = B\hat{y}$
$\vec{B}$
$\hat{y}v_{\parallel}$
$\hat{x}v_{\perp}$
$\hat{y}$
$\vec{v} = v_{\perp}\hat{x} + v_{\parallel}\hat{y}$
$= v(\hat{x}\cos\alpha + \hat{y}\sin\alpha)$
$\vec{F} = q\vec{v}\times\vec{B} = qvB(\cos\alpha\hat{x} + \sin\alpha\hat{y})\times\hat{y}$
$= qvB\cos\alpha\,\hat{z}$
$r = \frac{mv\cos\alpha}{qB}$
$P = Tv_{\parallel} = \frac{2\pi m}{qB}v\sin\alpha$
B
r


$\vec{j} = -ne\vec{v}_d$
$\vec{F} = -e\vec{v}_d \times \vec{B}$
$d\vec{F} = -nA\,ds\, e\vec{v}_d \times \vec{B} = (A\,ds)\vec{j} \times \vec{B}$
$= I\, d\vec{s} \times B$
$F = I\left[\int_P^Q d\vec{s}\right] \times \vec{B}$ UNif.
$\vec{F} = I\vec{l} \times \vec{B}$
$\vec{F} = 0$ flo dum
I
ds
j
P
Q
l
F

F su filo (C. uniforme) $\boxed{\vec{I} \vec{l} \times \vec{B}}$

F su filo durante in C.C.

$\boxed{F = \emptyset}$

- a non-uniform.
- $F = \emptyset$, ma $\vec{M} \neq \emptyset$