

Some Physical Constants

Elementary charge: $e = 1.602 \times 10^{-19} \text{ C}$

Electron mass: $m_e = 9.109 \times 10^{-31} \text{ kg}$

Proton mass: $m_p = 1.673 \times 10^{-27} \text{ kg}$

Speed of light: $c = 2.998 \times 10^8 \text{ m/s}$

Permittivity constant $\epsilon_0 = 8.854 \times 10^{-12} \text{ F/m}$

Permeability constant $\mu_0 = 4\pi \times 10^{-7} = 1.257 \times 10^{-6} \text{ T}\cdot\text{m/A (H/m)}$

Some Conversion Factors

$1 \text{ eV} = 1.602 \times 10^{-19} \text{ J}$

$1 \text{ T} = 10^4 \text{ gauss}$

Useful Formulas

$\vec{F}_B = q\vec{v} \times \vec{B}$	$\mathcal{E} = -N \frac{d\Phi_B}{dt}$
$a_{\text{centripetal}} = \frac{v^2}{r}$	$L = \frac{N\Phi_B}{i}$
$r = \frac{mv}{ q B}$	$L_{\text{solenoid}} = n^2 \mu_0 \ell A$
$T = \frac{2\pi m}{ q B}$	$\mathcal{E}_L = -L \frac{di}{dt}$
$\vec{F} = i\vec{L} \times \vec{B}$	$\frac{di}{dt} = ai + b \Rightarrow i(t) = e^{a(t-t_0)} (i_0 - i_\infty) + i_\infty$
$d\vec{B} = \frac{\mu_0}{4\pi} \frac{i d\vec{s} \times \hat{r}}{r^2}$	$v_R = i_R R$
$\oint \vec{B} \cdot d\vec{s} = \mu_0 i_{\text{enc}}$	$i_C = C \frac{dv_C}{dt}$
$B = \frac{\mu_0 i}{2\pi R}$	$v_L = L \frac{di_L}{dt}$
$B = \frac{\mu_0 i}{2R}$	$\sin(x) = \cos(x - 90^\circ)$
$B = \frac{\mu_0 i R^2}{2(R^2 + z^2)^{\frac{3}{2}}}$	$-\cos(x) = \cos(x \pm 180^\circ)$
$B = \mu_0 in$	$\Phi_B = \oint \vec{B} \cdot d\vec{A} = 0$
$F_{ba} = \frac{\mu_0 Li_a i_b}{2\pi d}$	$c = \frac{\omega}{k} = \frac{1}{\sqrt{\mu_0 \epsilon_0}} = \frac{E_m}{B_m} = \frac{E}{B}$