

Physics 106 Syllabus Song, Words by Walter F. Smith

Tune: The Merry-go-round Broke Down by Cliff Friend & Dave Franklin, 1937

C G7 C
Yahda da da dah da da, Yahda da da dah da da

C G7
Oh – static charge makes an **E**, and **E** times q is force.

$$\mathbf{F}_{\text{on a point charge}} = q\mathbf{E}$$

G7 C
 dV/dx is E , I guess, No! minus E , of course!

$$E = -\frac{dV}{dx}$$

C G7
If you have to store a charge, don't put it in your pants!

$$C_{\text{parallel plate}} = \frac{\epsilon A}{d}$$

G7 C
Use eps'lon A by d instead, it's called capacitance!

C G7
 dq/dt is I , and V is I times R ,

$$I \equiv \frac{dq}{dt}$$

$$V = IR$$

Ohm's Law

$$R = \rho \frac{L}{A}$$

G7 C
Where R is rho times L by A , ho ho, and har har har!

C G7
Now moving charge makes **B**, **B** pushes moving charge.

$$\mathbf{B} = \frac{\mu_0}{4\pi} \frac{q\mathbf{v} \times \hat{\mathbf{r}}}{r^2}$$

$$\mathbf{F} = q\mathbf{v} \times \mathbf{B}$$

G7 C
A changing **B** can make an **E**, with consequences large!

$$\oint \mathbf{E} \cdot d\vec{\ell} = -\frac{d}{dt} \int \mathbf{B} \cdot \hat{\mathbf{n}} dA$$

Faraday's Law

C G7
So changing **B** makes **E**, and changing **E** makes **B**,

$$\oint \mathbf{B} \cdot d\vec{\ell} = \mu_0 I_{\text{net threading}} + \mu_0 \epsilon_0 \frac{d}{dt} \int \mathbf{E} \cdot \hat{\mathbf{n}} dA$$

Ampere's Law

G7 C
And that makes light, which gives us sight, and travels at speed c !

$$c = \frac{1}{\sqrt{\mu_0 \epsilon_0}}$$

C G7
The speed of light's the same, no matter what your frame,

G7 C
That gives, you see, relativity, says Albert whats-his-name!

$$x = \gamma(x' + Vt')$$

$$t = \gamma\left(t' + \frac{Vx'}{c^2}\right)$$

$$\gamma \equiv \frac{1}{\sqrt{1 - V^2/c^2}}$$

The Lorentz Transformation

C G7
That's all that's in our course, but I guess I'm just a ham,

G7 C
'Cause I'll give forty lectures more before our last exam!