

SESSION III

Coulomb's Law

$$\vec{F} = \frac{kq_1q_2}{r^2} \hat{r}$$

Superposition principle

$$\vec{F}_{total} = \vec{F}_{12} + \vec{F}_{13} + \vec{F}_{14} + \dots$$

Line Charge

$$\vec{F} = kq \int \frac{\mathbf{l}(x)dx}{r^2} \hat{r}$$

Sheet Charge

$$\vec{F} = kq \int \frac{\mathbf{s}(x,y)ds}{r^2} \hat{r}$$

Volume Charge

$$\vec{F} = kq \int \frac{\mathbf{r}dV}{r^2} \hat{r}$$

Electric Field

$$\vec{E} = \frac{\vec{F}}{q_0} = \frac{kq}{r^2} \hat{r}$$

Force

$$\vec{F} = q_0 \vec{E}$$

Dipole

$$\vec{E} = \frac{kqL}{r^3} \hat{i}$$

Sheet Charge

$$E = \frac{\mathbf{s}}{2\mathbf{e}_0} \text{ or } E = \frac{\mathbf{s}}{\mathbf{e}_0} \text{ for two sheets}$$

Torque for Dipole

$$\vec{\tau} = \vec{r} \times \vec{F} = \vec{p} \times \vec{E}$$

Energy

$$U = -\vec{p} \cdot \vec{E}$$