

4 equations for electrostatics

Coulomb force

$$\vec{F}_c = k \frac{q_1 q_2}{r^2} \hat{r} \quad [\text{N}]$$

$$E = \frac{F}{q} \quad F = E q$$

$$\vec{E} = k \frac{q}{r^2} \hat{r} \quad \frac{[\text{N}]}{[\text{C}]} \quad \frac{[\text{V}]}{[\text{m}]}$$

electric field

electric Potential energy

$$U = k \frac{q_1 q_2}{r} \quad [\text{J}] = [\text{N}][\text{m}]$$

$$U = V q \quad V = \frac{U}{q}$$

$$V = k \frac{q}{r} \quad [\text{V}]$$

electric Potential (this is voltage)

$$U = F \cdot r \quad / \quad U = \int F dr$$

$$F = \frac{U}{r} \quad / \quad F = \frac{\partial U}{\partial r}$$

$$V = E \cdot r \quad / \quad V = \int E dr$$

$$E = \frac{V}{r} \quad / \quad E = \frac{\partial V}{\partial r}$$