

Potential Energy

$$\text{Point Charge } U = \frac{kqQ}{r}$$

V = electric potential

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

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

$$\Delta V = - \int \vec{E} \cdot d\vec{r}$$

Electron Volt

electron-volt : amount of kinetic energy gained by an electron when it accelerates through one volt of potential

$$\Delta KE = -\Delta U = -(q\Delta V) = -(-e)(1 \text{ V})$$

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

$$\Delta V = \frac{-\lambda}{2\pi\epsilon_0} \ln\left(\frac{r_f}{r_0}\right)$$

Equipotential Curves + Surfaces

- an equipotential is any curve or surface along which $\Delta V = 0$
- example: perpendicular to uniform \vec{E}

$$|\vec{E}| = \frac{-\Delta V}{\Delta r} = \frac{-dV}{dr}$$

$$\vec{E} = \frac{-dV}{dx}\hat{i} - \frac{dV}{dy}\hat{j}$$