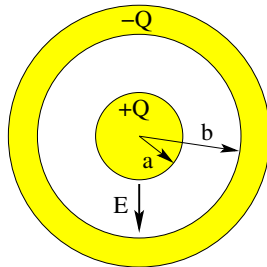




- Electric field: $E(r) = \frac{Q}{4\pi\epsilon_0} \frac{1}{r^2}$
- Voltage: $V = \frac{Q}{4\pi\epsilon_0} \frac{b-a}{ab} = \frac{Q}{4\pi\epsilon_0} \left[\frac{1}{a} - \frac{1}{b} \right]$
- Energy density: $u_E(r) = \frac{1}{2} \epsilon_0 E^2(r)$



- Energy stored in capacitor: $U = \int_a^b u_E(r) (4\pi r^2) dr$
- $\Rightarrow U = \int_a^b \frac{1}{2} \epsilon_0 \frac{Q^2}{(4\pi\epsilon_0)^2} \frac{1}{r^4} (4\pi r^2) dr$
- $\Rightarrow U = \frac{1}{2} \frac{Q^2}{4\pi\epsilon_0} \int_a^b \frac{1}{r^2} dr = \frac{1}{2} \frac{Q^2}{4\pi\epsilon_0} \left[\frac{1}{a} - \frac{1}{b} \right] = \frac{1}{2} QV$