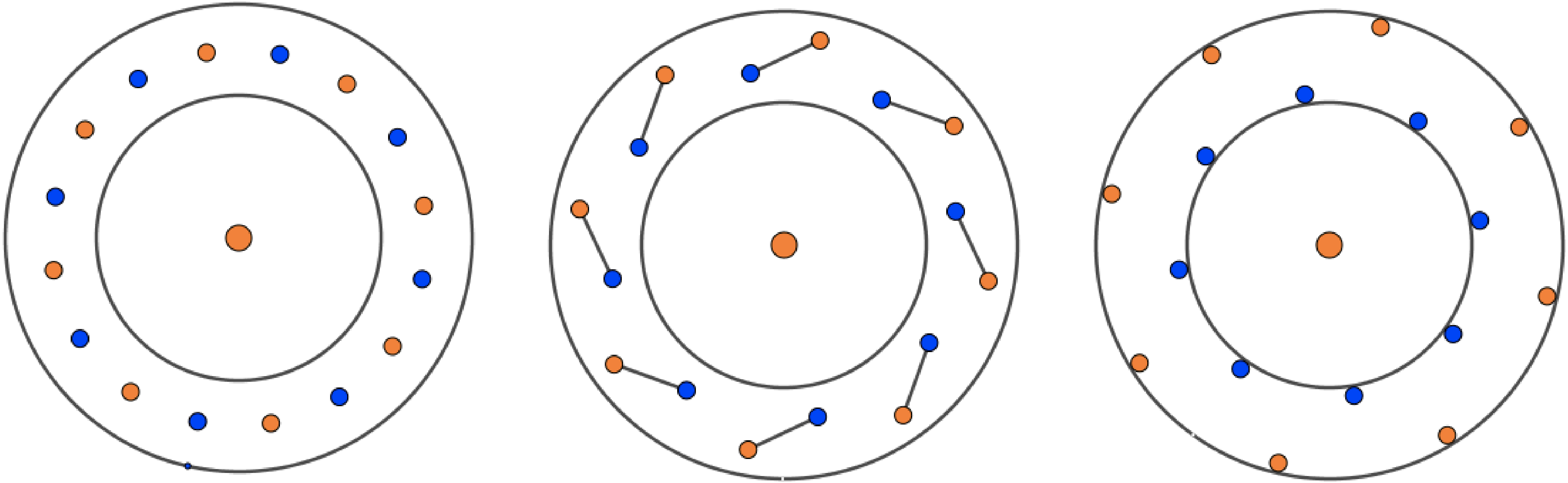
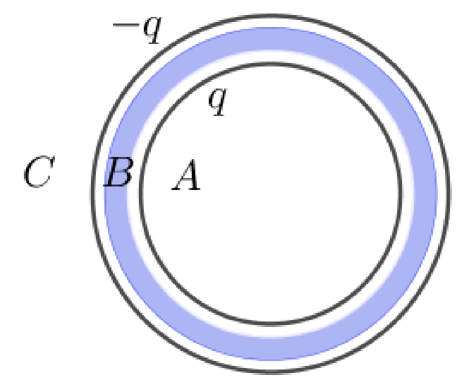


$\vec{E}_{(r)}$	*insulator*	*dielectric*	*conductor*
A	$\frac{q}{r^2}$	$\frac{q}{r^2}$	$\frac{q}{r^2}$
B	$\frac{q}{r^2}$	$\frac{1}{\epsilon_d}\frac{q}{r^2}$	0
C	$\frac{q}{r^2}$	$\frac{q}{r^2}$	$\frac{q}{r^2}$

$$C_{new} = \epsilon \cdot C_{old}$$



		$\vec{E}_{(r)}\hat{r}$	$\phi_{(r)}$	
$0 < r < R_{AB}$	A	0	$\frac{1}{\epsilon} C_A$	$\boldsymbol{q \frac{R_{BC} - R_{AB}}{R_{AB} \cdot R_{BC}} = V}$
$R_{AB} < r < R_{BC}$	B	$\frac{1}{\epsilon} \frac{q}{r^2}$	$\frac{1}{\epsilon} \frac{q}{r} + C_B$	$\boldsymbol{\frac{q}{r} - \frac{q}{R_{BC}}}$
$R_{BC} < r < \infty$	C	0	C_C	$\mathbf{0}$

$$C_A = \frac{q}{R_{AB}} + C_B \Rightarrow C_A = q(\frac{1}{R_{AB}} - \frac{1}{R_{BC}})$$

$$\frac{q}{R_{BC}} + C_B = C_C \Rightarrow C_B = -\frac{q}{R_{BC}}$$

$$C_C = 0$$

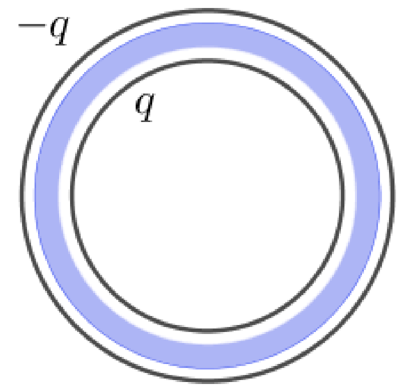
$$\epsilon \quad \boldsymbol{C = \frac{q}{V}}$$

$$\frac{q}{v} = \frac{R_{AB} \cdot R_{BC}}{R_{BC} - R_{AB}} = \frac{R \cdot (R + \Delta)}{\Delta} \Rightarrow C_{peel} = \frac{R^2}{\Delta}$$

$$U = CV^2 = \frac{1}{C}Q^2$$

$$C_{new} = \epsilon \cdot C_{old}$$

$$U_{new} = \epsilon \cdot CV^2 = \frac{1}{\epsilon} \cdot \frac{1}{C}Q^2$$

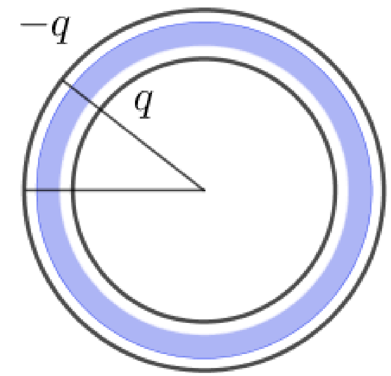


$\sigma = \Delta \vec{E}$ $\qquad$ $\sigma R^2 = q$

$$\sigma_{AB} = \frac{1}{\epsilon}\frac{q}{R^2} - 0$$

$$\sigma_{AB_-} = \frac{q}{R^2} - 0 \quad \Rightarrow \quad \boldsymbol{q_{AB_-} = q_{free}}$$

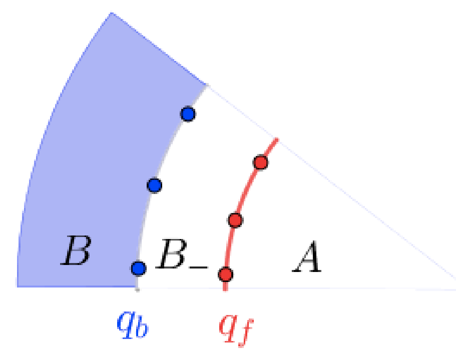
$$\sigma_{B_-B} = \frac{1}{\epsilon}\frac{q}{R^2} - \frac{q}{R^2} \Rightarrow \quad \boldsymbol{q_{BB_-} = q(\frac{1}{\epsilon} - 1)_{bound}}$$

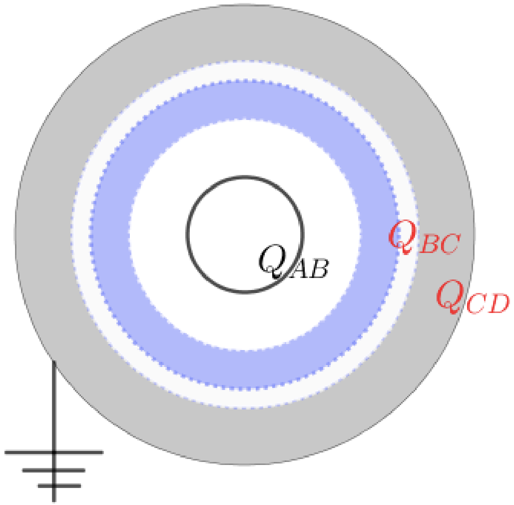


$$\vec{E}_A = 0$$

$$\vec{E}_{B_-} = \frac{q}{r^2}$$

$$\vec{E}_B = \frac{1}{\epsilon}\frac{q}{r^2}$$





$$\sigma = \Delta \vec{E}$$

$$\rho_{(r)} = \nabla \cdot \vec{E} = \frac{1}{r^2}\frac{d(r^2 \cdot \vec{E})}{dr}$$

B $\quad \frac{Q_{AB}}{r^2}$

$$\sigma_{Bd} = \frac{Q_{AB}}{R_{Bd}^2}(\frac{1}{\epsilon_{(r)}} - 1) \quad \Rightarrow Q_{Bd} = Q_{AB}(\frac{1}{\epsilon_{(r)}} - 1)$$

d $\quad \frac{1}{\epsilon_{(r)}}\frac{Q_{AB}}{r^2}$

$$\rho_{(r)} = \nabla \cdot \vec{E} = \frac{1}{r^2}\frac{d(r^2 \cdot \frac{1}{\epsilon_{(r)}}\frac{Q_{AB}}{r^2})}{dr} \quad \Rightarrow \rho_{(r)} = \frac{Q_{AB}}{r^2}\frac{d(\frac{1}{\epsilon_{(r)}})}{dr}$$

$$\sigma_{dB} = \frac{Q_{AB}}{R_{dB}^2}(1 - \frac{1}{\epsilon_{(r)}}) \quad \Rightarrow Q_{dB} = Q_{AB}(1 - \frac{1}{\epsilon_{(r)}})$$

B $\quad \frac{Q_{AB}}{r^2}$

$$Q_{BC} = -Q_{AB}$$

$$Q_{CD} = 0$$

$$\Delta_g = Q_{BC} + Q_{CD}$$

$$U = Q_{AB}(\frac{Q_{AB}}{R_{AB}} - \frac{Q_{AB}}{R_{BC}})$$