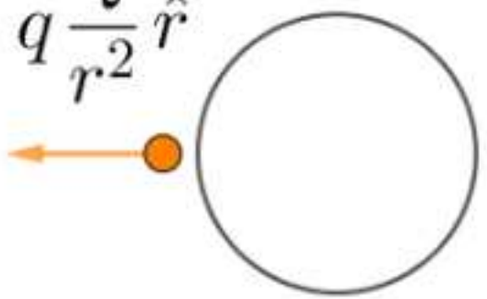
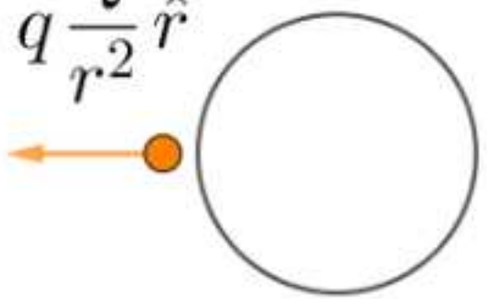
$$\vec{F}_Q = q\frac{Q}{r^2}\hat{r}$$



$$\vec{F}_Q = q\frac{Q}{r^2}\hat{r}$$

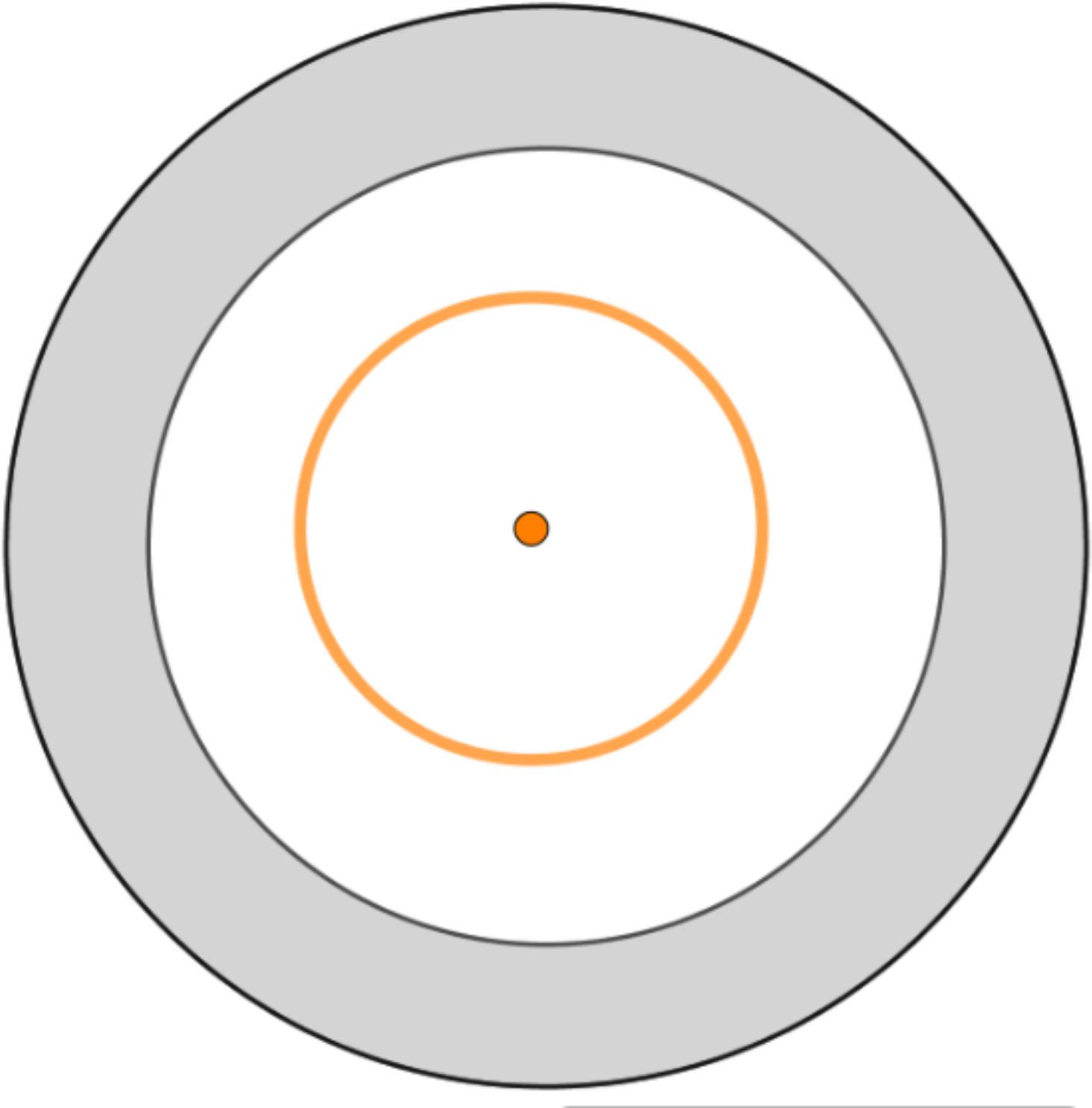


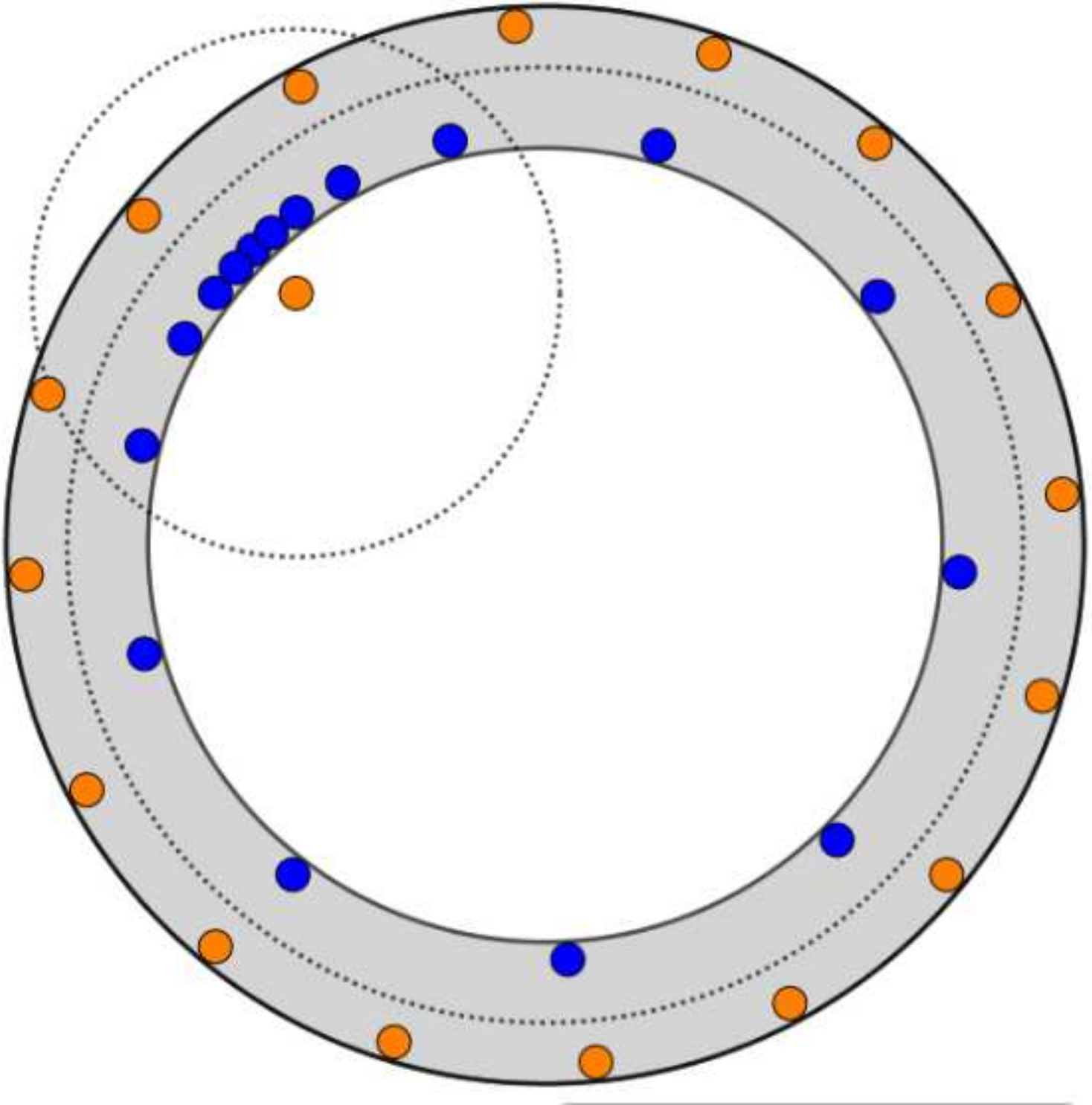
$$\vec{F}_Q = q\vec{E}_Q$$

$$\vec{E}_Q = \frac{Q}{r^2}\hat{r}$$

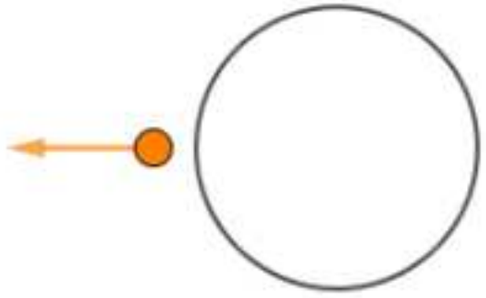
$$\vec{F}_g = mg\hat{y}$$

$$\vec{E}_g = g\hat{y}$$



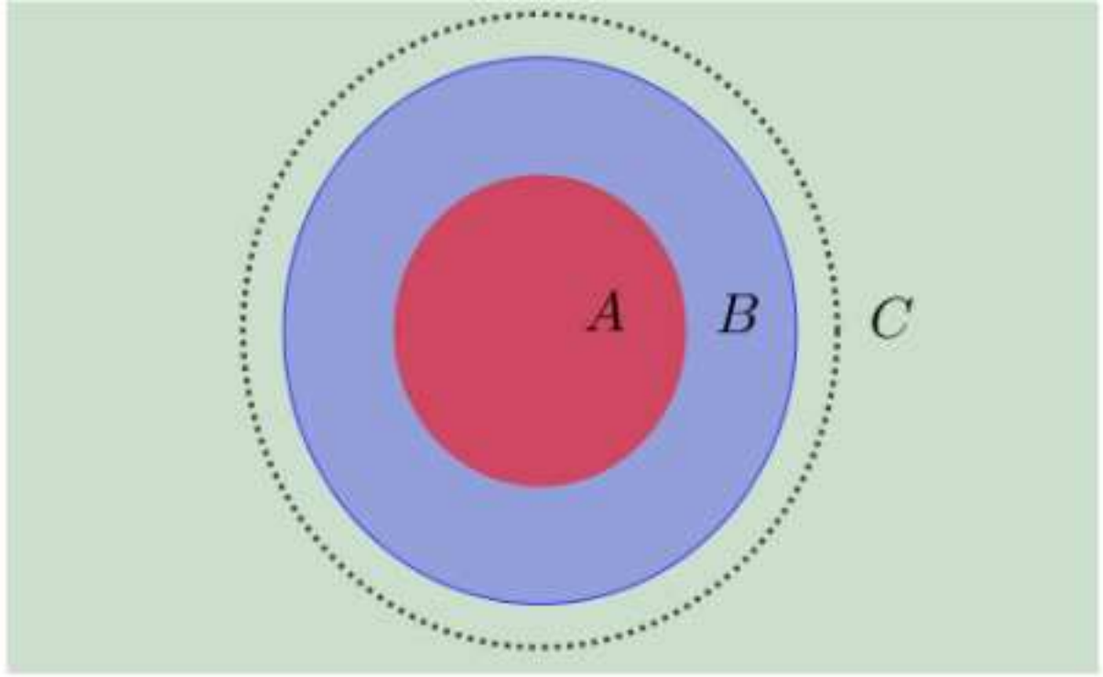


$$\vec{E}_Q = \frac{Q}{r^2}\hat{r}$$



$$U_{\vec{E}} = \int_0^\infty E_{(r)}^2 dv = \int_0^R 0^2 \cdot r^2 \cdot dr + \int_R^\infty (\frac{Q}{r^2})^2 \cdot r^2 \cdot dr = \int_R^\infty \frac{Q^2}{r^2} \cdot dr$$

$$= Q^2 \int_R^\infty \frac{1}{r^2} \cdot dr = Q^2 \cdot \Big|_R^\infty (-\frac{1}{r}) = Q^2 \cdot \Big|_\infty^R (\frac{1}{r}) = Q^2 \cdot (\frac{1}{R} - \frac{1}{\infty}) = \boldsymbol{\frac{Q^2}{R}}$$



	$E_{(r)}$
A	0
B	$\frac{Q_{AB}}{r^2}$
C	$\frac{Q_{AB}+Q_{BC}}{r^2}$