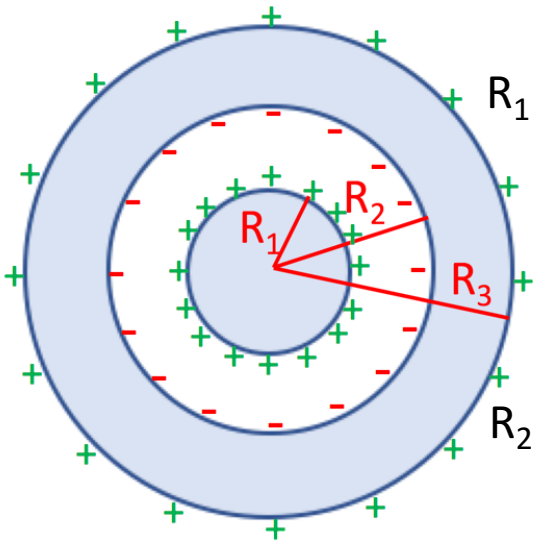
sfera carica in guscio sferico neutro

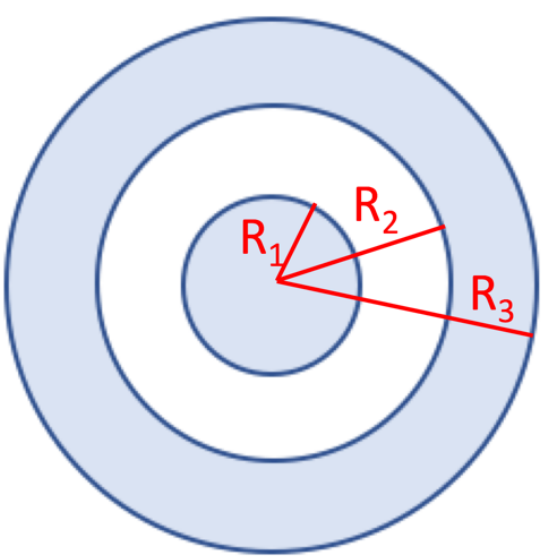


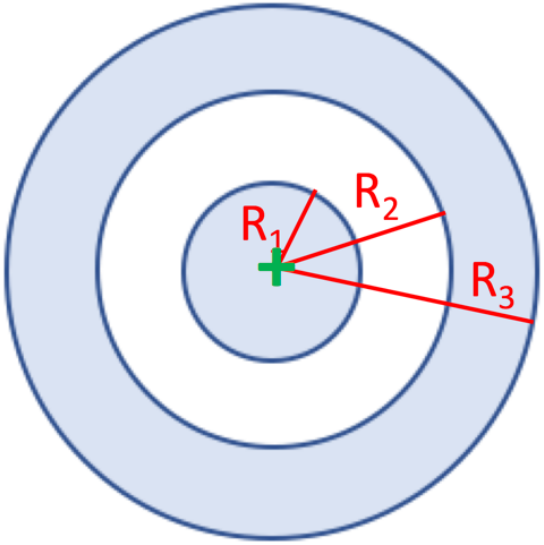
cariche nei conduttori

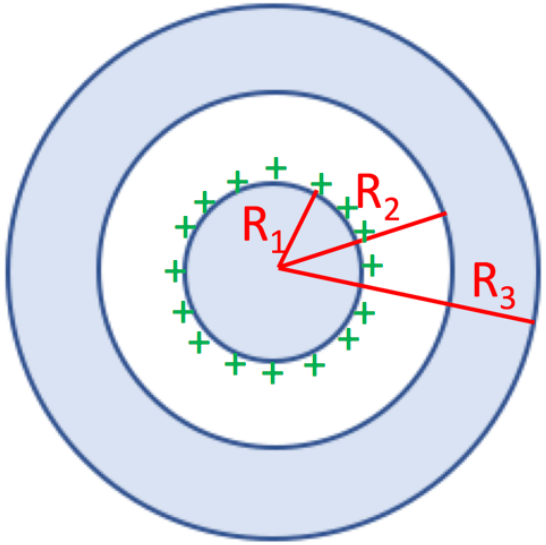
teorema di Gauss

$R_1 > r > 0$	$\rho = 0$	$E = 0$	$V = \frac{Q}{4\pi\varepsilon_0 R_3} + \frac{Q}{4\pi\varepsilon_0}\left(\frac{1}{R_1} - \frac{1}{R_2}\right)$
$r = R_1$	$\sigma = +\frac{Q}{4\pi {R_1}^2}$		$V = \frac{Q}{4\pi\varepsilon_0 R_3} + \frac{Q}{4\pi\varepsilon_0}\left(\frac{1}{R_1} - \frac{1}{R_2}\right)$
$R_2 > r > R_1$	$\rho = 0$	$E = +\frac{Q}{4\pi\varepsilon_0 r^2}$	$V = \frac{Q}{4\pi\varepsilon_0 R_3} + \frac{Q}{4\pi\varepsilon_0}\left(\frac{1}{r} - \frac{1}{R_2}\right)$
$r = R_2$	$\sigma = -\frac{Q}{4\pi {R_2}^2}$		$V = +\frac{Q}{4\pi\varepsilon_0 R_3}$
$R_3 > r > R_2$	$\rho = 0$	$E = 0$	$V = +\frac{Q}{4\pi\varepsilon_0 R_3}$
$r = R_3$	$\sigma = +\frac{Q}{4\pi {R_3}^2}$		$V = +\frac{Q}{4\pi\varepsilon_0 R_3}$
$r > R_3$	$\rho = 0$	$E = +\frac{Q}{4\pi\varepsilon_0 r^2}$	$V = +\frac{Q}{4\pi\varepsilon_0 r}$

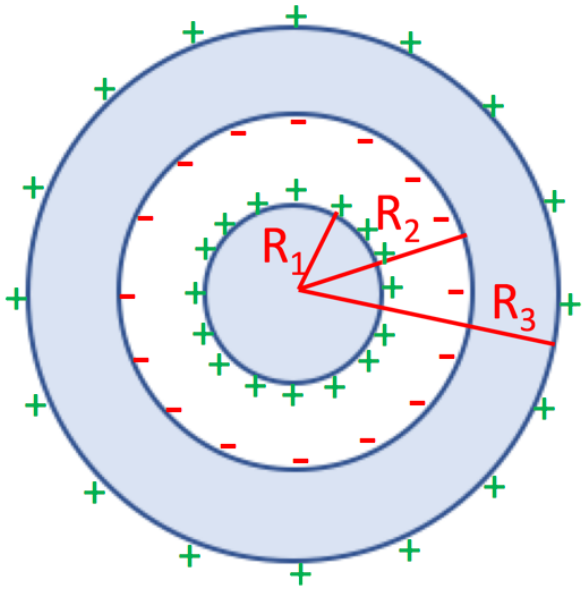
$V(\infty) = 0$

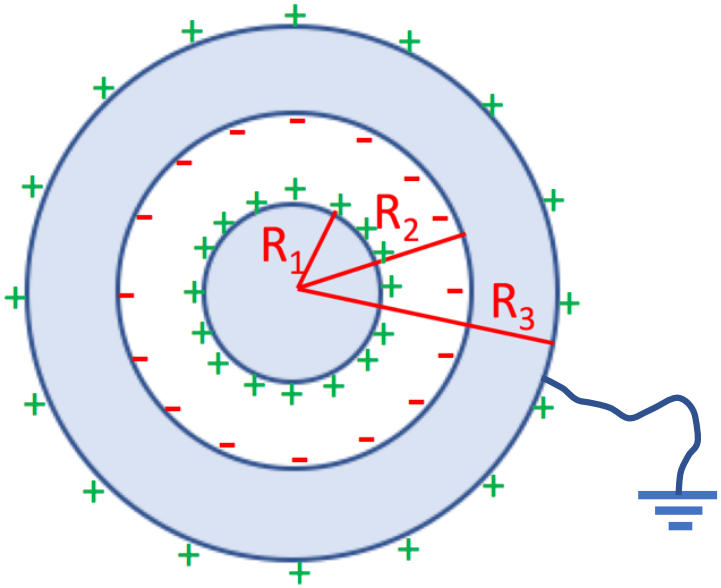


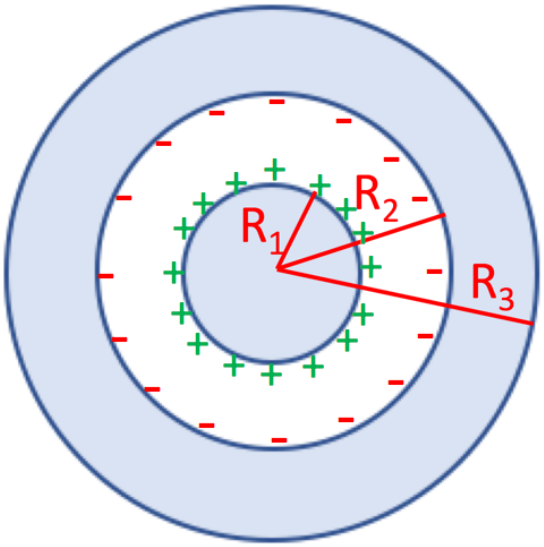




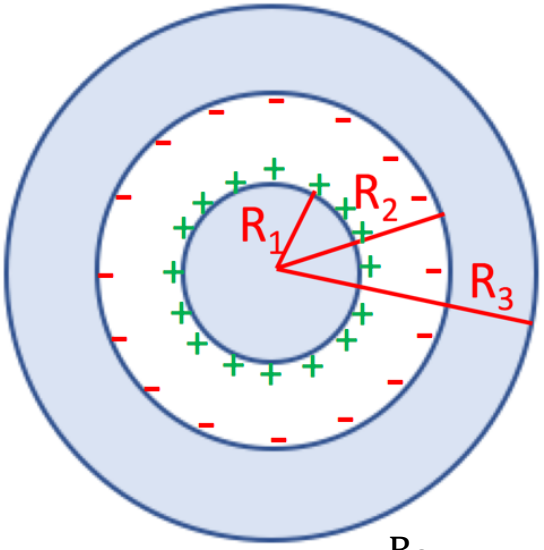
come ottenere un condensatore sferico







CONDENSATORE SFERICO



l'unica regione dello spazio in cui c'è campo elettrostatico è fra la superficie della sfera (raggio R_1) e la superficie interna del guscio (raggio R_2): $\vec{E} = \frac{1}{4\pi\varepsilon_0 r^2}\hat{r}$

$$V_- = V_+ + \int_{R_1}^{R_2} -\frac{Q}{4\pi\varepsilon_0 r^2}\,dr = V_+ + \frac{Q}{4\pi\varepsilon_0}\left(\frac{1}{R_2} - \frac{1}{R_1}\right) \qquad V_+ - V_- = +\frac{Q}{4\pi\varepsilon_0}\left(\frac{1}{R_1} - \frac{1}{R_2}\right)$$

oppure

$$V_+ = V_- + \int_{R_2}^{R_1} -\frac{Q}{4\pi\varepsilon_0 r^2}\,dr = V_- + \frac{Q}{4\pi\varepsilon_0}\left(\frac{1}{R_1} - \frac{1}{R_2}\right) \qquad V_+ - V_- = +\frac{Q}{4\pi\varepsilon_0}\left(\frac{1}{R_1} - \frac{1}{R_2}\right)$$

$$C = \frac{Q}{V_+ - V_-} = \frac{4\pi\varepsilon_0}{\frac{1}{R_1} - \frac{1}{R_2}} = 4\pi\varepsilon_0 \frac{R_1 R_2}{R_2 - R_1}$$

per ottenere un'elevata capacità occorre minimizzare la separazione fra le due distribuzioni di carica