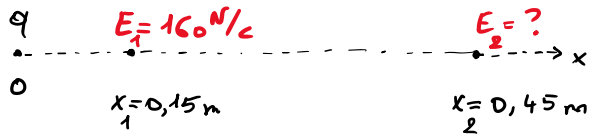
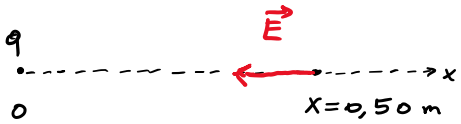
8.19



q, Charge ponctuelle $\Rightarrow$ $E_1 = k\dfrac{|q|}{x_1^2} \Rightarrow k|q| = E_1 \cdot x_1^2$

et $E_2 = k\dfrac{|q|}{x_2^2} = E_1\dfrac{x_1^2}{x_2^2} = 160 \cdot \left(\dfrac{0{,}15}{0{,}45}\right)^2 = \dfrac{160}{9} \simeq 18\ N/C$

8.20

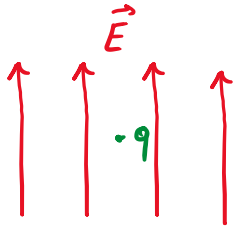


$E = k\dfrac{|q|}{x^2} \Rightarrow |q| = \dfrac{E \cdot x^2}{k} = \dfrac{9 \cdot 10^5 \cdot 1/4}{9 \cdot 10^9}$ ($=0{,}5^2$) $= 2{,}5 \cdot 10^{-5}\ C$

$q = -2{,}5 \cdot 10^{-5}\ C$

"$\vec{E}$ dirigé vers la charge" $\equiv q < 0$

8.21



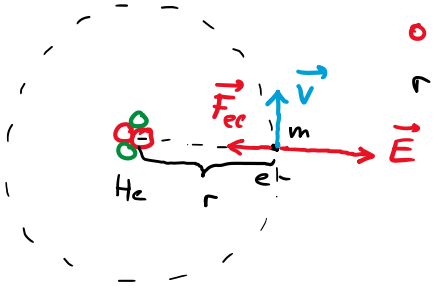
Calcul de l'intensité de $\vec{F}_{ee}$:

$F_{ee} = qE = 3 \cdot 10^{-5} \cdot 15'000 = 0{,}45\ N$

(a). Si $q > 0$: $\vec{F}_{ee} = q\vec{E}$ vers le haut

(b). Si $q < 0$: $\vec{F}_{ee} = q\vec{E}$ vers le bas !

8.22 $m_{électron} = 9{,}1 \cdot 10^{-31}\ kg$



○ = neutron

○ = proton

$r = 2{,}65 \cdot 10^{-11}\ m$

(a). Champ $\vec{E}$ radial sortant, le noyau est chargé positivement

$Q_{He} = 2e = 2 \cdot 1{,}6 \cdot 10^{-19}\ C$

$\Rightarrow E = k\dfrac{2e}{r^2} = 9 \cdot 10^9 \cdot \dfrac{2 \cdot 1{,}6 \cdot 10^{-19}}{(2{,}65 \cdot 10^{-11})^2} \simeq 4{,}1 \cdot 10^{12}\ \dfrac{N}{C}$

(b). $\vec{F}_{ee}$ radiale, vers le noyau

$F_{ee} = k\dfrac{2e^2}{r^2} = \dfrac{Ee}{r} \simeq 6{,}56 \cdot 10^{-7}\ N$

(c). MCU : $F_{ee} = m\dfrac{v^2}{r}$

$\Rightarrow v^2 = \dfrac{r}{m}F_{ee} \Rightarrow v = \sqrt{\dfrac{r}{m}F_{ee}} \simeq 4{,}37 \cdot 10^6\ m/s$