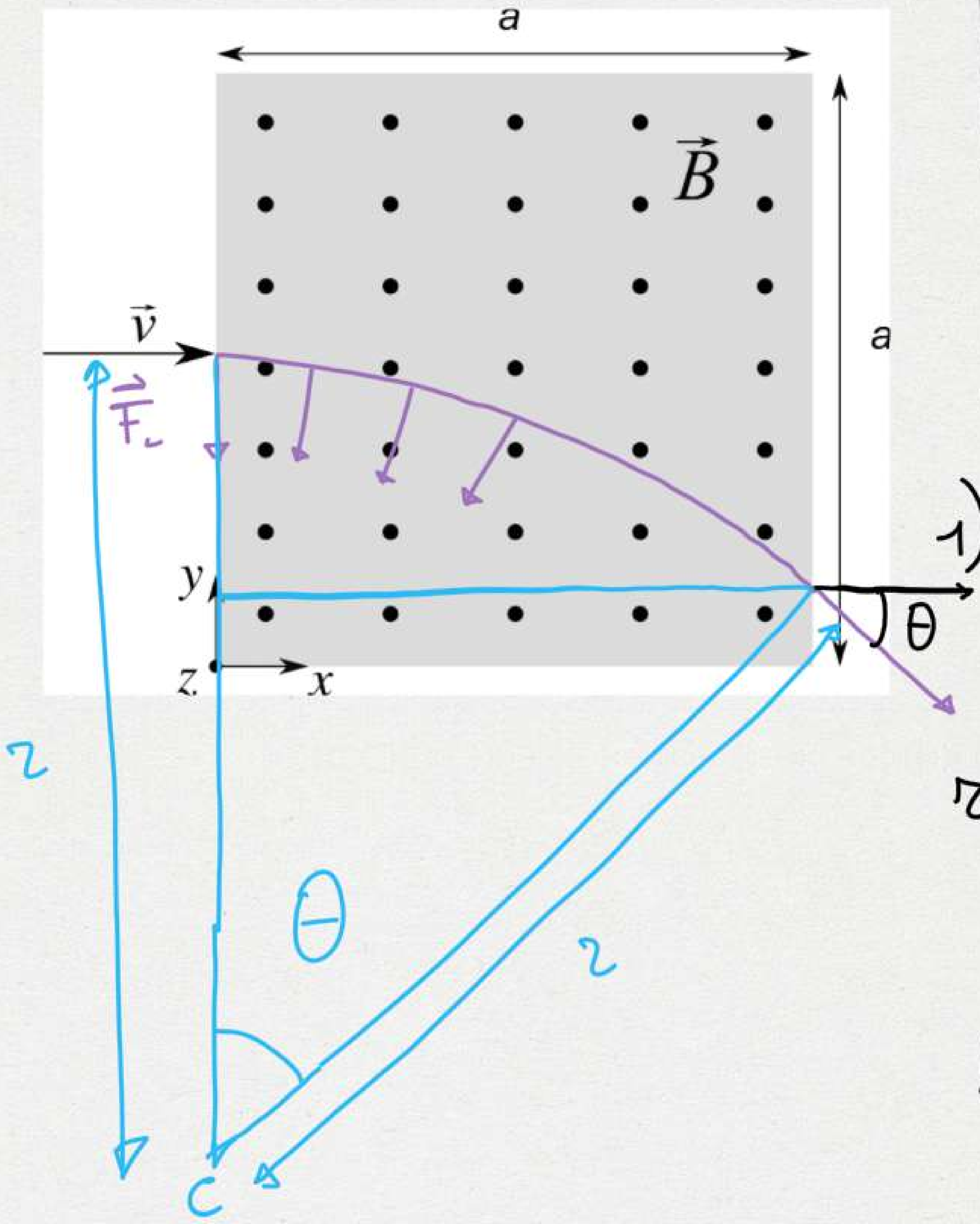


$$\boxed{r = \frac{mv}{qB} = \frac{mv}{|q|\,B}} \quad , \quad \boxed{\vec{F}_L = q\,\vec{v} \times \vec{B}}$$

$$\omega = \frac{v}{r} = \frac{qB}{m} \quad , \quad T = \frac{2\pi}{\omega} \quad , \quad t(\theta) = \frac{\theta}{\omega}$$

$q > 0$

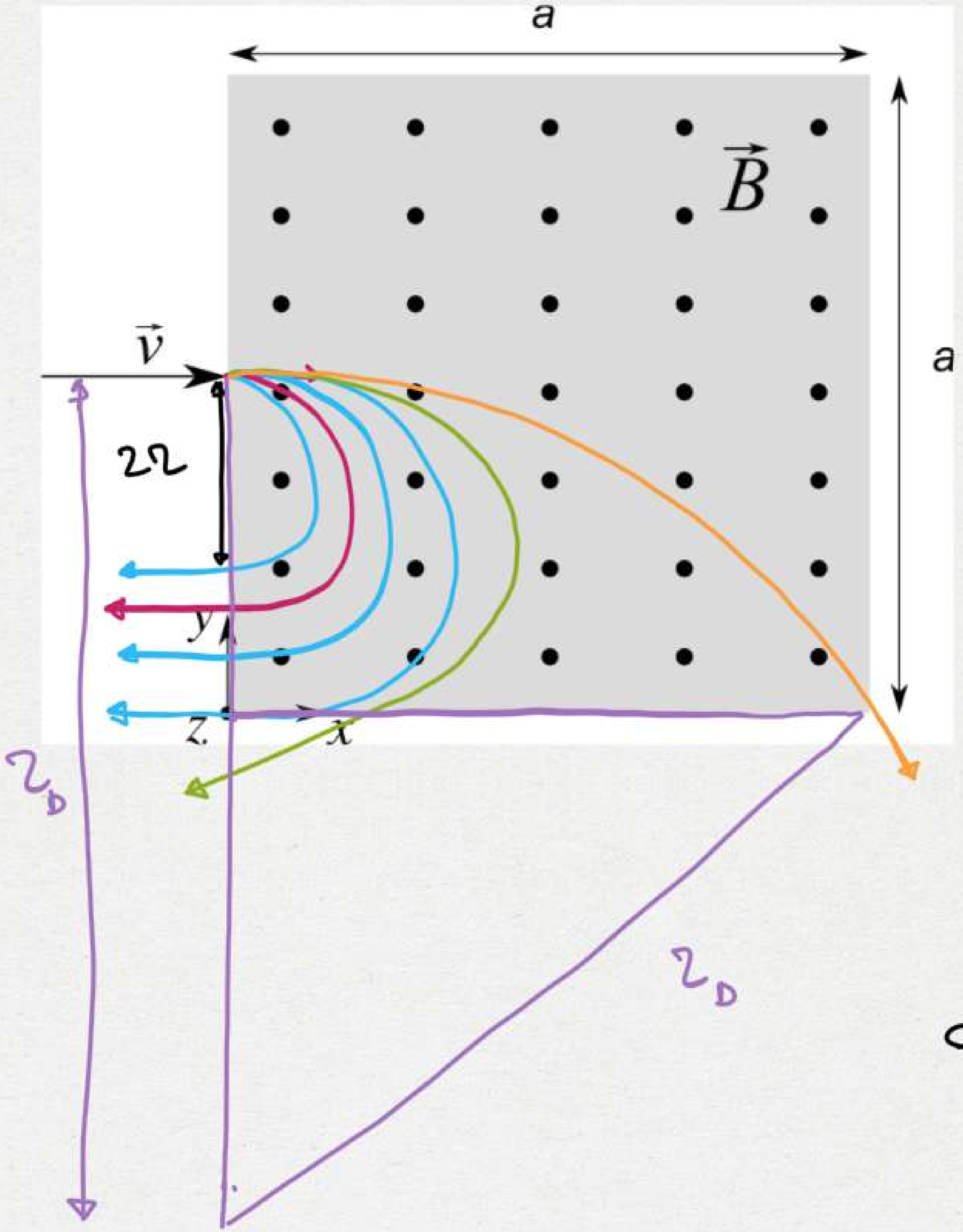
1) QUAL È θ CON CUI q ESCE DALLA REGIONE CON IL CAMPO SE $B = \frac{mv}{10\,qa}$

$$r \sin\theta = a \implies \sin\theta = \frac{a}{r} = \frac{a\,qB}{mv} = \frac{1}{10}$$

$$\theta = \arcsin 0.1 \simeq 0.1$$

$$t = \frac{\theta}{\omega} = \frac{\theta\, m}{qB}$$ tempo impiegato

2) PER QUALI VALORI DI $\vec{B}$ LA PARTICELLA ESCE DAL LATO DA CUI È ENTRATA?



$$r = \frac{mv}{qB}$$

$$2r_L = \frac{a}{2} \Rightarrow r_L = \frac{a}{4} = \frac{mv}{qB_L} \Rightarrow$$

$$B_L = 4\frac{mv}{qa}, \Rightarrow \text{PER } B > B_L = 4\frac{mv}{qa}$$

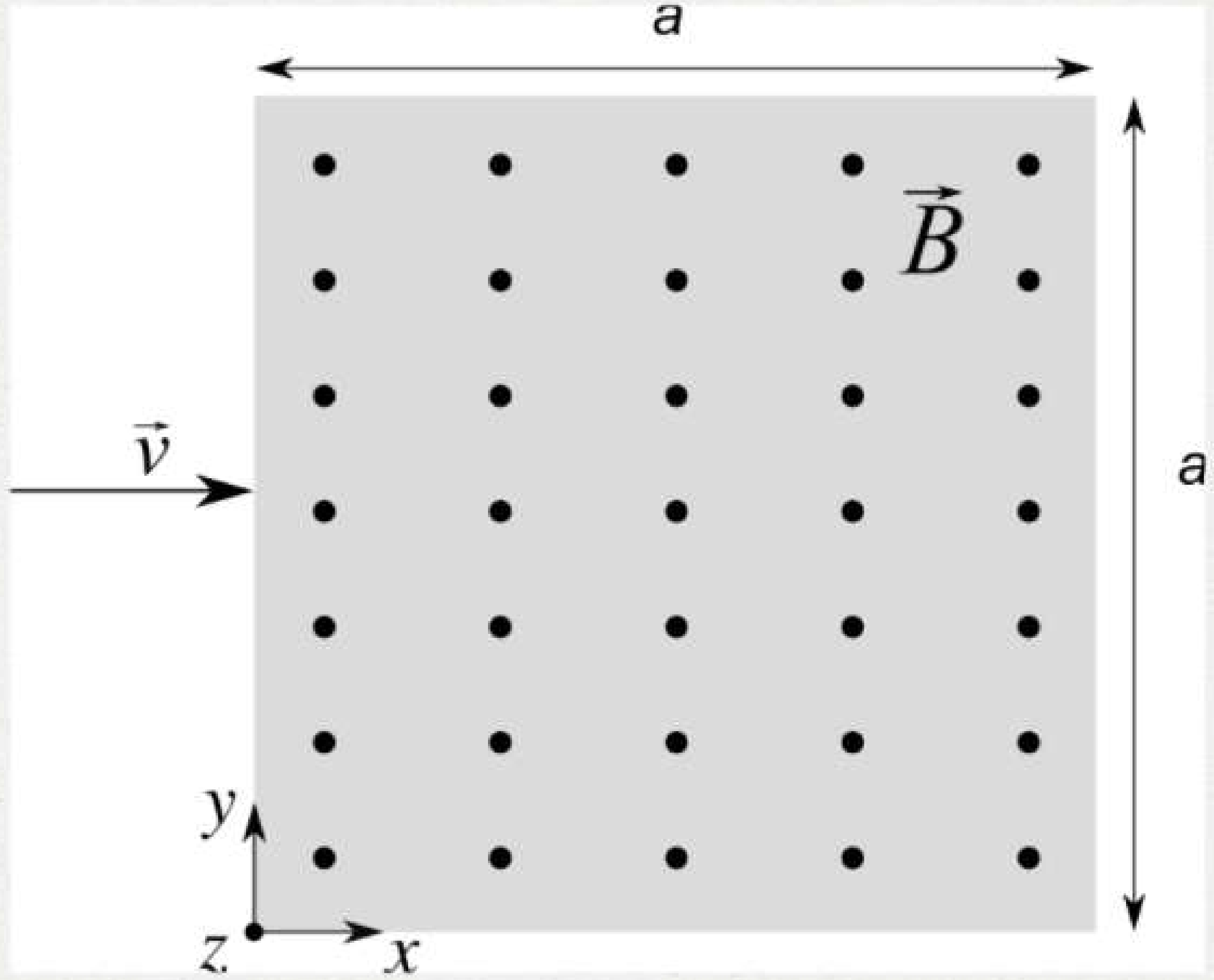
3) PER QUALI B ESCE DAL LATO A DESTRA

$$a^2 + \left(r_D - \frac{a}{2}\right)^2 = r_D^2 \Rightarrow$$

$$a^2 + \cancel{r_D^2} + \frac{a^2}{4} - a r_D = \cancel{r_D^2} \Rightarrow$$

$$\cancel{a} r_D = \frac{5}{4} a^{\cancel{2}} \Rightarrow r_D = \frac{5}{4} a = \frac{mv}{qB_D} \Rightarrow B_D = \frac{4}{5}\frac{mv}{qa}$$

$$\Rightarrow \text{PER } B_L > B > B_D$$

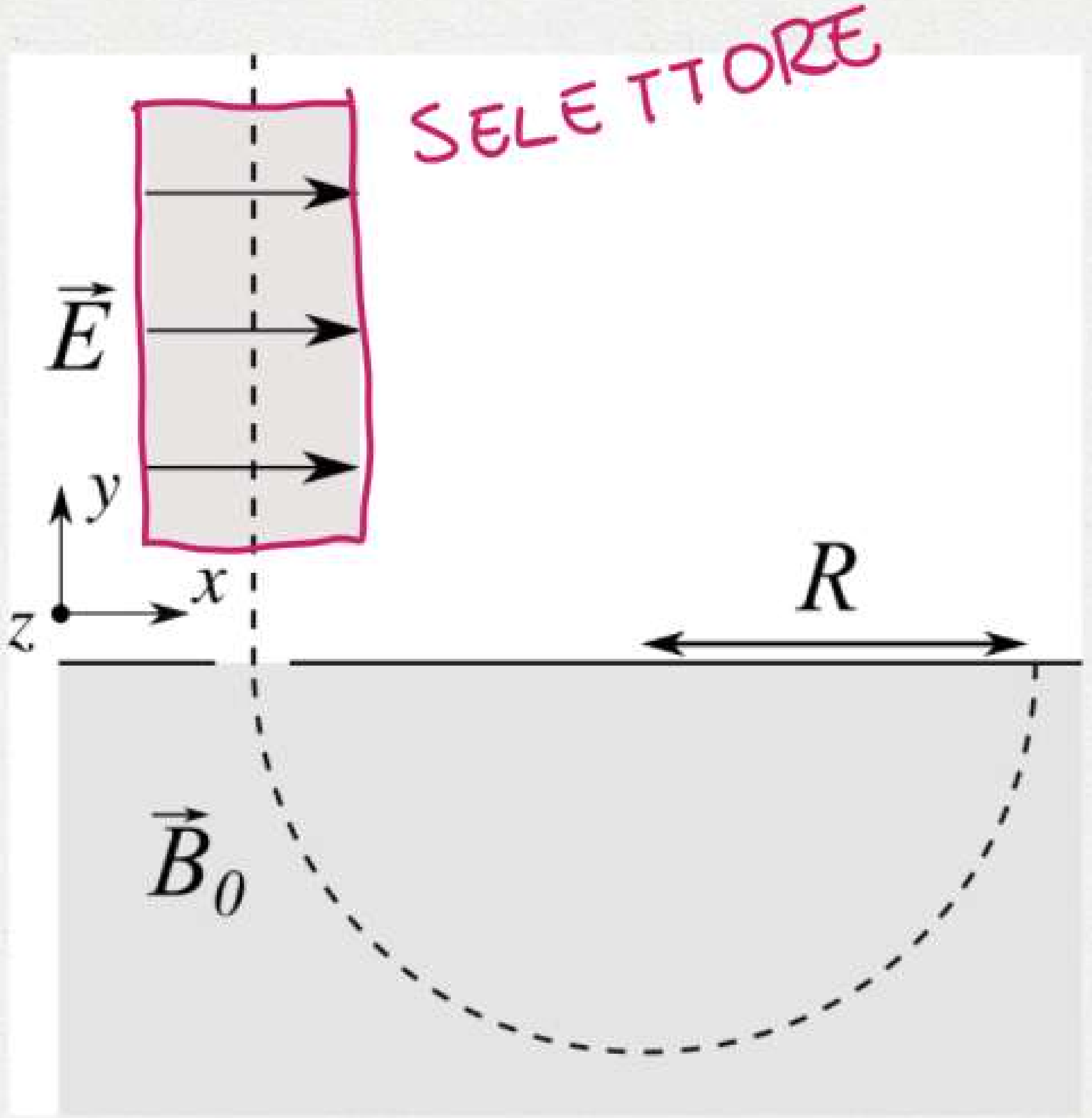


4) PER QUALI B ESCE DAL LATO DI FRONTE A QUELLO DA CUI ENTRA?

$B < B_D$

5) DISCUTERE COSA SUCCEDE SE $\vec{v} = (v_x, 0, v_z)$

6) COSA CAMBIA SE $q < 0$?



$E = 2.5\ \frac{kV}{m}$, $B_0 = 0.035\,T$

$q = 1.6 \cdot 10^{-19}\ C$, $m = 2.18 \cdot 10^{-26}\ Kg$, $R = 0.28\ m$

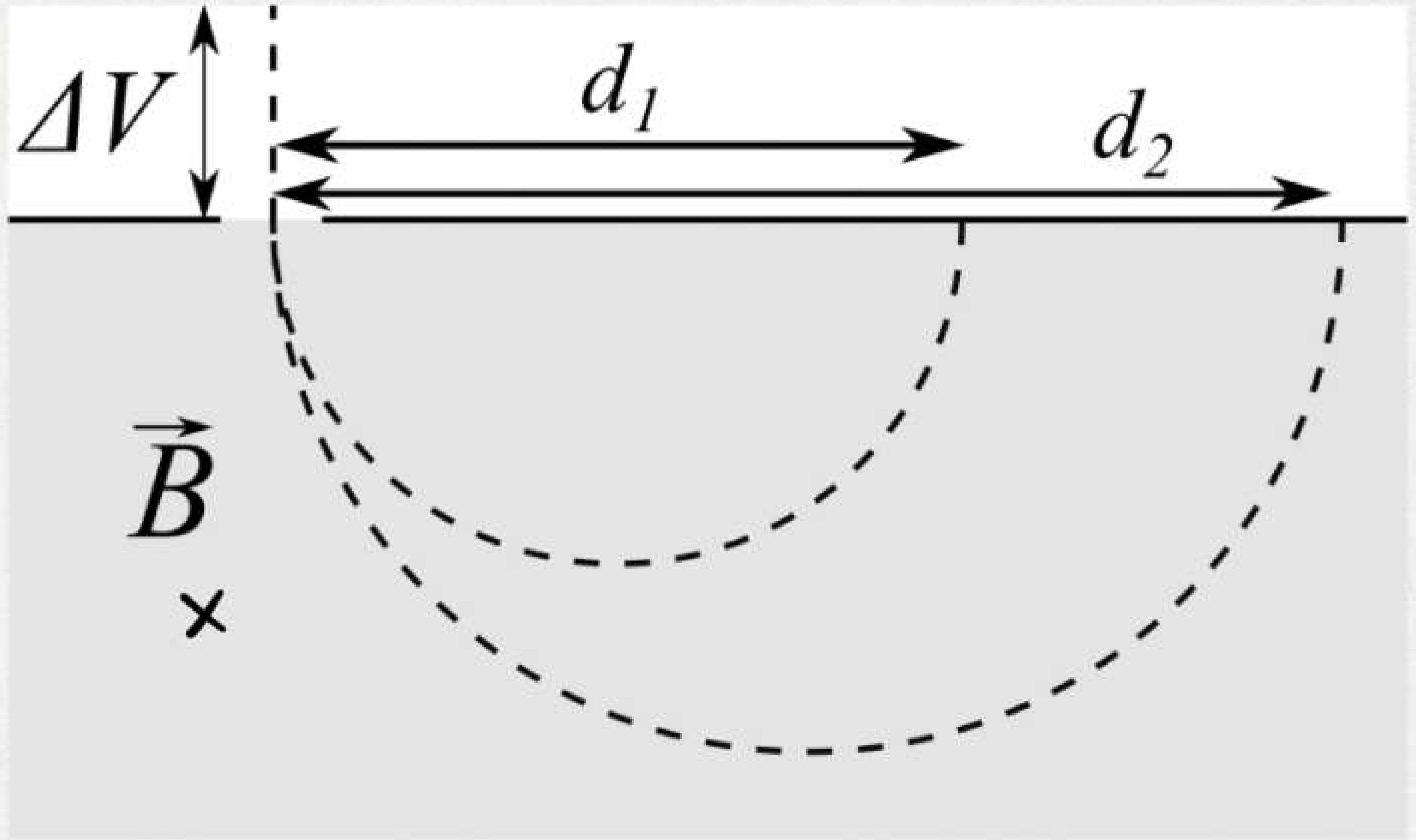
$\boxed{q\vec{E} + q\vec{v} \times \vec{B} = 0}$, $\boxed{r = \frac{mv}{qB}}$

$\vec{B}$ nel selettore ?

MODULO, DIREZIONE, VERSO

$$\cancel{q}E = \cancel{q}vB \Rightarrow B = \frac{E}{v}$$

$$R = \frac{mv}{qB_0} \Rightarrow v = \frac{qB_0R}{m} \Rightarrow B = \frac{Em}{qB_0R}$$



$q = 1.6 \cdot 10^{-19}\ C$, $\Delta V = 23V$

$d_1 = 280\ mm$, $d_2 = 392\ mm$

$m_1 = 3.8 \cdot 10^{-26}\ Kg$

1) DETERMINARE DIREZIONE E VERSO DI $\vec{B}$

2) CALCOLARE m_2 E v_2

$r = \frac{mv}{qB}$, $R_1 = \frac{m_1 v_1}{qB}$, $R_2 = \frac{m_2 v_2}{qB}$

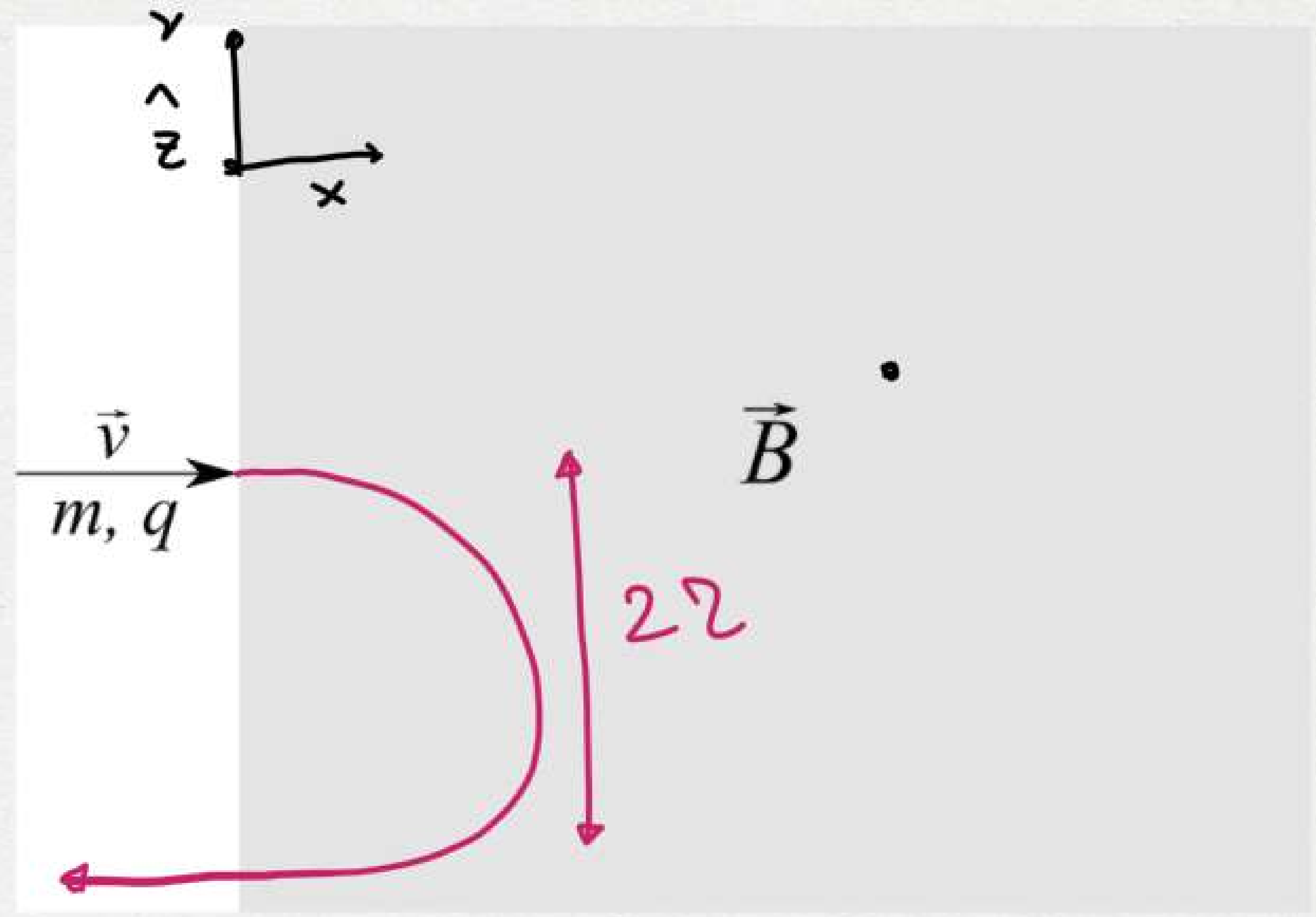
$$U_K = q\Delta V = \frac{1}{2} m_1 v_1^2 = \frac{1}{2} m_2 v_2^2$$

$$v_1 = \sqrt{\frac{2q\Delta V}{m_1}}$$

$d_1 = 2R_1$

$d_2 = 2R_2$

$$\begin{cases} qB = \boxed{\frac{m_1 v_1}{R_1} = \frac{m_2 v_2}{R_2}} \\ \frac{1}{2} m_1 v_1^2 = \frac{1}{2} m_2 v_2^2 \end{cases} \Rightarrow \begin{aligned} m_2 &= m_1 \left(\frac{R_2}{R_1}\right)^2 \\ v_2 &= v_1 \frac{R_1}{R_2} \end{aligned}$$



$q = 50\,mC$, $m = 20\,g$, $B = 0{,}25\,T$

$v = 8\ m/s$

1) calcolare la distanza a cui la particella esce dalla regione col campo

2) quanto tempo impiega?

3) che $\vec{E}$ bisogna aggiungere per far sì che la particella non venga deflessa?

4) a che tempo bisogna spegnere $\vec{B}$ per avere $\theta = 30°$ come angolo di uscita

1) $2r = \frac{2mv}{qB} \approx 26\ m$

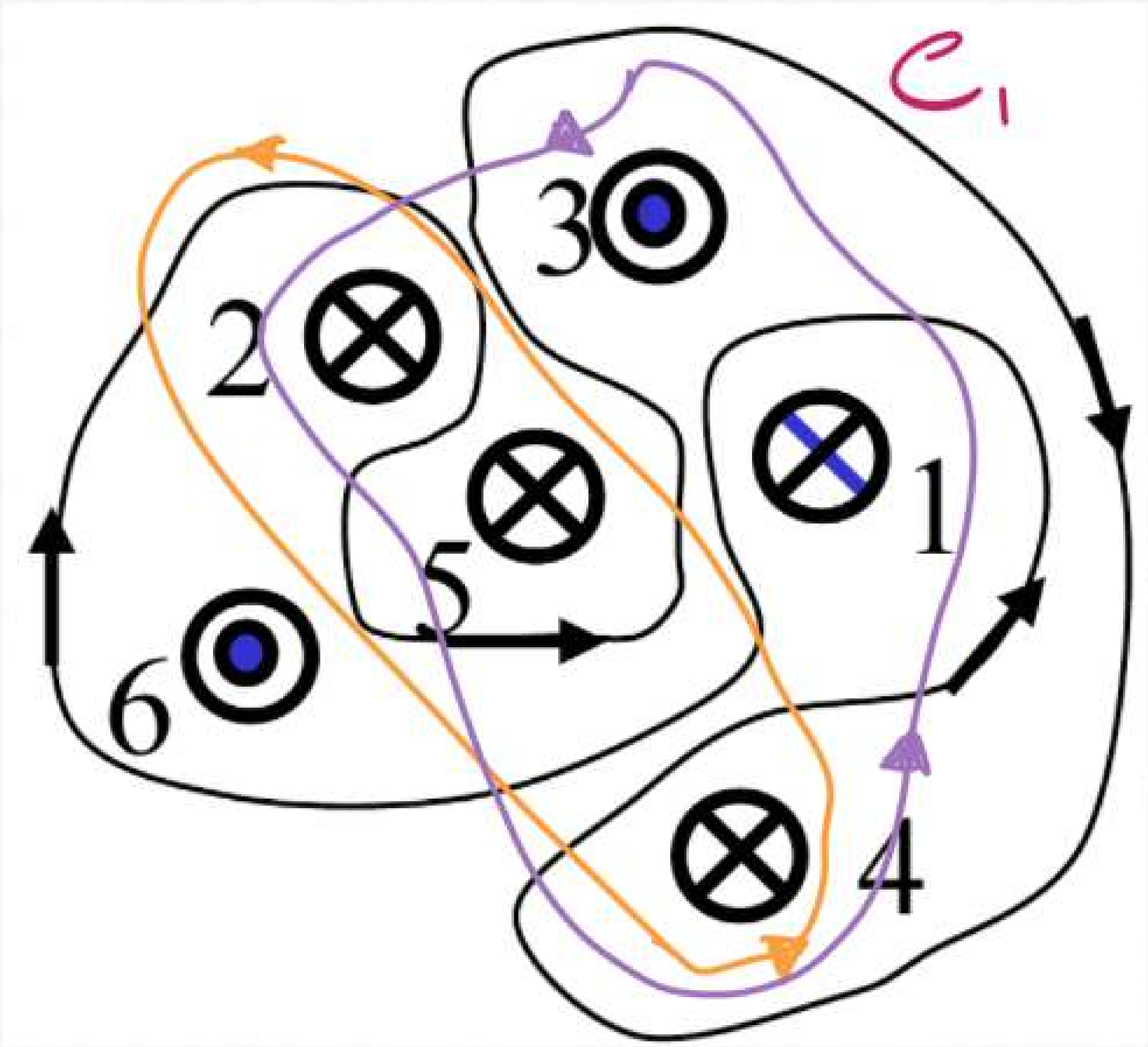
2) $t = \frac{T}{2} = \frac{\theta}{\omega} = \frac{\pi}{\omega} = \frac{\pi m}{qB}$

3) $q\vec{E} + q\vec{v} \times \vec{B} = 0$

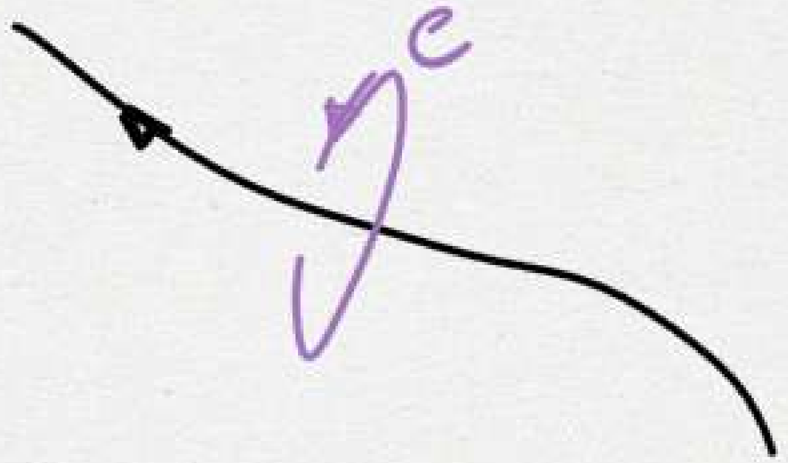
4) $t = \frac{\theta}{\omega}$, $\omega = \frac{\theta}{t} \leftrightarrow v = \frac{d}{t}$

$\downarrow$

$t = \frac{\pi}{6}\frac{1}{\omega} = \frac{\pi m}{6qB} = 0.84\ s$



$$\boxed{\oint_C \vec{B}\cdot d\vec{s} = \mu_0 \sum_k i_k}$$



i

1) $\oint_{C_1} \vec{B}\cdot d\vec{s} = ?$

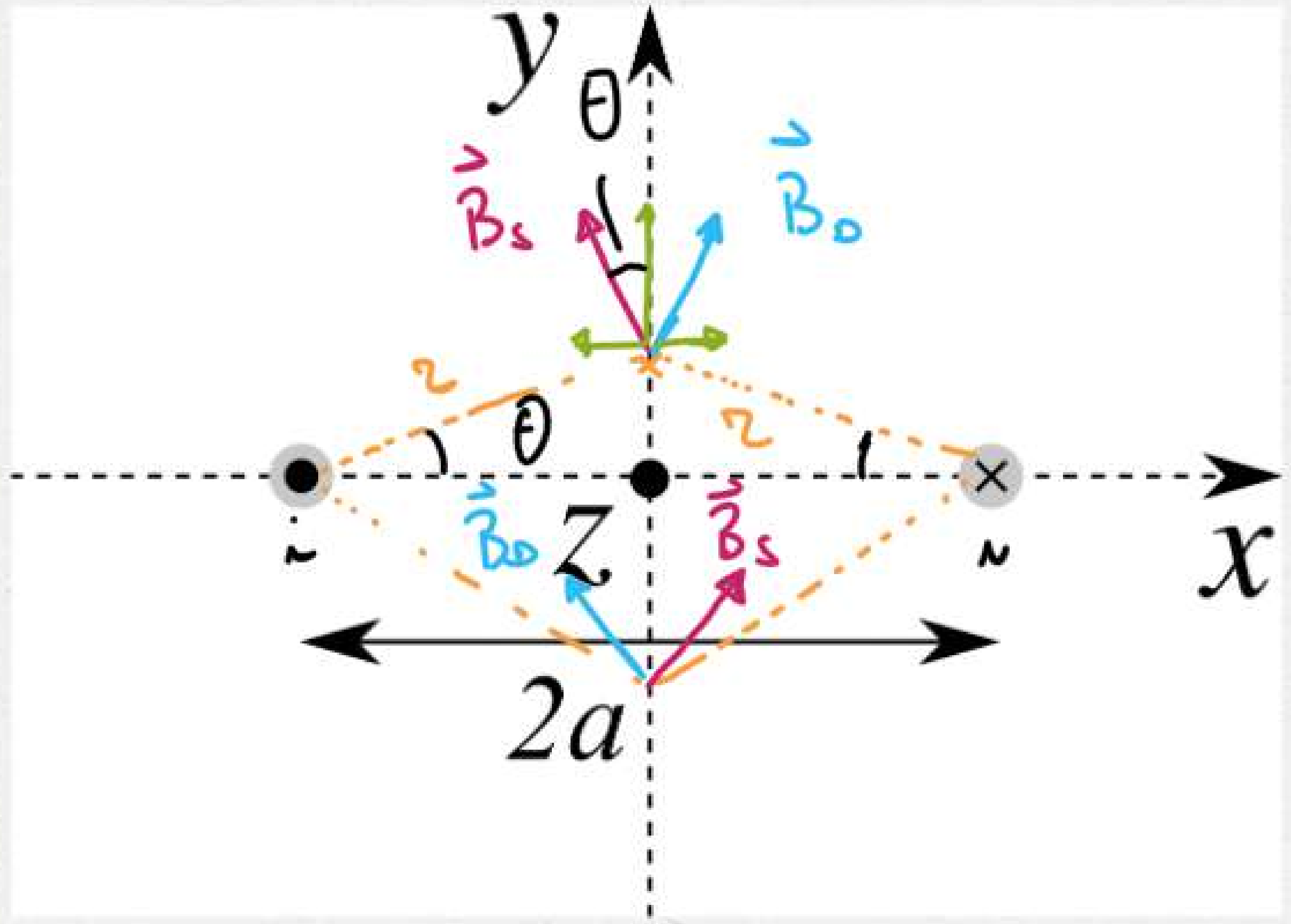
2) trovare, se esiste, C_2 : $\oint_{C_2} \vec{B}\cdot d\vec{s} = -3\mu_0 i$

3) " " " C_3 : $\oint_{C_3} \vec{B}\cdot d\vec{s} = \mu_0 \frac{i}{2}$

1) $\oint_{C_1} \vec{B}\cdot d\vec{s} = \mu_0 (i_2 + i_4 - i_3 - i_6) = 0$

2)

3) NO



① $\vec{B} = \vec{B}(x,0,0)$

② $\vec{B} = \vec{B}(0,y,0)$

$$B = \frac{\mu_0 i}{2\pi r}$$

$\vec{B} = \vec{B}_s + \vec{B}_D \parallel \hat{y}$

$\vec{B} = 2B_{sy}\hat{y}$

$$B_{sy} = B_s\cos\theta = \frac{\mu_0 i}{2\pi r}\cos\theta = \frac{\mu_0 i a}{2\pi r^2} = \frac{\mu_0 i a}{2\pi(a^2+y^2)}$$

$r\cos\theta = a \Rightarrow \cos\theta = \frac{a}{r}$

$$\boxed{\vec{B}(0,y,0) = \frac{\mu_0 i a}{\pi(a^2+y^2)}\hat{y}}$$