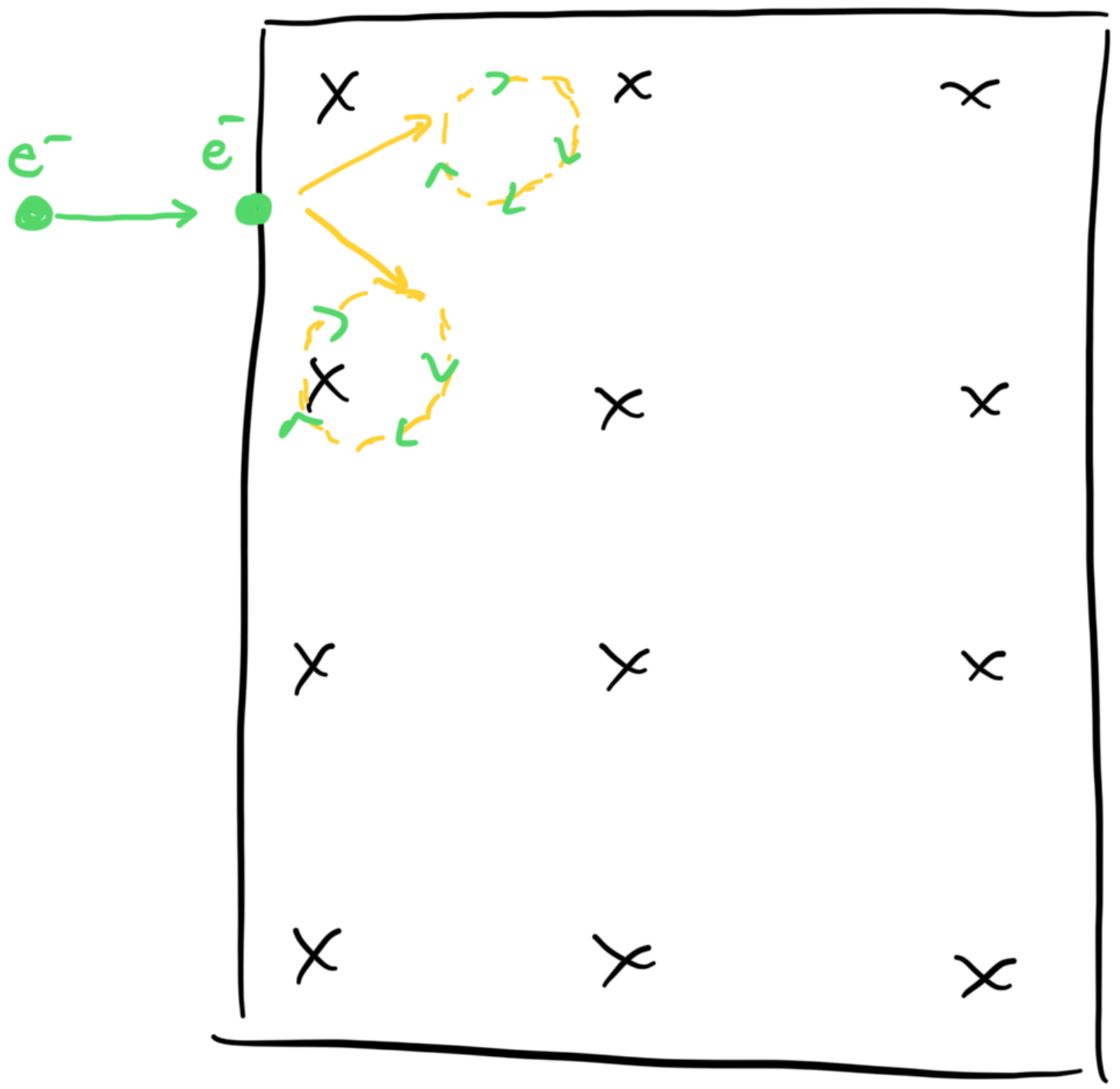
5.



$$r_1 = \frac{m v_1}{|q| B} \Rightarrow v_1 = \frac{r_1 |q| B}{m}$$ ✓

$$r_2 = \frac{m v_2}{|q| B} \rightarrow v_2 = \frac{r_2 |q| B}{m}$$ ✓

Elastic → kinetic energy is conserved.

$$\frac{1}{2} m v^2 = \frac{1}{2} m v_1^2$$

~~$\frac{1}{2} m v_i^2 + \frac{1}{2} m v_f^2$~~ ~~$+ \frac{1}{2} m v_2^2$~~

$$v_i^2 = v_1^2 + v_2^2$$

$$v_i = \sqrt{v_1^2 + v_2^2}$$

$r_1 = 0.01\ m \rightarrow v_1 = 1.124 \times 10^8\ m/s$

$r_2 = 0.019\ m \rightarrow v_2 = 2.129 \times 10^8\ m/s$

$$v_i = 2.40 \times 10^8\ m/s$$

$$E_i = \frac{1}{2} m v_i^2 = 2.63 \times 10^{-14}\ J$$

$$Ei = \frac{2.63 \times 10^{-14}\ J}{1.6 \times 10^{-19}\ J/eV}$$

$$= 164{,}400\ eV$$

$$= 164.4\ keV$$