**Answer on Question #40876, Physics, Atomic Physics**

In an oscilloscope, an electron is accelerated from rest through a voltage of 1.14 x 10 ^3 V it then passes through deflecting plates 2.00 cm apart, across which there is a voltage of 412V. Its velocity when it enters the plate is perpendicular to the electric field of the plates. When the electron leaves the plates, what distance will it have moved toward the positive plate? The length of the plates is 4.00 cm.

**Solution**

$v_0 = 0$ is the initial velocity of an electron, $v$ its velocity when it enters the plate, $V_a = 1.14 \cdot 10^3$ V is the accelerating voltage, $V_d =$ 412V is the deflecting voltage, $l = 4.00$ cm $= 4.00 \cdot 10^{-2} m$ length of the plates, $d = 2\ cm = 0.02\ m$ is the distance between the plates, $t$ is the time that the electron travel between the plates.

$e = 1.6 \cdot 10^{-19} C$ is the charge of an electron, $m = 9.11 \cdot 10^{-31} kg$ is the mass of an electron.

The kinetic energy of an electron after accelerating voltage:

$$K = \frac{mv^2}{2} = eV_a \to v = \sqrt{\frac{2eV_a}{m}}.$$

The time that the electron travel between the plates:

$$t = \frac{l}{v}.$$

The electric field accelerates the electron toward the positive plate:

$$E = \frac{V_d}{d}.$$

The force acting on electron when it travel between the plates:

$$F = eE = e\frac{V_d}{d}.$$

An acceleration of an electron:

$$a = \frac{F}{m} = \frac{eV_d}{md}.$$

The distance that an electron have moved toward the positive plate:

$$x = \frac{at^2}{2} = \frac{1}{2}\frac{eV_d}{md}\left(\frac{l}{v}\right)^2 = \frac{1}{2}\frac{eV_d l^2}{md} \cdot \frac{m}{2eV_a} = \frac{1}{4}\frac{V_d l^2}{V_a d} = \frac{1}{4}\frac{412 \cdot 0.04^2}{1.14 \cdot 10^3 \cdot 0.02} = 7.23 \cdot 10^{-3} m.$$

**Answer: $\mathbf{7.23 \cdot 10^{-3} m}$.**