**Answer on** Question #66811, Physics / Electromagnetism

An electron moving parallel to the x-axis has an initial speed of 3.70×(10)^6 m/s at the origin. It's speed is reduced to 1.40×(10)^5 m/s at the point x=2c.m -calculate the electric potenial difference between the origin and that point?

**Find:** $v_E$ – ?

**Given:**

$v_0=3.7\times10^6$ m/s

$v=1.4\times10^5$ m/s

x=0.02 m

$e=-1.6\times10^{-19}$ C

$m=9.1\times10^{-31}$ kg

**Solution:**

The changing of the kinetic energy of electron:

$W = \frac{mv_0^2}{2} - \frac{mv^2}{2}$ (1),

where m is the mass of electron

The electric field performs work:

$A = Fx$ (2),

where F is the electric forse, x is the displacement of electron

Electric forse:

$F = v_E|e|$ (3),

where $v_E$ is the electric potenial, e is electron charge

(3) in (2):

$A = v_E|e|x$ (4)

The changing of kinetic energy of electron is equal to work of electric field:

$\frac{mv_0^2}{2} - \frac{mv^2}{2} = v_E|e|x$ (5)

Of (5) $\Rightarrow$ $v_E = \frac{\frac{mv_0^2}{2}-\frac{mv^2}{2}}{|e|x}$ (6)

Of (6) $\Rightarrow$ $v_E=1.9\times10^{-7}$ N/C

**Answer:**

$1.9\times10^{-7}$ N/C