Electrostatic Potential

• Reminder: **Electric Field** = electric force acting on a probe charge q, divided by q:

$$\vec{E} = \frac{\vec{F}_{elect}}{q}$$

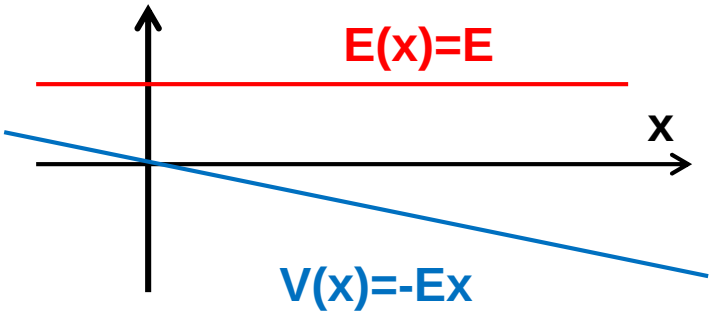
• Similarly, **Electrostatic Potential** = electrostatic potential energy divided by charge. It is also known as Voltage, since SI unit of potential is Volt (V):

$$V = \frac{U_{elect}}{q}$$

• **Example.** Consider constant electric field E(x)=E,(as inside a capacitor). Potential energy change = - Work:

$$\Delta U_{elect} = -F_{elect}\Delta x = -Eq\Delta x$$

$$V(x) = \frac{U_{elect}}{q} = -Ex$$



Homework

Problem 1: A capacitor is made of two parallel metallic plates separated by distance **h**. There is vacuum inside. An electron enters the capacitor moving parallel to the plates with speed **u**. Due to the electric field, its trajectory bends towards the positive plate. Find the minimal voltage **V** that needs to be applied to the capacitor so that electron hits the plate before escaping. The length it needs to travel across the capacitor to exit is L (see the Figure for details). Electron charge and mass are **e** and **m**, respectively.