

Big Idea

Last time we defined the electric potential energy of charge q in an electric field:

$$\Delta U_{a \rightarrow b} = -\int_a^b \vec{F} \cdot d\vec{l} = -\int_a^b q\vec{E} \cdot d\vec{l}$$

The only mention of the particle was through its charge q .

We can obtain a new quantity, the electric potential, which is a **PROPERTY OF THE SPACE**, as the potential energy per unit charge.

$$\Delta V_{a \rightarrow b} \equiv \frac{\Delta U_{a \rightarrow b}}{q} = -\int_a^b \vec{E} \cdot d\vec{l}$$

Note the similarity to the definition of another quantity which is also a **PROPERTY OF THE SPACE**, the electric field.

$$\vec{E} \equiv \frac{\vec{F}}{q}$$