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Analytical Mechanics

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Lec.7: The potential energy function in 3D motion

4.5 The potential energy function in 3D motion

If a particle moves under the action of a conservative ~~force~~ force $\vec{F}$, then

$$\vec{F} \cdot d\vec{r} = -dV(r)$$

where $V(r) \longrightarrow$ scalar function of the position $\vec{r}$

The potential energy (V) in one dimension is

$$F \cdot d\dot{x} = -dV$$

$$\therefore \quad \vec{F} \cdot d\vec{r} = dT$$

$$\therefore \quad dT = -dV$$

$$d(T+V) = 0$$

i.e $\quad T+V = $ constant as the particle moves .

i.e this quantity calls the total energy E

$$\frac{1}{2} m v^2 + V(r) = E$$