

Solutions

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P1 Assume the wave-fcn has size L

$$KE \sim pE \quad +3 \text{ for } KE \text{ correct}$$

$$\frac{\hbar^2}{2mL^2} \sim eE L \quad \leftarrow +3 \text{ for this equation}$$

$$\frac{\hbar^2}{2meE} \sim L^3$$

a) $\left(\frac{\hbar^2}{2meE} \right)^{1/3} \sim L \quad \leftarrow +2 \text{ solution}$

b) $KE \sim \frac{\hbar^2}{2mL^2} \sim \frac{\hbar^2}{2m \left(\frac{\hbar^2}{2meE} \right)^{2/3}} \quad +2 \text{ for this}$

c) $KE \sim \frac{\hbar^2}{2ma_0^2} \sim 13.6 \text{ eV} \quad \leftarrow +2 \text{ for this}$

$$\frac{\hbar^2}{2m \left(\frac{\hbar^2}{2meE} \right)^{2/3}} \sim \frac{\hbar^2}{2ma_0^2}$$

$$a_0 \sim \left(\frac{\hbar^2}{2meE} \right)^{1/3}$$