

1 ISW Right Quarter

For a particle in an infinite square well from 0 to L , calculate the probability of finding the particle in the range $\frac{3L}{4} < x < L$ for each of the first three energy eigenstates.

2 ISW Energy Measurement

A particle in an infinite square well potential has an initial state vector

$$|\Psi(0)\rangle = A(|\phi_1\rangle - |\phi_2\rangle + i|\phi_3\rangle)$$

where $|\phi_1\rangle$, $|\phi_2\rangle$, and $|\phi_3\rangle$ are the first three energy eigenstates.

- Determine A .
- At time $t = 0$, what are the possible outcomes of a measurement of energy, and with what probability would each possible outcome occur?
- What is the average value of energy one would measure at $t = 0$? In other words, what is the expectation value of energy at $t = 0$?
- What is the quantum state of this particle at some later time t ?
- At time $t = \hbar/E_1$, what are the possible energies you would measure and with what probabilities would you measure them? *Check Beasts:* Verify that $\hbar/E_1$ is a time.

3 ISW Expectation

Consider an infinite square well potential between 0 and L .

- Write down an expression for the n th energy eigenstate.
- Find the expectation value of position for the n th energy eigenstate.
- Find the uncertainty of position for the n th energy eigenstate.
- Find the expectation value of momentum for the n th energy eigenstate.
- Find the uncertainty of momentum for the n th energy eigenstate.