Indian Institute of Technology Guwahati

Tutorial-4 PH1410H: Introductory Quantum Mechanics Due on : 13 April 2026

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1. How accurately can the position of a proton with $v \ll c$ be determined without giving it more than 1.00 keV of kinetic energy?

2. An eigenfunction of the operator $\frac{d^2}{dx^2}$ is $\sin nx$, where n= 1, 2, 3, ... Find the corresponding eigenvalues.

3. Suppose a particle starts out in a linear combination of just two stationary waves such that

$$\Psi(x,0) = a_1\psi_1(x) + a_2\psi_2(x)$$

. What is the wave function $\Psi(x,t)$ at a subsequent time? Find a probability density and describe its motion.

4. Find the probability that a particle trapped in a box L wide can be found between 0.45 L and 0.55L for the ground and first excited states. What happens to the probability density in the infinite well when n$\rightarrow \infty$? Is this consistent with classical physics?
