

Indian Institute of Technology Guwahati

Tutorial-3

PH1410H: Introductory Quantum Mechanics

Due on : 07 April 2026

1. An electron and a proton have the same velocity. Compare the wavelengths and the phase and group velocities of their De Broglie waves.
 2. Find the phase and group velocities of the De Broglie waves of an electron whose kinetic energy is 500 keV.
 3. An electron is confined to a region of space of the size of an atom (0.1 nm). What is the uncertainty in the momentum of the electron? What is the kinetic energy of an electron with a momentum equal to Δp ? Does this give a reasonable value for the kinetic energy of an electron in an atom?
 4. A nucleus emits a gamma ray of energy 1.0 MeV from a state that has a lifetime of 1.2 ns. What is the uncertainty in the energy of the gamma ray? The best gamma-ray detectors can measure gamma-ray energies to a precision of no better than a few eV. Will this uncertainty be directly measurable?
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