

PHYSICS 454
2nd HOMEWORK
Dr. V. Lempesis

Hand in: Monday 31st October 2016

1. A proton is confined in an infinite square well of width 10 fm. (The nuclear potential that binds protons and neutrons in the nucleus of an atom is often approximated by an infinite square well potential.)
 - a) Calculate the energy and wavelength of the photon emitted when the proton undergoes a transition from the first excited state to the ground state.
 - b) In what region of the electromagnetic spectrum does this wavelength belong?
2. A particle is in the n -th energy eigenstate of an infinite well which extends in the region $(0, a)$. What is the probability to find it in the region $(0, a/4)$
3. The state of a particle in an infinite well is $|\psi\rangle = \frac{1}{\sqrt{3}}|\psi_1\rangle - i\sqrt{\frac{2}{3}}|\psi_3\rangle$.
What is the average energy $\langle E \rangle$ of the particle and its energy in energy ΔE ?

(5 marks)

(3 marks)

(7 marks)