Due Date: 10-15-08

Nuclear Physics 621

Homework 4 – Binding Energy

Send your answer to:
Nicolas Schunck,
schuncknf@ornl.gov

The mass of atomic nuclei is usually given in terms of the **mass excess**, defined as:

$$m_{exc} = M_{nucleus} - Au$$

where $M_{nucleus}$ is the nuclear mass, A the mass number and u the **atomic mass unit** (u = 931 494.027 keV). We give the following data:

$m_{exc}(^3He) = 14\,931.204$ keV $\qquad$ $m_{exc}(^3H) = 14\,949.794$ keV

1) Calculate the binding energy of ^{3}He and ^{3}H

2) The β-decay of a given nucleus is governed by the process:

$$^{A}_{Z}X_{N} \rightarrow {}^{A}_{Z+1}X_{N-1} + e^{-} + \bar{\nu}_{e}$$

Can ^{3}H and ^{3}He β-decay ? Discuss the result.

Does your answer contradict the isospin conservation ?