Homework 12 PS405

Due: Wednesday, December 8, 2016
5:00 pm

The first two problems are from Richard Dunlap's book, "The Physics of Nuclei and Particles."

1. **Problem 8.2**

Using known atomic masses calculate the value of Q for the α-decay of the following nuclides. Assume transitions between ground states.

Note: You can compare your calculations with values found on the IAEA Isotope Browser available in the **iTunes** App Store for iPhones and iPads. The **Android** version of the app is also available.

(a) $^{208}_{84}Po$

(b) $^{222}_{88}Ra$

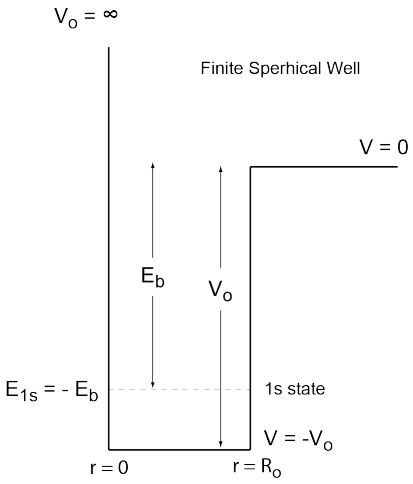
(c) $^{240}_{94}Pu$

(d) $^{252}_{100}Fm$

2. Problem 8.5

Calculate the kinetic energy of the α-particle released during the α-decay of $^{225}_{89}Ac$

3. A proton resides in a nuclear potential described by a finite spherical well with a potential energy depth V_o of 70 MeV, as shown in the figure to the right. If the radius of the well is 3.50 fm, calculate the following:



a. The total energy (E_b) for all the $\ell = 0$ bound states. Since these are bound states, the total energy E_b = KE + PE is negative. Use the (n, ℓ) labeling for identifying the bound states (e.g., 1s, 2s, 3s, ...).

$E_{1s} =$ _____ *MeV*

$E_{2s} =$ _____ *MeV*

etc.

b. The mean radial distance from the center of the nucleus. Again, write your repective answers using the labeling 1s, 2s, . . . etc.

$\langle r_{1s} \rangle =$ _____ *fm*

$\langle r_{2s} \rangle =$ _____ *fm*