Today	**Ch 31**	**The Nuclear Atom**	**HW29Redo; HW31**
Monday	**Ch 31**	**The Nuclear Atom & Review**	**HW 30Redo; HW32**
Lab	**9 Radioactivity**		

This Time

Issues of Identity: The other Quantum Numbers & the Exclusion Principle

- ***n*: Principle quantum number.**
- ***l*: Orbital quantum number.**
- **m_l: Magnetic quantum number.**
- **m_s: Spin quantum number.**

Orbital shapes

- **Quantum numbers and identity**
  - **Pauli Exclusion Principle**
  - **Orbital Occupancies**

  orbital n =1 Two electrons allowed
  orbital n =2 Eight electrons allowed

Example1: orbital n = 3 …How many electrons could have n = 3?

Order of Occupancy – Orbital Energies

Transition

Ch 31 Nuclear Physics and Radioactivity

31.1 Nuclear Structure

- ***Nucleons.***
  - **Proton**
  - **Neutron**
- **Vocab**
  - **Z: Atomic Number, distinguish atomic elements**
  - **N: Neutron Number, distinguish isotopes**
  - **A: Atomic Mass Number, distinguishes mass**
  - **Nuclear Notation**

31.2 The Strong Nuclear Force and the stability of the Nucleus

- **Electric Interactions**
- **Gravitational Interactions**

- **The Strong Force**
  - **Quark model of Nucleons**
    - **Strong Force & Color**
    - **Nuclear Strong Force & Color Tri-poles**
    - **Stability: Short range Strong vs. long range Electric**
      - **Small nucleus – tightly bound.**

- **Large nucleus – weakly bound.**
- **Role of neutrons in holding it all together.**

HW32

Ch 30

24. Say that it is determined for a particular electronic state that the possible values for the magnetic quantum number m_l are -4, -3, -2, -1, 0, 1, 2, 3, and 4. Determine the orbital quantum number, *l*, and the smallest possible value of the principal quantum number, *n*.

Ch 31

2. In electrically neutral atoms, how many (a) protons are in the uranium ${}^{238}_{92}\mathrm{U}$ nucleus, (b) neutrons are in the mercury ${}^{202}_{80}\mathrm{Hg}$ nucleus, and (c) electrons are in orbit about the niobium ${}^{93}_{41}\mathrm{Nb}$ nucleus?

You'll need to read ahead in chapter 31 for these next two.

14. Find the binding energy (in MeV) for lithium ${}^{7}_{3}\mathrm{Li}$ (atomic mass = 7.016003 u). Find the mass difference ('mass defect') between an intact Li atom and the sum of its parts: its constituent electrons and protons (collectively, hydrogen atoms) and neutrons. Then use Einstein's mass-energy relationship to find how this mass difference's equivalent amount of energy.

18. Complete the following decay processes by stating what the symbol "X" represents (X = a, b^-, b^+, or γ): (a) ${}^{211}_{82}\mathrm{Pb} \rightarrow {}^{211}_{83}\mathrm{Bi} + \mathrm{X}$, (b) ${}^{11}_{6}\mathrm{C} \rightarrow {}^{11}_{5}\mathrm{B} + \mathrm{X}$, (c) ${}^{231}_{90}\mathrm{Th}^* \rightarrow {}^{231}_{90}\mathrm{Th} + \mathrm{X}$, and (d) ${}^{210}_{84}\mathrm{Po} \rightarrow {}^{206}_{82}\mathrm{Pb} + \mathrm{X}$. Note: in nuclear notation a = ${}^{4}_{2}a$, $b^- = {}^{0}_{-1}e$, and $b^+ = {}^{0}_{+1}e$.