Introduction to Nuclear Physics
PS405

Terminology and Definitions:

Light Atoms	$^{A}_{Z}X$
Hydrogen	$^{1}_{1}H$
Deuterium	$^{2}_{1}H$
Tritium	$^{3}_{1}H$
Helium 4	$^{4}_{2}He$
Helium 3	$^{3}_{2}He$

Z	Atomic number	# of protons	Determines the chemistry of the element.
N		# of neutrons	
A	Mass Number	# of nucleons	A = Z + N
	Nucleon	Either a proton or a neutron	
	Atomic Mass	What you read in the table of nuclear isotopes. Nuclear Chemistry Includes the mc^2 of the nucleus + electrons	
u	atomic mass unit	1u = 931.494 MeV/c^2 1 u = $\frac{1}{12}$ mass of $^{12}_{6}C$	
	Nuclear Mass	What you read in the table of nuclear masses. This is what is in the back of your book. For example: mass of $^{235}_{92}U$ = 235.0439231 u Nuclear Physics	
	Nuclide	Specific nuclear species identified by its values of N and Z	
	Isotopes	Nuclides with the same Z. The A value can change. $^{12}_{6}C$ $^{14}_{6}C$	
	Radioisotopes	Nuclides with the same Z. However, they are unstable and will undergo radioactive decay.	
	Isotones	Nuclides with the same N.	$^{4}_{2}He$ $^{3}_{1}H$
	Isobars	Nuclides with the same A.	$^{14}_{7}N$ $^{14}_{6}C$
	Natural Abundance	The fraction of a particular isotope of an element naturally occurring in terrestrial samples of the element.	
	Atomic weight	What you read off the periodic table. It includes the weighted average of the natural abundances.	

Units and Dimensions:

Distance	Nuclear dimensions are measured in fm (femtometers or fermis) 1 fermi = 10^{-15} meters			
Area	Particularly important when quoting cross-sections. 1 barn = 10^{-28} m^2 or 100×10^{-30} m^2 or 100 fm^2			
Time	Nuclear/Particle decays cover a range of 10^{-25} seconds to 10^{39} seconds. Long times are usually expressed in years.			
Energy	Atomic Physics	eV	the electron volt visible light (2-3 eV)	
		keV	kilo-electron volt typical X-ray energies	10^3 electron volts
	Nuclear physics	MeV	mega-electron volts m_ec^2 = 0.511 MeV	10^6 electron volts
	Particle Physics	GeV	giga-electron volts m_pc^2 = 0.938 GeV m_Hc^2 = 125 GeV	10^9 electron volts (proton) (Higgs boson)
Mass	1 atomic mass unit = 1 u = 1.661×10^{-27} kg = 931.494 MeV/c^2			