

Physics 113 -Lecture 16

Nuclear Physics(Cont.)

Binding Energy

Measure binding energy using $E=mc^2$

$${}^{12}_6\text{C} = 12.00000 \text{ u}$$

For stable nuclei

mass of free
n's and p's $>$ mass of
nucleus

mass defect \equiv (mass free p's and n's) - (mass nucleus)

Nuclear Stability

only certain combinations of n's and p's stable

low mass # $\frac{N}{Z} \cong 1$

high mass # $\frac{N}{Z} \cong 1.6$

Coulomb repulsion

Radioactivity

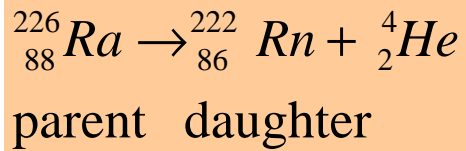
Marie Currie - Three Types of Decays

α - He^{++}

β - e^- or e^+

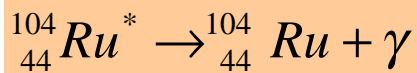
γ - photon

α Decay



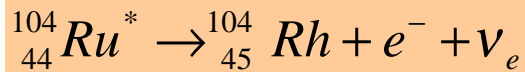
- energy conserved
- charge conserved
- nucleons (A) conserved
(#p's and #n's separately)

γ Decay



- often accompanies
 α or β emissions

β Decay



- energy conserved
- charge conserved
- nucleons conserved (A)
but $n \rightarrow p$

A New Force !

Strong
Weak
Electromagnetic
Gravity

These are the four
known (presently) forces
found in nature