

Stuff for Tuesday, May 8, 2012

- Schedule this week back to usual:
 - 1094 session tomorrow (2:30pm!), PS#12 due Thursday
 - Quiz #6 on Friday on Q12–Q15
 - Unit T starts on Thursday

Binding energy and decay rates:

- Binding energy $E_b \equiv E_{\text{parts}} - E_{\text{system}}$, $\Delta m \equiv m_{\text{parts}} - m_{\text{sys}} = E_b/c^2$
 - nucleus: $\Delta m = Zm_H + Nm_n - m_{\text{atom}}$ where $m_H = 1.007825 \text{ u}$
 - $m_p = 1.007277 \text{ u}$ $m_n = 1.008665 \text{ u}$ $m_e = 0.0005486 \text{ u}$
- Decays: alpha, beta (neutron β^- , proton β^+ , EC) $\implies \nu$ or $\bar{\nu}$, gamma
- A radioactive sample's **activity** is λN , which is decays per second
- 1 becquerel = 1 Bq \equiv 1 decay per second; 1 curie = 1 Ci = 3.7×10^{10} Bq
- $$\frac{dN}{dt} = -\lambda N \implies \lambda \approx -\frac{\Delta N}{N\Delta t} \implies N(t) = N_0 e^{-\lambda t} \text{ where } N_0 \equiv N(t=0)$$
- half-life $t_{1/2}$ related to λ by $\lambda = \ln 2/t_{1/2}$