Homework 1-2   Homework Assignment

Particle Detectors

Modern Particle Physics (2nd Edition) by Mark Thomson

Problems: 1.7,   1.8,   1.10,   1.11,

1.xx   A 1.00 GeV K$^+$ meson enters a thin silicon waver "face on." If the wafer thickness is 300μ, calculate how much kinetic energy is lost due to ionization. Use Eq. 1.2 and assume that the energy loss (dE/dx) is constant as the kaon passes through the wafer.

1.yy   A 1.00 GeV proton is normally incident on a water target. How far does the proton travel before it comes to rest in the water? Once again, you can use Eq. 1.2; however, the calculation is best done with a computer program.

Suggestion: Iteratively calculate the dE/dx and determine the energy loss in 1.00 mm steps. After each step, calculate the new proton energy (including the new β, γ and v), and repeat the dE/dx calculation for the next 1.00 mm step. Determine how far the proton travels in water before it comes to rest--assuming all its energy loss is due to ionization.

Suggestion: It might be interesting to plot your results--the energy loss as a function of depth (i.e., penetration distance).

Due Date: **September 12, 2017**   **(Tuesday)**