**Activity 2-1 b – August 29, 2016**

**Part 2 - Divergence and Delta Functions**

i. Determine a purely mathematical expression for the volume charge density, ρ, of the beam line of the Cornell accelerator (the beam line is a hollow metal cylinder with radius R and surface charge density σ).

ii. Check your answer by integrating to find the total charge for a length L of beam line. (Are the units correct?)

iii. What are the units of your delta function in (i.)?

iv. You have found that when charged, the beam line produces an E-field. Considering all space, describe where is this E-field’s divergence zero and where is it non-zero? Can you now write one mathematical expression which says the same thing?