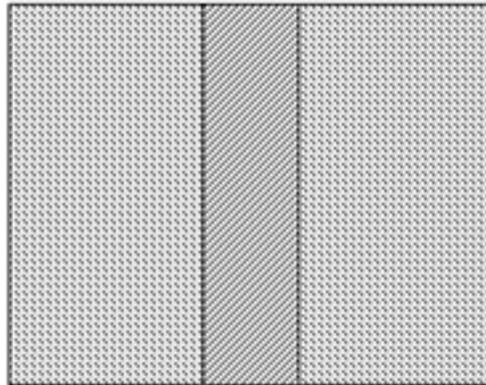


22.058, Principles of Medical Imaging
Fall 2002
Homework #5

You are given a laminar structure of two materials with different, known, linear attenuation coefficients and a known thickness of the outer layers. The task is to measure the thickness of the inner layer precisely by observing the X-Ray attenuation.



- What is the geometry of the measurement; assume that you have an X-Ray tube as the source.
- In order to determine the width of the inner layer to within $1 \mu\text{m}$ how many counts do you need to detect?
- Assuming that the detector efficiency is 1, how many photons must strike the sample to obtain this number of counts?
- How would scatter influence the measurement? Explain completely how you would include scatter in your analysis.
- How would you change the experiment if the outer layer thickness was not known?