

Phys 586 Laboratory

Lab 8

Goal: In this lab you will make three measurements with several ion chambers using a 6 MV photon beam from the Varian 6eX linac in the UA Radiation Oncology facility. The first measurement will be to follow the TG21 protocol for calculating the dose to water at d_{max} using a water phantom. A second measurement time permitting will be to measure the dose to a water phantom at several different depths. A final measurement will be to measure the dose to a solid water phantom with three different ion chambers\electrometers.

Reading: TG21 protocol and Chapter 2 (Dosimetric principles, quantities, and units)

Lab:

1. Dr.Chris Watchman or his designee will give a short overview of the equipment, procedure, and safety considerations.
2. For the TG21 protocol, you will need to make several corrections to the chamber signal per monitor unit (MU). In particular, you will need to record the chamber temperature T and pressure P. Make a note as to length of time the phantom has been filled with water.
3. You will need to record (or find) details about the specific chamber make and model used. Also record the make and model of the electrometer. Record any calibration factors associated with the ion chamber. Also record the calibration date.
4. Do any required checks on the electrometer.
5. For the first measurement, record the details of the phantom material, source to surface distance (SSD), collimator field size, and depth of measurement.
6. The raw data you will collect will be the mean chamber signal per monitor unit. Later you will use this data to calculate the dose to water per monitor unit at d_{max} .

7. If time permits, make measurements at several additional water depths. From this data, estimate the effective attenuation length for water for this photon beam.
8. Switch now to the solid water phantom. Make measurements of the dose to phantom material per monitor unit with two different ion chamber\electrometers.
9. Profusely thank Dr. Watchman and his technicians for allowing us to do this lab in Radiation Oncology.

In your lab writeup, please include:

1. Filled out worksheet for the first measurement at a depth of 5 cm.
2. Plot of the charge collected as a function of water depth. There were two sets of measurements taken, one for each group. Please combine all the measurements for your plot.
3. From this plot, estimate d_{max} for water for this beam.
4. From this plot, estimate the HVL for water for this beam.
5. Filled out worksheets for the measurements of the two types of ionization chambers in solid water.