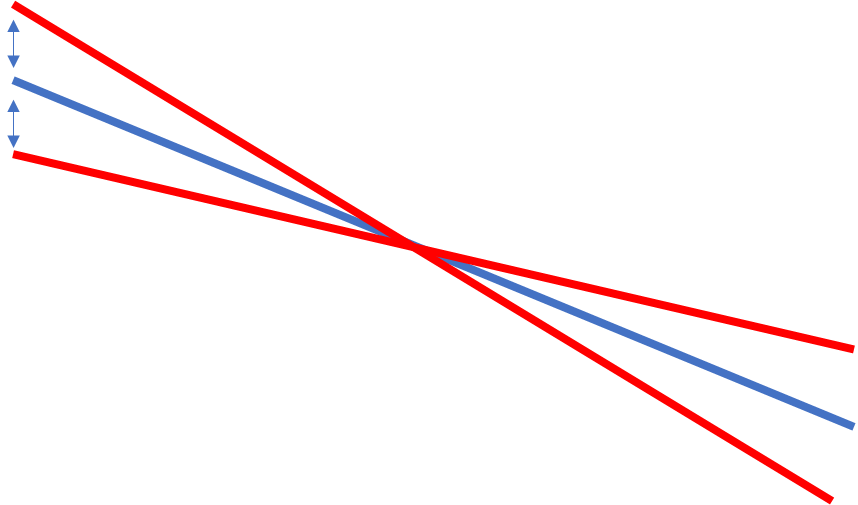
# General Goal

Identify an angle range allowable on the IC Profiler which corresponds to the 2% threshold recommended in TG-142.



Using the TPS acquire the same profiles we would expect to collect on the IC Profiler. The expected wedge angle is measured from TPS, as well as a range of wedge angles associated with +/- 2%.

# Phantom Information

Patient: Commissioning, LaJolla TrueBeam

Image set: ICProfiler1: Dimensions 42x42x12cm (3cm depth of IC profiler, plus 9cm solid water)

## Plan Information

User origin set to be 9.9cm deep, corresponding with plane of electronics.

Plan Group: Geom 4 (EDW)

Plan: ICProfiler15X/ICProfiler6X

Fields: 20x20 field, 90.1SSD, EDW60IN

Depth of 9.9cm, 100SAD

Profile plane at user origin was exported, coronal field (bottom left)

A screenshot of a computer

Description automatically generated with medium confidence

Move viewing plane to the origin

Right click Dose -> export dose plane

X Plane: 25.5cm 256 pixels, and Y Plane: 25.5cm 256 pixels

## In code

<https://github.com/brianmanderson/EDWProfile>

Set the folder location with ***ONLY ONE DOSE DICOM*** present (path variable).

Change PDD data to reflect current machine/clinic

# Calculating Wedge Angle

Equation is based on acquisition model expressed in the IC Profiler.

<https://pulse.ucsd.edu/tools/radonc/physicists/Documents/Manuals/IC%20PROFILER%E2%84%A2%20Reference%20Guide.pdf>

Pages 65 on pdf for acquisition

A picture containing line, diagram, plot, parallel

Description automatically generated

R refers to response at two points, respectively, and wdistL refers to the distance between those to points. The equation for u is below.

Where PDD refers to percent depth dose at depth D.

For 15X, D1 at 4cm and PDD1 = 96.1%, D2 = 10.02cm and PDD2 = 76.7% results in

u15MV = 0.0375

For 6X, D1 at 4.02cm and PDD1 = 91.00%, D2 = 10.00cm and PDD2 = 69.53% results in

u6MV = 0.0450.

For the 20x20 field, we selected points at the 80% field size (20\*.8=16cm), we took the points +8cm and -8cm from the middle.

## Comparing to IC Profiler

15MV 60 degrees: From the equations listed above, and the exported dose profile, we would expect the measured angle to be 62.52 degrees, and between 61.69-63.32 degrees. The IC Profiler measured a response of 62.25 degrees.

15MV 30 degrees: From the equations listed above, and the exported dose profile, we would expect the measured angle to be 32.72 degrees, and between 29.93-35.35 degrees. The IC Profiler measured a response of 32.48 degrees.

6MV 60 degrees: From the equations listed above, and the exported dose profile, we would expect the measured angle to be 62.75 degrees, and between 62.07-63.4 degrees. The IC Profiler measured a response of 62.28 degrees.

6MV 30 degrees: From the equations listed above, and the exported dose profile, we would expect the measured angle to be 33.29 degrees, and between 31.01-35.46 degrees. The IC Profiler measured a response of 32.79 degrees.

# Measuring Wedge Angle with IC Profiler

First, it is important to follow the steps listed on page 55 (PDF 66/186) from the IC Profiler manual: <https://pulse.ucsd.edu/tools/radonc/physicists/Documents/Manuals/IC%20PROFILER%E2%84%A2%20Reference%20Guide.pdf>

The most vital of these is the PDD data. It is from this data that the wedge angle is calculated. The exact equation is shown in sections above.

## After profile is acquired

Please read the following slowly and carefully. It is not entirely intuitive and can lead to errors.

***The wedge angle presented IS NOT related to the energy set in the header information. Conversations with the vendor have indicated that it should be, but experimental evaluation has shown that it currently does not (07/01/2023).***

This means that if a 6X wedge angle is desired: the profile is measured, the user will need to click Setup -> Wedge Configuration -> 6MV -> Done. This should show the angle next to the acquired profile.

The Wedge Configuration selection is ‘sticky’, meaning if the user selects ‘9MV’ for a profile, and then *goes back* to the 6MV profile, the wedge angle will now appear with the ‘9MV’ wedge configuration.