Weekly Update - Week of 10 June 2018

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1 Past Week

This **past week** I was focused on **two** primary tasks:

1. **Track down why the 2mm results gave funny behaviours while 1mm results did not**
   - After some investigation I have finally figured out why the dose distributions for the 2mm case did not give the correct results
   - I finally realized that in order for volume corrections to take into account the fact that an applicator is present and thus correct for it you must set the applicator geometry as a source geometry in addition to the seed geometry *during volume corrections*
   - However, strictly speaking, only the ^{192}Ir, is emitting radiation. Thus, *during the simulation of radiation transport*, the source must be set only to the ^{192}Ir (seed) geometry
   - Examples that ship with egs_brachy do not do this for some reason
     - Not sure why this problem wasn't encountered in the example HDR case
     - Might be because the doses that were measured were fairly far away from the applicator?
   - Having done this I now get good (differences of at most 8%) agreement with Lymperopoulou results.
     - I think once I have the error bars in place the small difference from expected can be explained
2. **Read Peppa et al. (2016) paper and explore data set available**
   - Read the Peppa paper once through
   - Need to read again for clarification on models and test cases
   - Downloaded the data sets from the Radiation Dosimetry Lab (RDL) website
   - Used a Python parser (Python module: dicom) to see what was in the dicom files
   - Looked over Stephen's scripts a bit to figure out how he turned these dicom files into egsphants
   - Still need more time to process Stephen's code

2 Next Week

This **next week** I will be focused on **three** primary things:

1. **Doing Data Production Runs**

- With the problem of volume corrections having been solved and everything else seeming okay, I am ready to do runs for all different sizes of applicators and for the three different sources
- Will probably have most of them run on Graham
- Might also expand to Cedar cluster depending on if the simulations get too many
- If I have time, I may replicate Joanna's configuration of dwell positions as well

2. **Add errors and error propagation to my analysis**
   - Need to add error bars to all my plots
   - Having a little bit of trouble figuring out the correct way to do it
   - Looking at code for how 3D Dose Tools does error propagation
   - Will converse with Martin this week to try and sort the algorithm out
3. **Work at reproducing Case 3 of Peppa paper**
   - As a start/benchmark, will first look at recreating Case 3
   - Try and get an understanding of the results
   - Work out pipeline in Python that will get me from CT dicom files to egsphant

3 Figures

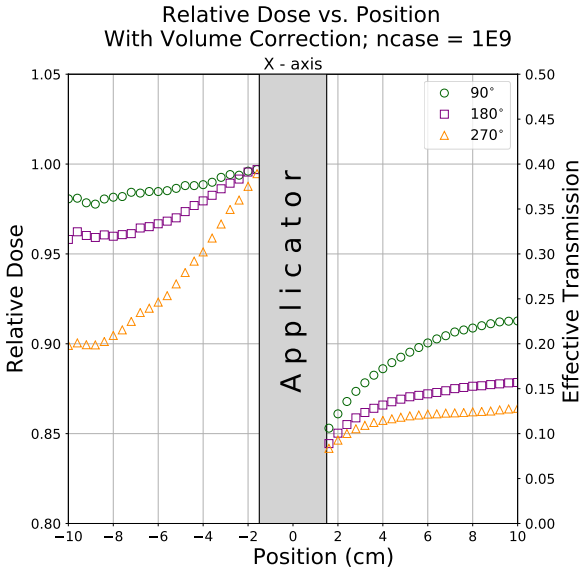

Figure 1: **Relative Dose Comparison**. MC calculated results of dose for a shielded applicator to dose for the unshielded applicator at the same point as a function of distance away, x, for y=0 cm in the unshielded (relative dose, left) and the shielded (transmission factor, right) sides of the central axial plane (xy at z=0 cm) for the 90° (green circles), the 180° (purple squares), and the 270° (orange triangles) tungsten alloy shields.

Table 1: Shielded side comparison of attenuation factors

Shield Type	X-Coord	Relative Dose	Expected	Difference (%)
90	10	0.2225405158618	0.23	3.243
180	10	0.156912113441	0.17	7.69
270	10	0.128142220894	0.13	1.43