Exercises: advanced scoring

- Learn how to use `DETECT` and `DETGEB` to score in coincidence

- Learn how to use `AUXSCORE` to filter scorings

1. DETECT and DETGEB

Learn how to use `DETECT` and `DETGEB` to score in coincidence

1. DETECT and DETGEB

Input file

- Simple setup consisting of a dual Gold slab (already created)

- The input file defines a 1 MeV photon beam interacting with two 1-mm thick gold plates, 6mm apart

1. Add these scorings and run

   1. DETECT over the second plate (downstream)
   2. DETECT in coincidence over the two plates
   3. DETECT in anti-coincidence over the two plates

- Set the energy limits so as to see the whole resulting spectrum

- You can keep the default number of channels (1024)

- Once you have obtained the three spectra:

   - What do you see on the graph?
   - Can you explain why one of the curves stops before the others?

1. DETECT and DETGEB

2. <u>Spectrum smearing</u>

- Add a smearing by specifying three `DETGEB` cards, controlled via pre-processor instructions (`smearall, smeard, smeart`)
  - Use the following coefficients values: a = 1.0e-5   b = 0   c = 0
  - One applies to the **d**etector only, one to the **t**rigger only, and one to both

- Redo the plot from 1. In these three cases
  - What changes do you notice in each of the new plots?
  - How do you notice the trigger smearing taking place?

2. AUXSCORE

Learn how to use `AUXSCORE` to filter scorings

2. AUXSCORE

Consider the case of a 150A MeV Carbon beam impacting a 20cm Water target.

1. Add scoring cards

Add scoring cards allowing you to determine the energy deposition from each ion species separately (H, He, Li, Be, B, C)

Hint: you can set A=0 to accept all isotopes of a given element

2. Run between 5*1000 and 5*5000 primaries, depending on your CPU. You should try to obtain results in ~8-10mins

3. Plots

Plot the results on one summary plot with the six contributions, as well as the total.

What do we see? How do you explain the different curves?

The total energy deposition at the front of the target does not match the C contribution. Why?

What is the important limitation of this way of filtering scorings?