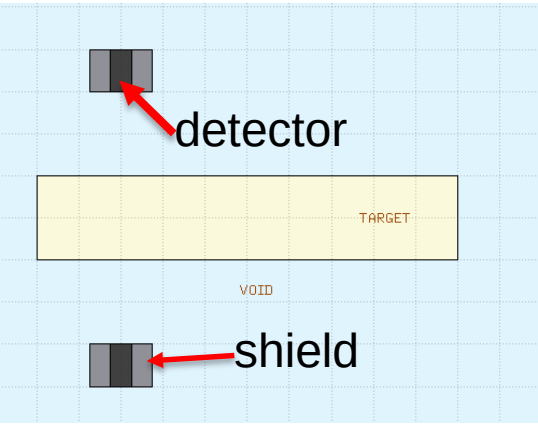
Exercise: Scoring, with mgdraw

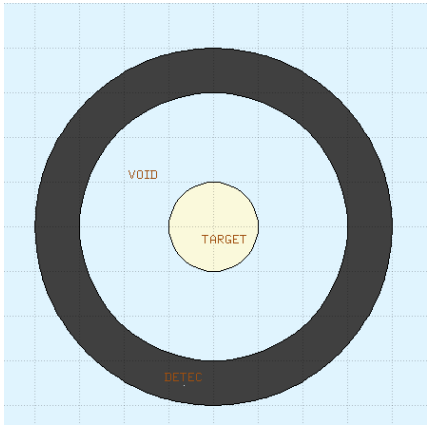
Advanced FLUKA Course 2019

Goal and setup

- Goal: Learn how to use mgdraw.f and how to to record and dump “particle histories”
- Setup: Germanium detector to detect (prompt) photons in carbon therapy (..well ..sort of..)
- Very simple geometry (already coded in the provided input skeleton)



Target: 10cm radius, 100 cm length, PMMA
Detector: annular, 5cm in Z, 10 cm radial thickness. Ge .
Located at 30 cm from axis, 20 cm from target start, can be moved
Shield around detector, Lead, 5 cm on each side



What do we want? Event by event:

- For each photon entering in the detector, we would like to know where it was generated, by which interaction (projectile, target, energy).
- If the interaction was a secondary one, we would like to know where and what was the first interaction.
- Also, if the photon was scattered and where
- Let's put a threshold on photon energy for all this
- Then, we need the total energy deposited in the detector, and the energy deposited by each entering photon.
- For the "history" quantities, we can use the provided user variables, SPAUSR,ISPUSR, LLOUSE , that are propagated to the stack (we have 11 reals and 10+1 integers)
- For the energy deposits, we'll define additional user variables

How?

- Using mgdraw, stuprf, stupre.
- Initialize event quantities in SODRAW
- Record the first ion interaction in USDRAW
- Look for photon production in STUPRE and STUPRF . Stuprf, not USDRAW, because we want to stick the history to the photon only, not to the other products. Stupre, because usdraw is called after it
- Look for photon scattering in stupre
- Dump the entering photon and its history in BXDRAW
- Collect energy depositions in MGDRAW and ENDRAW
- Dump energy depositions in EEDRAW

And you?

- In the Ex_Scoring directory, skeletons of input and user routines
- In each routine: try to understand what it does, and fill variables where “ fill here “ is indicated.
- List of variables is in next slide. Please stick to it, otherwise dump will be meaningless.
- In the input, add:
- Activation of mgdraw.f . Give file name in SDUM
- Three cylindical USRBIN covering the target, scoring
- Deposited energy
- Star density from ions
- Star density from all particles
- One EVENTBIN by region, for the detector on ascii, to check our dump

Variables

Target Z	ispusr(1)
Projectile Z	ispusr(2)
Projectile A	ispusr(3)
Generation level of original photon	ispusr(4)
Ordinal number of original photon	ispusr(5)
Track number of original photon	ispusr(6)
Region of first conversion (if any)!	ispusr(7)
Code of interaction generating orig. phot.	ispusr(8)
Id of projectile generating orig. phot.	ispusr(9)
Region of interaction generating orig. phot.	ispusr(10)
Ordinal number of entered photon	llouse
** reals to be kept	
Position of first had interaction (3)	spausr(1:3)
Energy of first had projectile	spausr(4)
Position of gamma production point (3)	spausr(5:7)
Energy of last had projectile	spausr(8)
Energy of original photon (might scatter)	spausr(9)
* local (non- stack) variables	
Total energy deposited in detector :	EDTOT
Energy in detector from each entering ph :	EDPHOT (vector)