



Exercise 8: Importance biasing

FLUKA Beginner's Course

Exercise: Importance biasing

Aim of the exercise:

- 1- Discover biasing power
- 2- Experience region importance
- 3- Use of cylindrical mesh USRBIN
- 4- Plot USRBIN in the Geometry Editor
- 5- Use of Conditional Directives

Exercise: Importance biasing

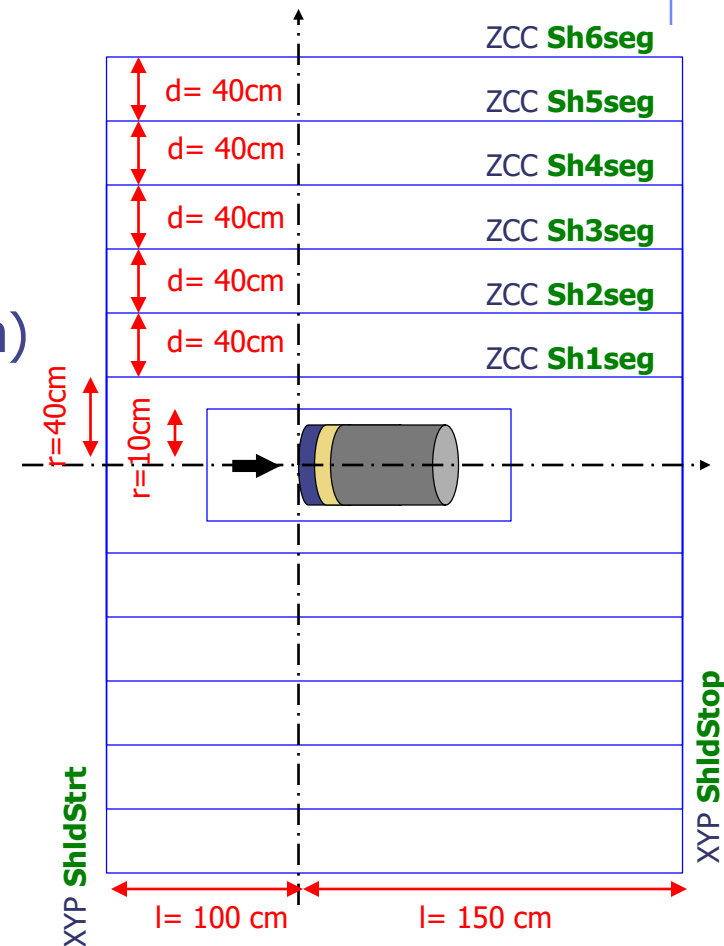
- Start from the solution of **ex4** (Copy both .inp and .flair files):

```
mkdir ex8 ; cp ex4/ex.* ex8 ; cd ex8
```

- Geometry modifications:
create a concentric shielding

- e.g.:

- Add 1 RCC surrounding the target
($R=10\text{cm}$; $Z_{\min}=-10\text{cm}$; $Z_{\max}=30\text{cm}$)
- Add 6 ZCC (radius = $n \times 40\text{cm}$)
- Add 2 XYP planes
($z=-100\text{cm}$ and $z=150\text{cm}$)
- Add 1 XZP plane ($y=0$)



Exercise 10: Importance biasing

Materials

- ❑ Shielding will be made of concrete
- ❑ Concrete is not a FLUKA predefined material
- ❑ It has to be defined

Concrete: (mass fraction)

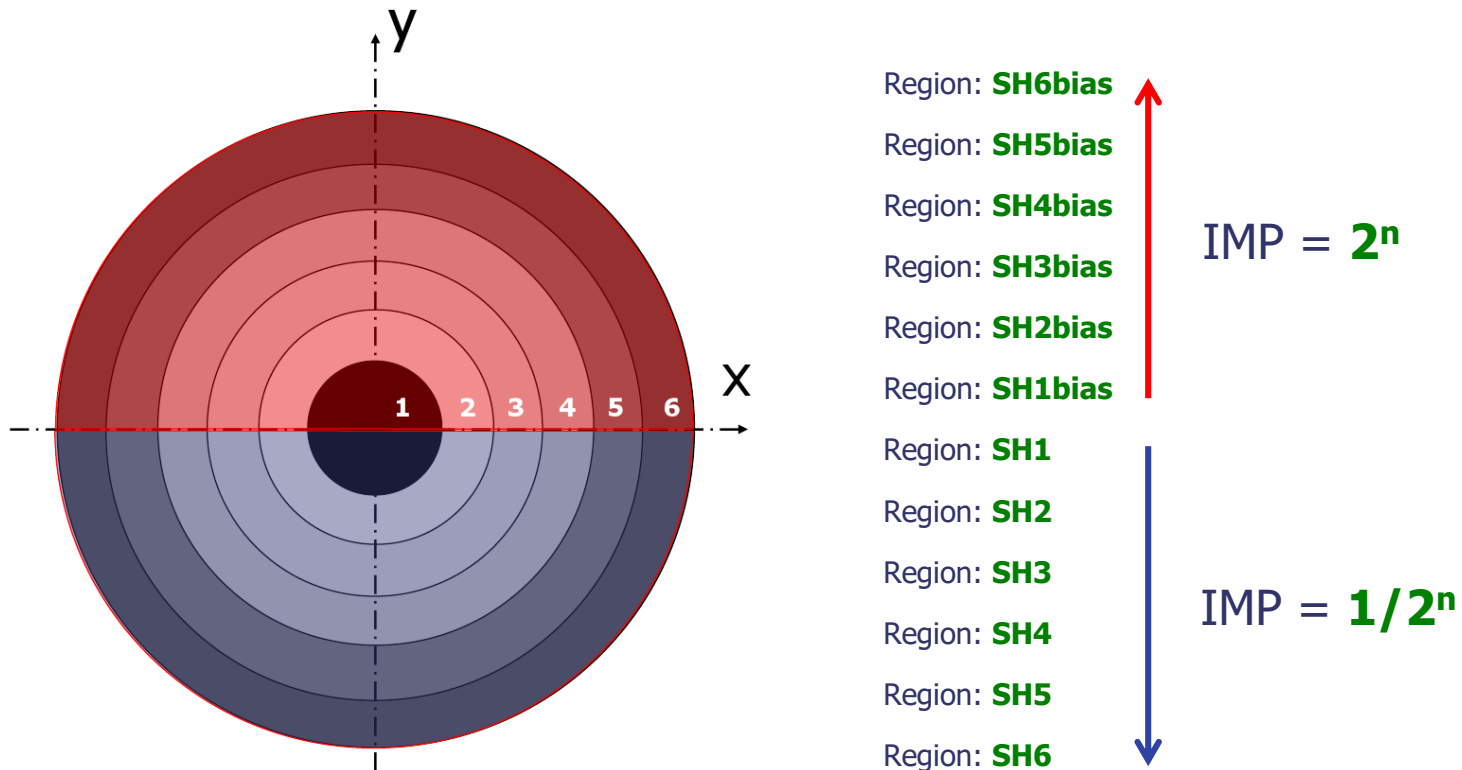
Hydrogen	0.01	Aluminum	0.034
Carbon	0.001	Silicon	0.337
Oxygen	0.529	Potassium	0.013
Sodium	0.016	Calcium	0.044
Magnesium	0.002	Iron	0.014

Density: 2.42g/cm³

- ❑ Assign it to all the shielding region
 - Try doing it with one single card

Exercise 10: Importance biasing

- ❑ Set the importance to 1, for all regions and particles
- ❑ For regions having $y > 0$ set importance to 2^n ($n = \# \text{layer}$)
- ❑ For regions having $y < 0$ set importance to $1/2^n$ ($n = \# \text{layer}$)
- ❑ Enclose biasing within a `#if Flag_BIAS` statement
(to be activated through `#define`)



Exercise 10: Importance biasing

Scoring

- ❑ Add one region independent scoring for neutrons (USRBIN)
 - To span over the whole geometry
 - To have sufficient bins
 - To have cylindrical coordinates [i.e. **R-Phi-Z**]
 - Unformatted output on unit 54

Run

- ❑ 2 separate runs, w/ and w/o biasing (do not overwrite results)
- ❑ 5 cycles, 10000 primaries each

Plot

- ❑ USRBIN results in Flair
- ❑ Region importance in the Geometry Editor
- ❑ USRBIN results in the Geometry Editor

Exercise 10: Importance biasing

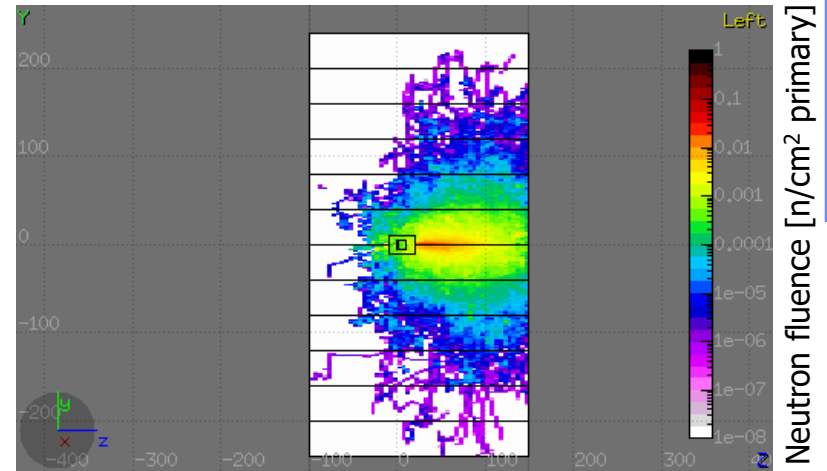
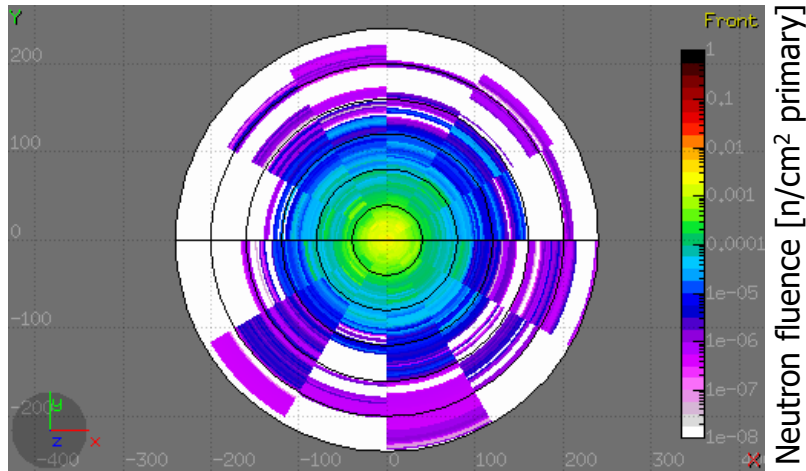
How to display region importance in the Geometry Editor

The screenshot displays the Geometry Editor interface. The top menu bar includes options like Flair, Input, Geometry, Run, Plot, and Compile. The main toolbar contains various tools such as Cut, Copy, Paste, Select, Pan, Orbit, Info, Body, Zone, Object, Clone, Visibility, Wireframe, Lock, Layer, and Layout. The central window, titled 'Geometry', shows a circular cross-section of a geometry with concentric regions labeled SH1 through SH6. The regions are color-coded to represent importance biasing, with a color scale on the right ranging from 0.1 (purple) to 10 (red). The regions are labeled as SH1 (center), SH2, SH3, SH4, SH5, and SH6 (outermost). The background is labeled 'OUTAIR'. The left sidebar shows the 'Bias(IMP)' layer selected, with options for 'Show' and 'Palette' set to 'Importance-N'. The bottom status bar displays coordinates: x: 158.7387039, y: -70.53883114, z: 97.5113.

Geometry Editor interface showing the visualization of region importance biasing. The central window displays a circular cross-section of a geometry, divided into concentric regions labeled SH1 through SH6. The regions are color-coded to represent importance biasing, with a color scale on the right ranging from 0.1 (purple) to 10 (red). The regions are labeled as SH1 (center), SH2, SH3, SH4, SH5, and SH6 (outermost). The background is labeled 'OUTAIR'. The left sidebar shows the 'Bias(IMP)' layer selected, with options for 'Show' and 'Palette' set to 'Importance-N'. The bottom status bar displays coordinates: x: 158.7387039, y: -70.53883114, z: 97.5113.

Exercise 10: Importance biasing - Results

No BIAS



Region Importance Biasing

