



Exercise 10: Importance biasing

FLUKA Beginner's Course

Exercise 10: 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 10: Importance biasing

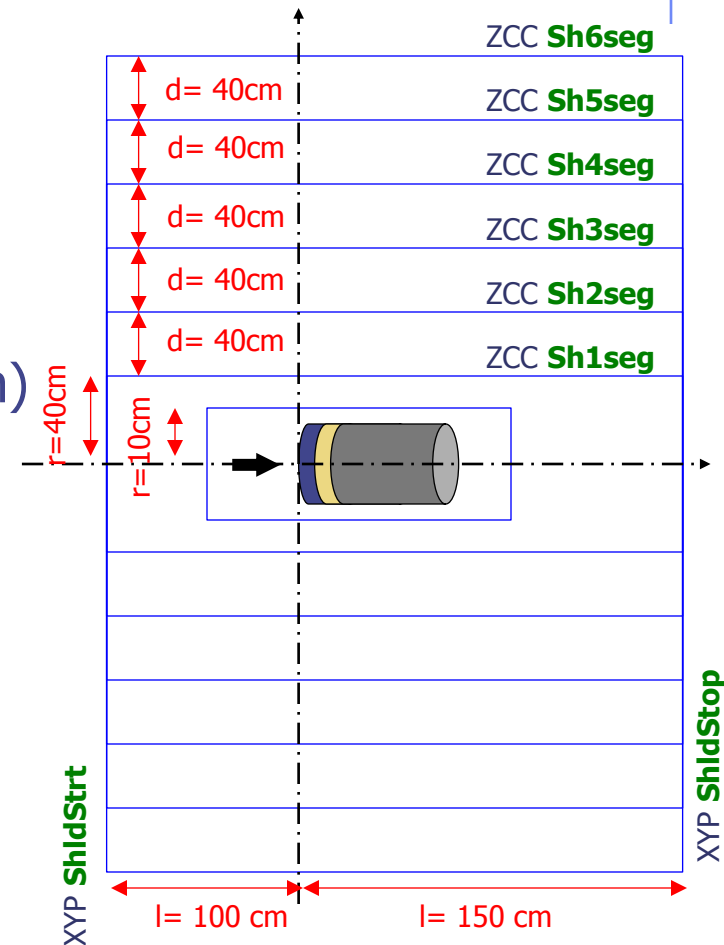
- Start from the solution of ex5 (copy both inp and flair files):

```
mkdir ex10 ; cp ex5/ex5.* ex10/. ; cd ex10
```

- 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 ($y=0$)



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Materials

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

Concrete: (mass fraction)

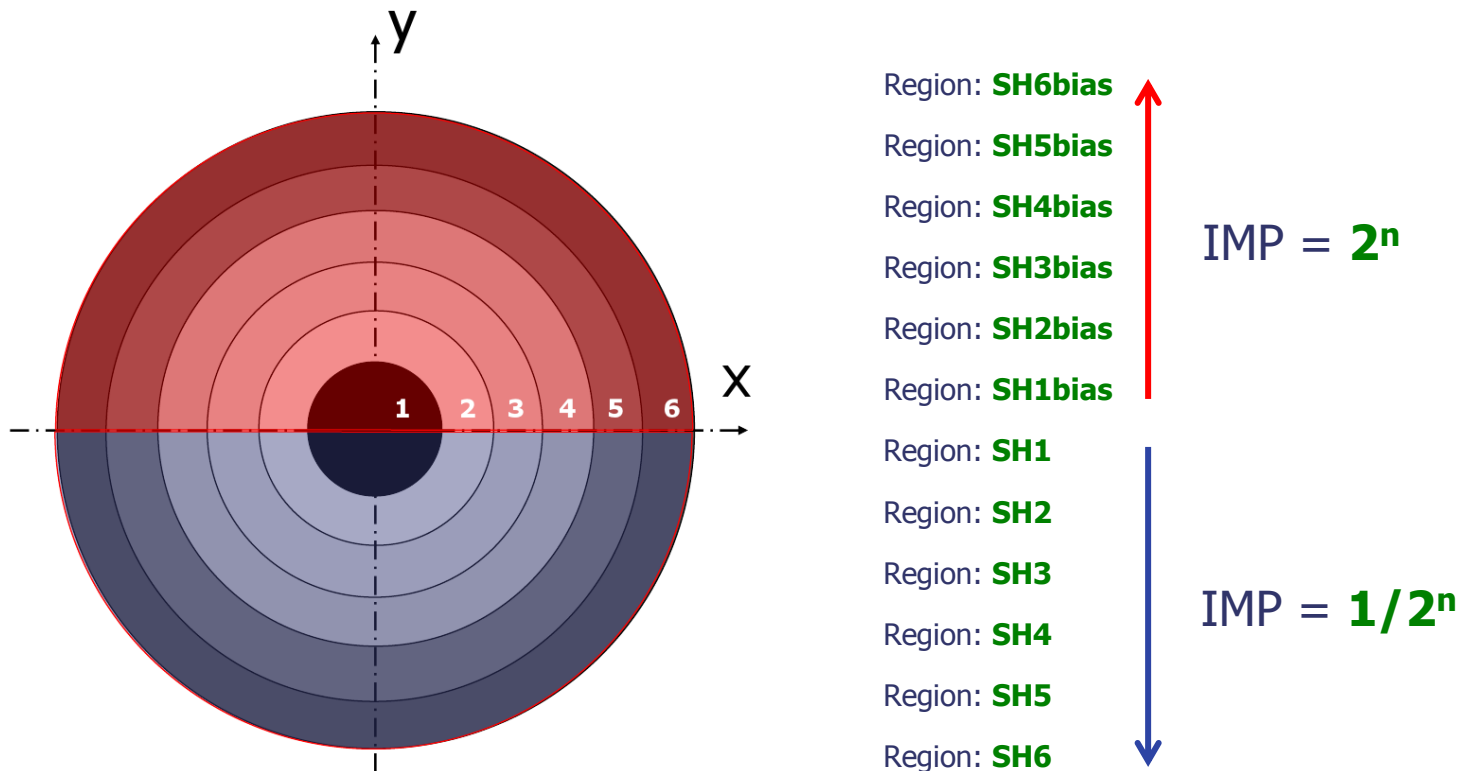
Hydrogen	0.01	Aluminum	0.034
Carbon	0.001	Silicon	0.337
Oxygen	0.529	Potassium	0.013
Sodium	0.016	Calcium	0.044
Magnesium	0.002	Iron	0.014

Density: 2.42g/cm³

- ❑ Assign it to all the shielding region
(Are you clever enough to do it with one single card?)

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- ❑ 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`)



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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

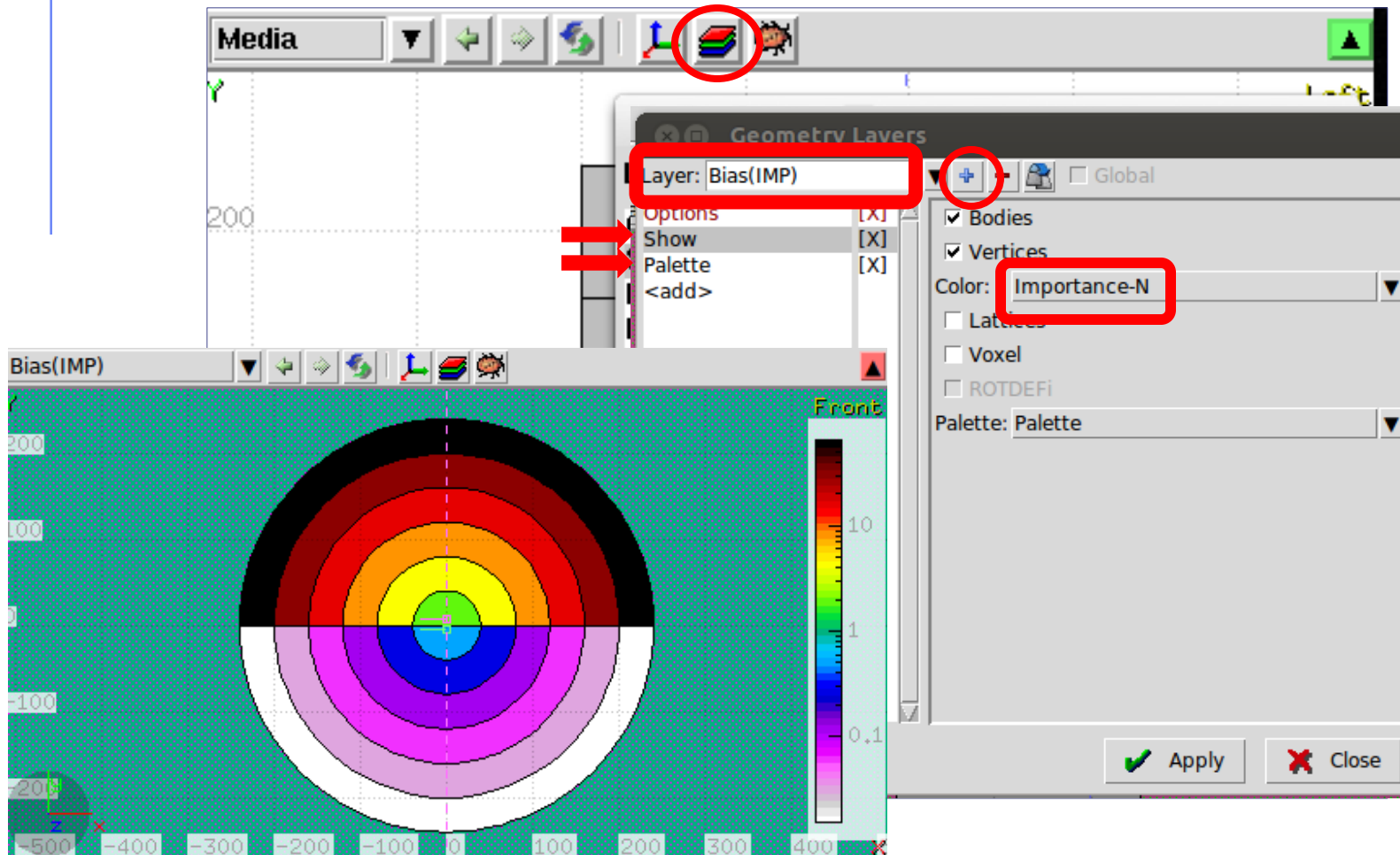
- ❑ 2 separate runs, w/ and w/o biasing (do not overwrite results)
- ❑ 5 cycles, 10000 primaries each

Plot

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

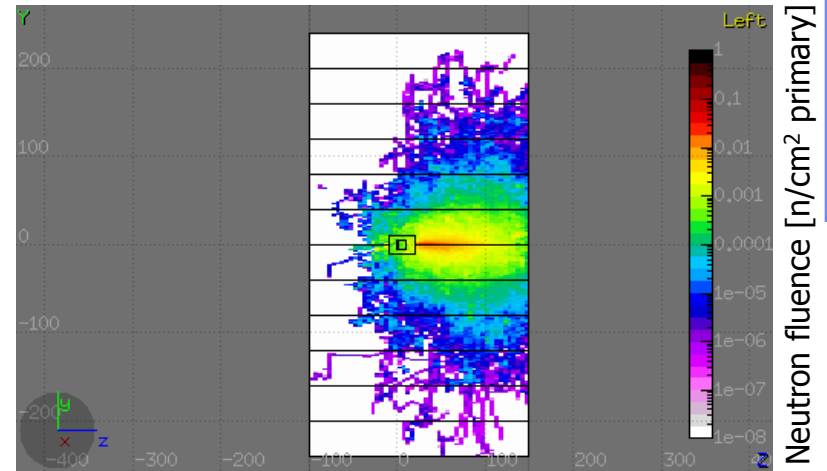
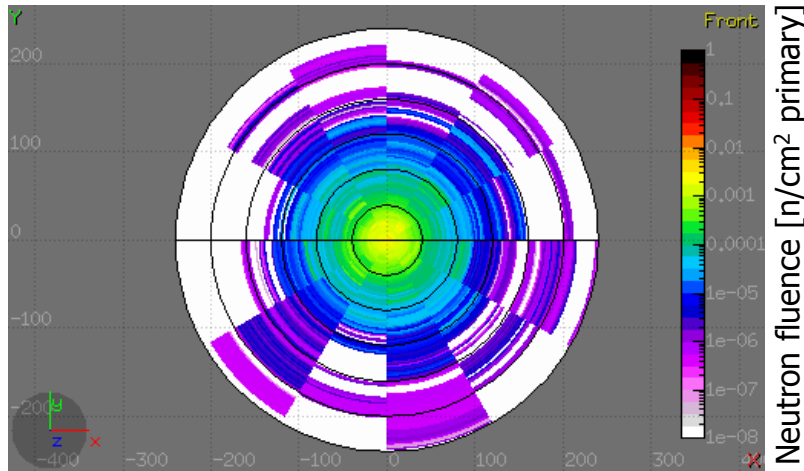
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How to display region importance in the Geometry Editor



Exercise 10: Importance biasing - Results

No BIAS



Region Importance Biasing

