



Exercise 8: Importance biasing

Beginners' FLUKA Course

Exercise : Importance biasing

GOAL: get a taste of the **region importance biasing** effects;

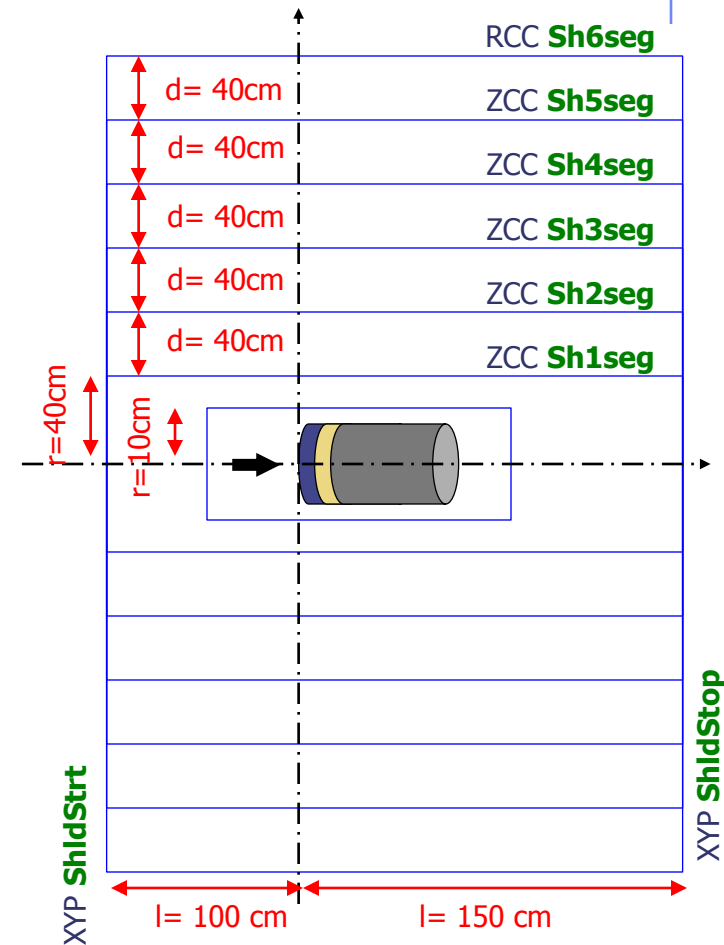
- Create a folder called **ex8** and start there a new flair project based on the **course** template (as before)
- Save the input as **ex8.inp** and the flair project as ex8.flair

Modify the geometry to create a concentric shielding which can be "biased":

- **Bodies (for example):**

- Add an **RCC** around the target with a radius of 10 cm, starting at $z=-10$ and with an height of +30 cm along z ;
- Add a 240 cm thick concrete **RCC** shield around the target segmented in 6x40 cm thick concentric layers (i.e. add 5 concentric **ZCC** cylinders).
- Add a cutting plane (**XZP**) at $y=0$.

Note: You can use also only ZCC cut by planes (optimal for speed).



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- **Materials:**

- Shielding is made out of concrete, which is not a default FLUKA material, so you must define it starting from a typical composition:

```
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
```

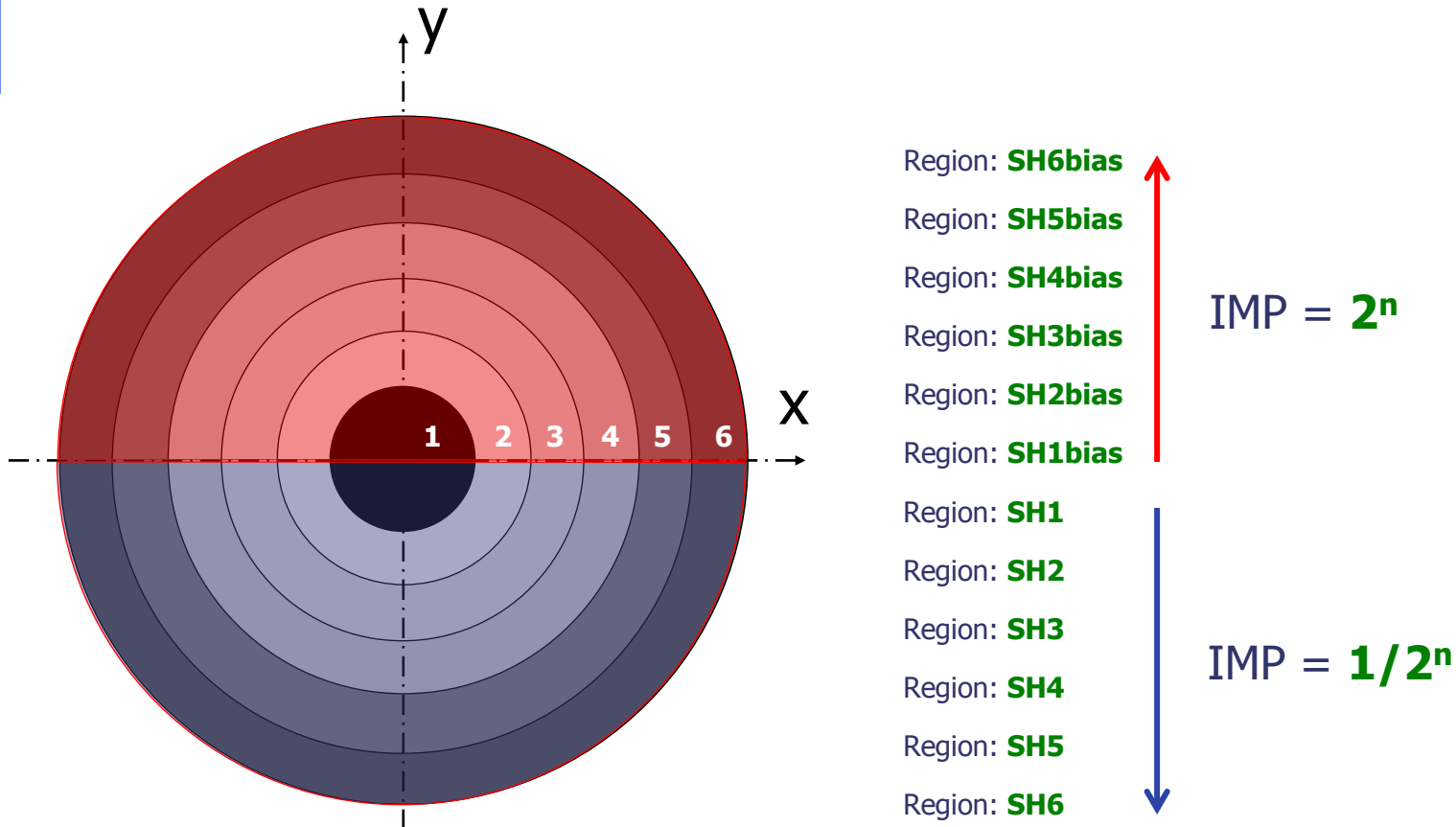
Density: 2.42g/cm³

- Assign the material to all the regions of the shielding (you can also do it with only one card if you positioned the definition of the region smartly)

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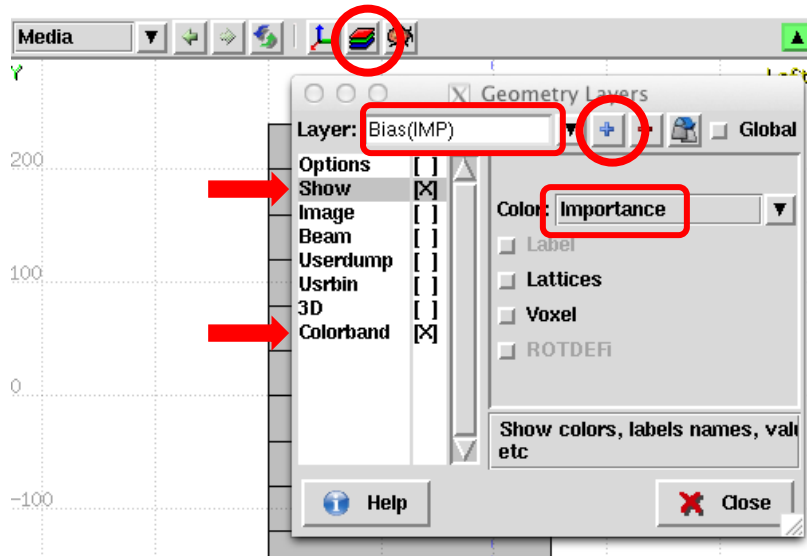
○ Setting the biasing

- Reset/set the importance of the biasing of all regions for all particles to 1;
- Set the importance of the region with the BIAS as 2^n for $y > 0$ and as $1/2^n$ for $y < 0$ where n is the layer/shell of the concrete shielding from 1 (inner) to 6 (outer);
- Enclose the BIAS cards between "**#if flagBIAS ... #endif**" statements, so you can activate/deactivate the biasing just enabling **flagBIAS**.



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- Display the importance of the regions in the geometry editor



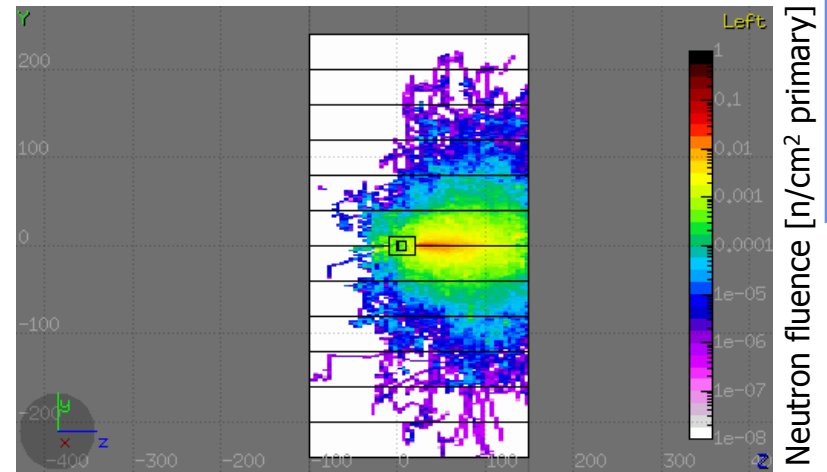
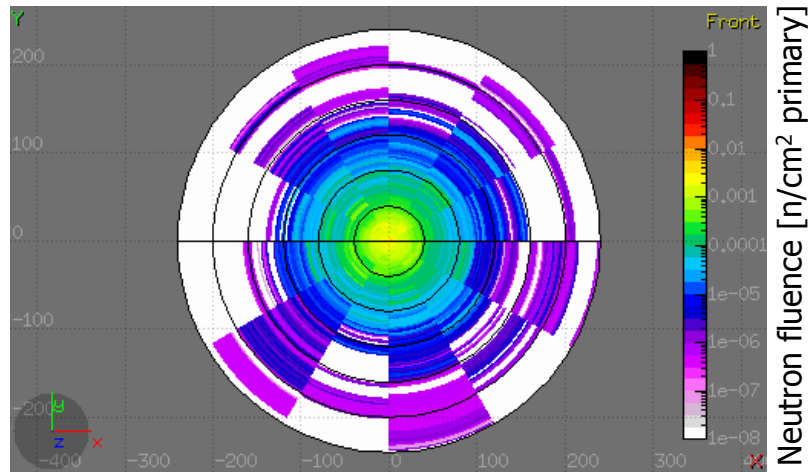
- **Setting the scoring**

- Add a region-independent scoring (USRBIN) for neutrons which extends over the full dimension of the shielding with sufficient bins [i.e. **R-Phi-Z**]
- Create an USRBIN plot with FLAIR. (Optional) you can also view the USRBIN also with geodit by creating a "new layer";

Note: as before not to overwrite the results when running the second time you can create two runs in flair (with and without bias) and run them independently enabling for the first the flagBIAS define.

Results – Neutron fluence

No BIAS



Region Importance Biasing

