Secondary Beam Lines Exercise Solutions

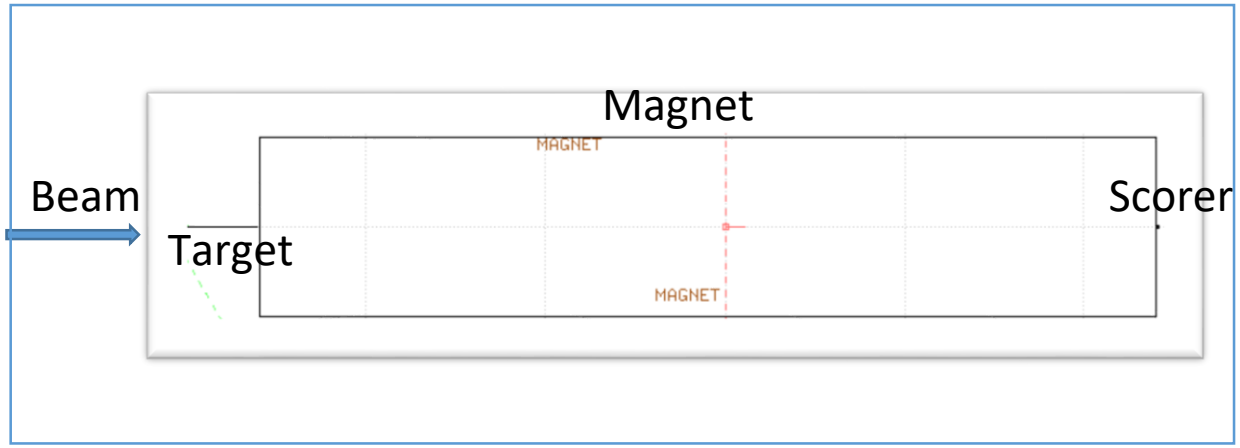
First complete beam line in FLUKA

Secondary Beam Lines

Solutions for secondary beam lines exercise:

- Built the main components as described in the exercise task.

- Set the Magnet region to magnetic



SBL exercise solutions – Input File

Preparation of the input file:

- Magnetic field definition: 2 Tesla field in y

  MGNFIELD Max Ang (deg): Bound Acc. (cm): Min step (cm):
  Bx: 0 By: 2 Bz: 0

- Activated the magnetic option in field

  ASSIGNMA Mat: VACUUM ▾ Reg: MAGNET ▾ to Reg: ▾
  Mat(Decay): ▾ Step: Field: Magnetic ▾

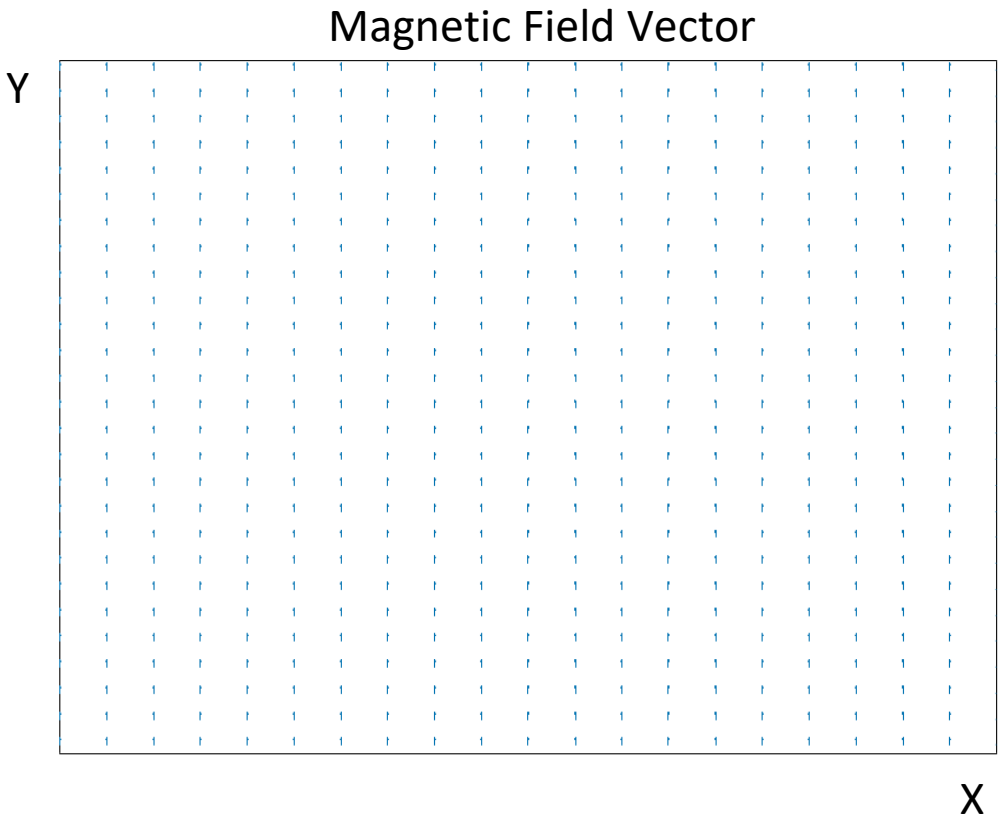
- Scoring particles with usrtrack, neutrons in this case

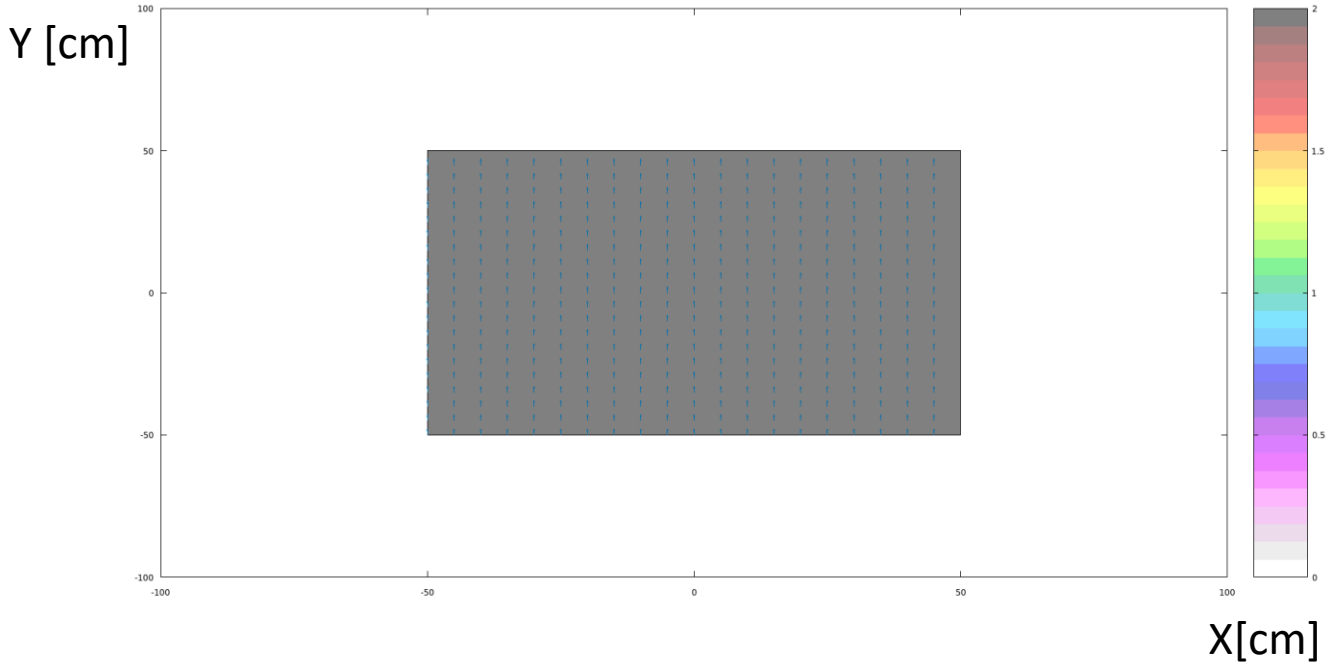
  USRTRACK Unit: 21 BIN ▾ Name: scoren
  Type: Log ▾ Reg: SCORE ▾ Vol: 1
  Part: NEUTRON ▾ Emin: 50. Emax: 400. Bins: 50

SBL exercise solutions

Plotting Field

- In flair Plot tab check magnetic field:

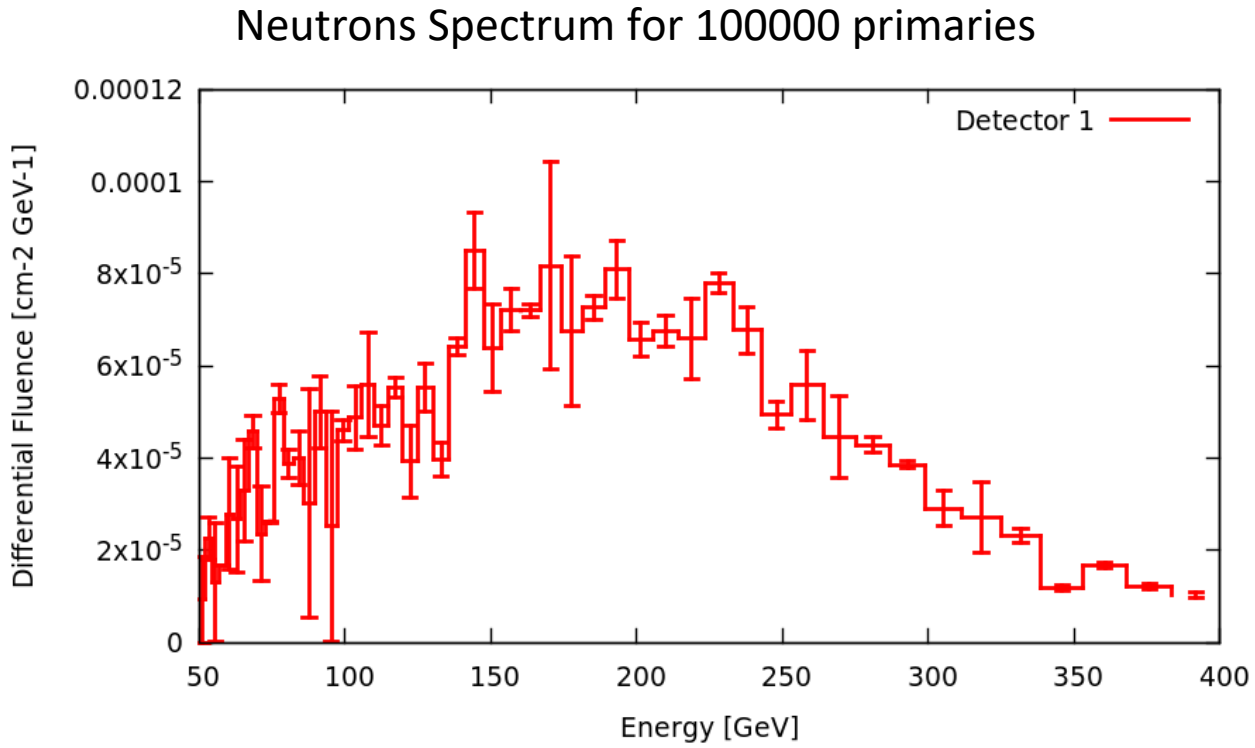




SBL exercise solutions

Plotting particles spectra

- In flair Plot tab plot spectra:
  - The bending magnet sweeps away all the charged particles, therefore we can see neutrons only with the defined scorer.



SBL exercise solutions-Optional Task

Calculating scoring volume size

- ϑ[rad] can be found using our values:

$$\vartheta[\text{rad}] = (0.29979 * 2[T] * 5[m])/400[\frac{\text{GeV}}{\text{c}}] \sim 7 \text{ mrad}$$

- To see the displacement in x we can use:

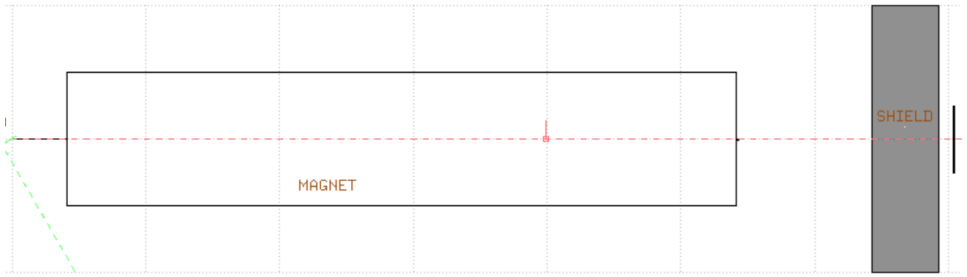
$$x = L/2 * \vartheta \sim 2\text{cm}$$

- Our detector has to therefore have an extension in x less than 2 cm in order to not detect primaries at 400 GeV/c.

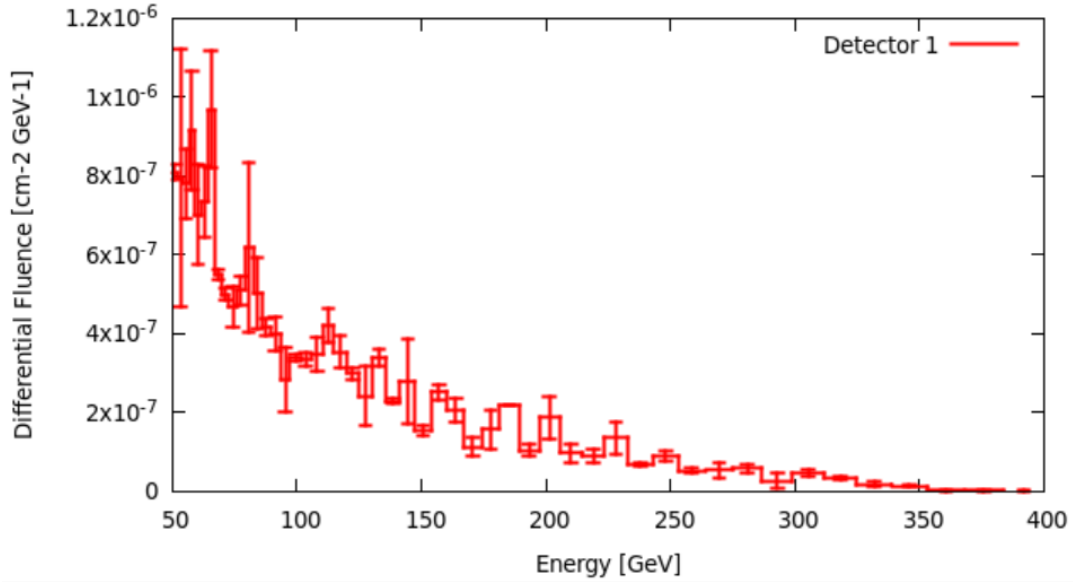
SBL exercise solutions-Optional Task

Adding Shielding

- The shielding and detector are added to the geometry:



- The fluence can be checked placing a USRTRCK card in the detector volume as done before:



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