



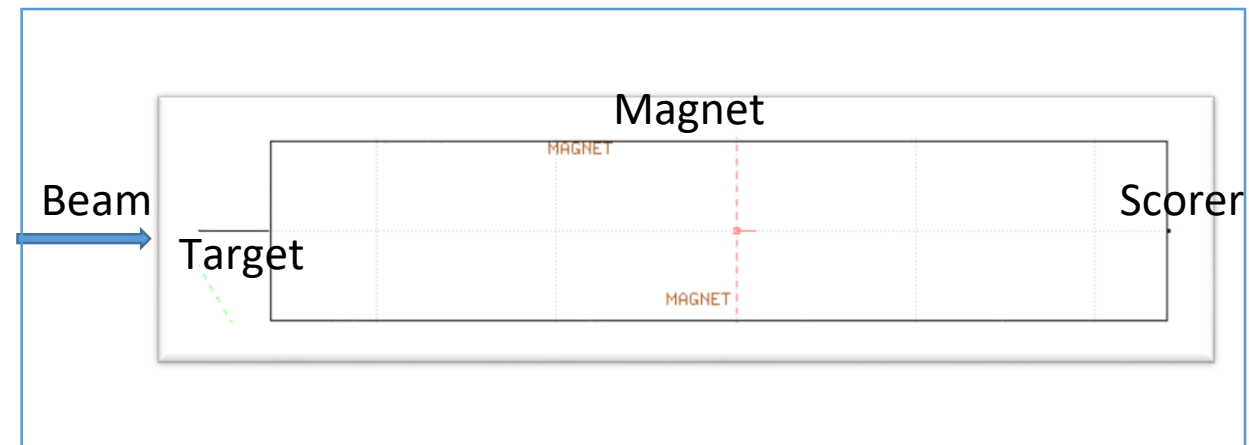
Secondary Beam Lines Exercise Solutions

First complete beam line in FLUKA

Secondary Beam Lines




Solutions for secondary beam lines exercise:

- Build the main components as described in the exercise task.
- Set the Magnet region to magnetic



SBL exercise solutions – Input File

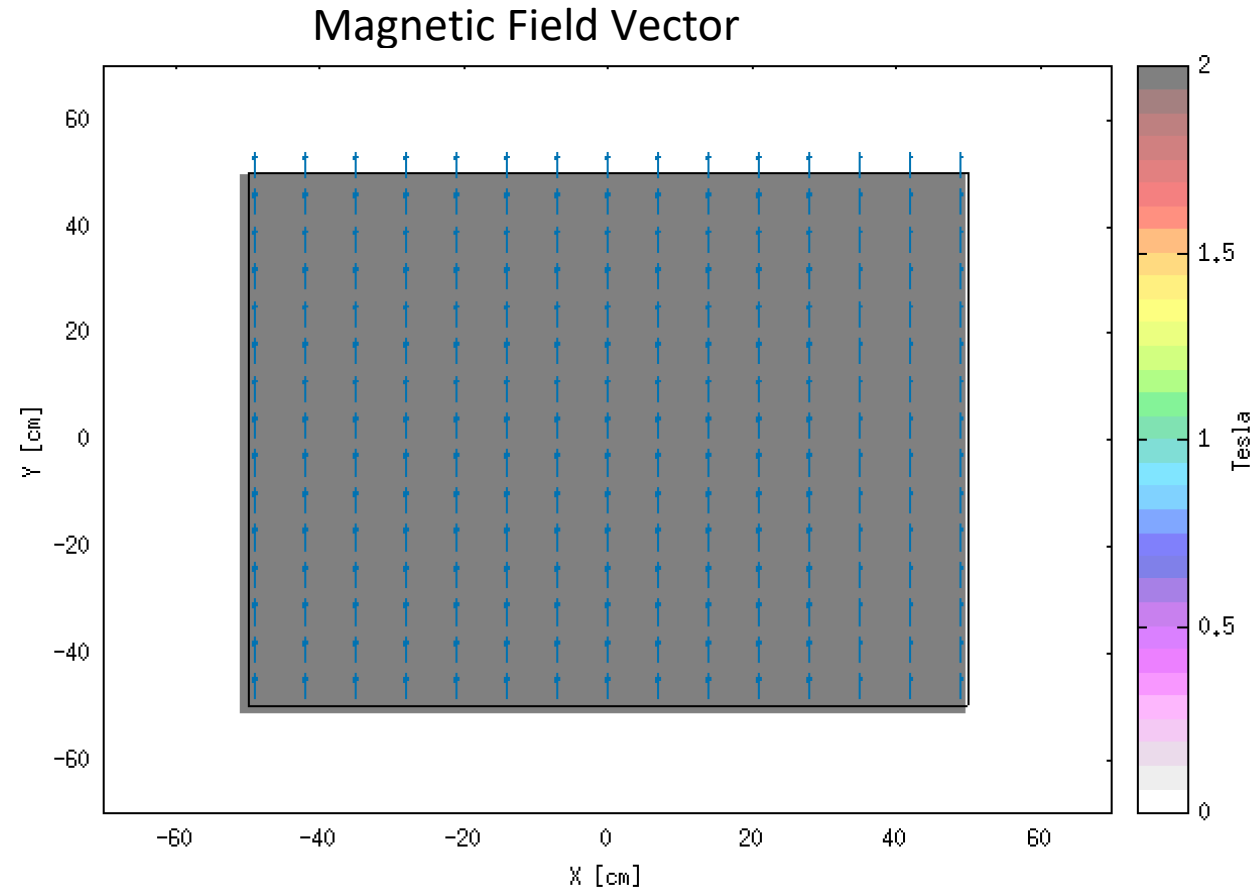
Preparation of the input file:

- 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

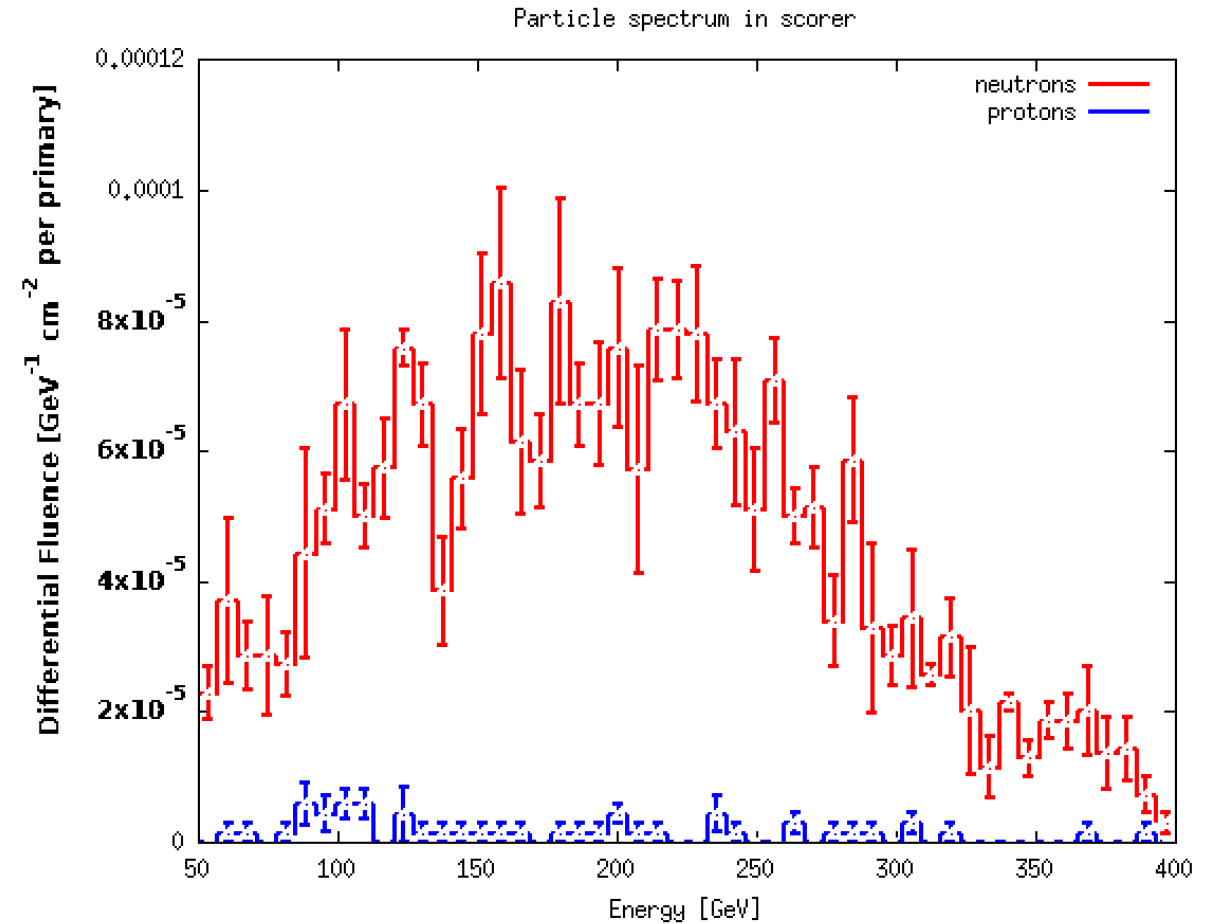
- In Flair Plot tab, check magnetic field:



SBL exercise solutions

Plotting particles spectra

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



Spectrum for 100000 primaries

SBL exercise solutions – Optional Task

Calculating scoring volume size

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

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

- To see the displacement in x we can use:

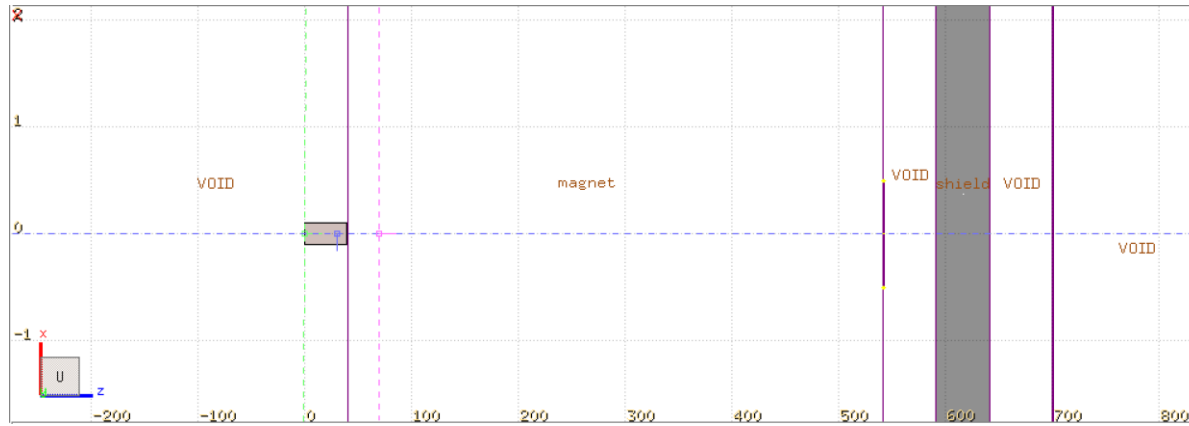
$$x = L/2 \times \vartheta \sim 2 \text{ cm}$$

- Therefore, our detector has to 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 USRTRACK card in the detector volume as done before:

USRTRACK	Unit: 22 BIN ▾	Name: n
Type: Linear ▾	Reg: detector ▾	Vol:
Part: NEUTRON ▾	Emin: 50	Emax: 400
		Bins: 50

