



## **Exercise: Simple sources and preprocessor**

# Exercise objectives

- Setting up different simple beams
  - Point source with **BEAM** and **BEAMPOS** card
- Using conditional preprocessor
- Using separate runs
- Visualizing the beams
- Plotting the predefined scorings

# Problem to solve

We want to set up a simulation for radiation therapy

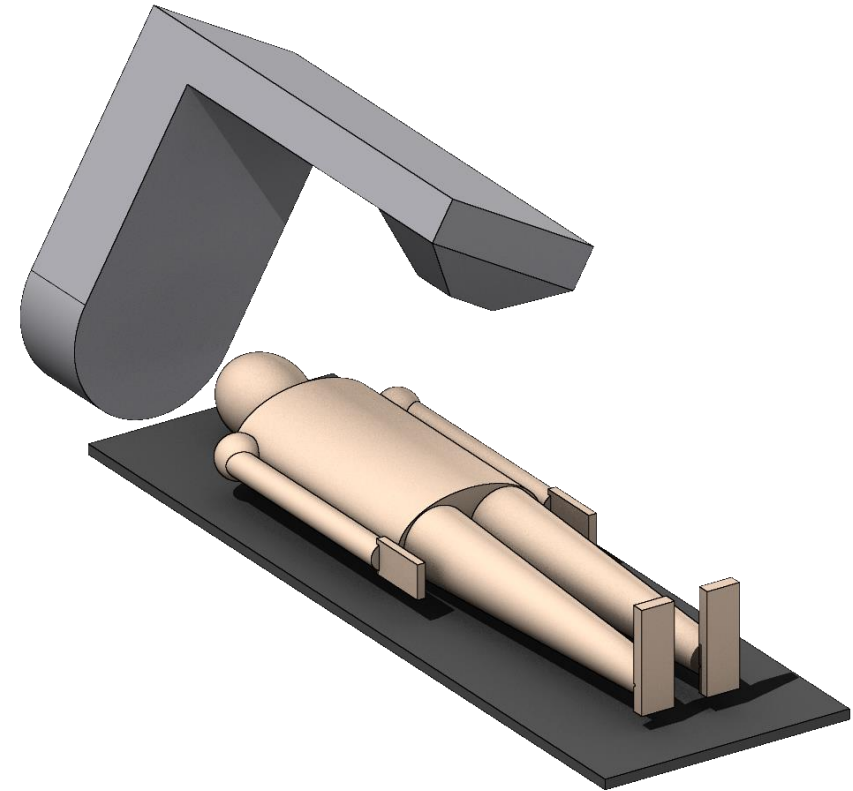
The beams should start in the gantry:

$(x = 22.5, y = 38.97114317, z = 0)$ ,

and directed towards the origin

The scorings already set up:

- Sideview of the beam
- Shape of the beam close to the patient
- Energy spectrum



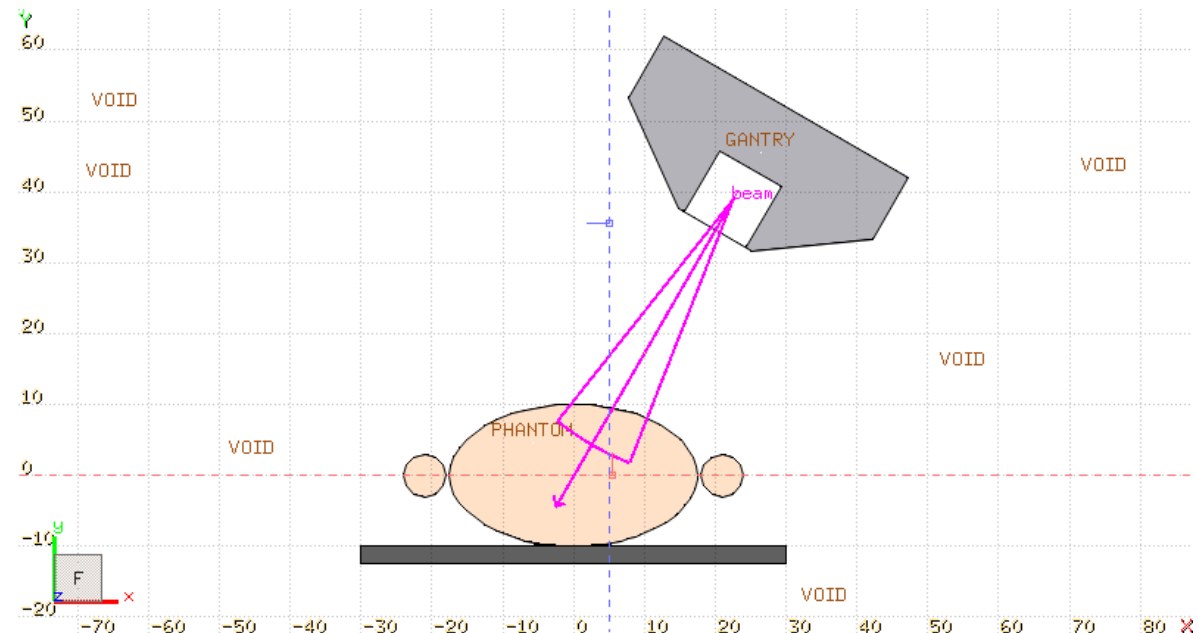
# Defining and selecting a beam

- Set up a two photon beams with a flat 0.3 rad angular divergence:
  - First beam with a Flat momentum distribution between 5 and 10 MeV/c
  - Second beam with a Gaussian momentum distribution:  
Mean energy = 10 MeV, FWHM = 1 MeV/c
- Use the Geometry tab (Geoviewer) to see if the direction and angular divergence is correct
- Define (**#define**) an identifier with the name “**Gaussian**”
- Make the two beams selectable with the conditional preprocessor directives (**#if**, **#else** and **#endif**)

Make sure if the “**Gaussian**” identifier is enabled, the appropriate beam is used

# Defining and selecting a beam

- Set up a two photon beams with a flat 0.3 rad angular divergence:
  - First beam with a Flat momentum distribution between 5 and 10 MeV/c
  - Second beam with a Gaussian momentum distribution:  
Mean energy = 10 MeV, FWHM = 1 MeV/c
- Use the Geometry tab (Geoviewer) to see if the direction and angular divergence is correct
  - Set the scale property to 5000 to be able to see the beam

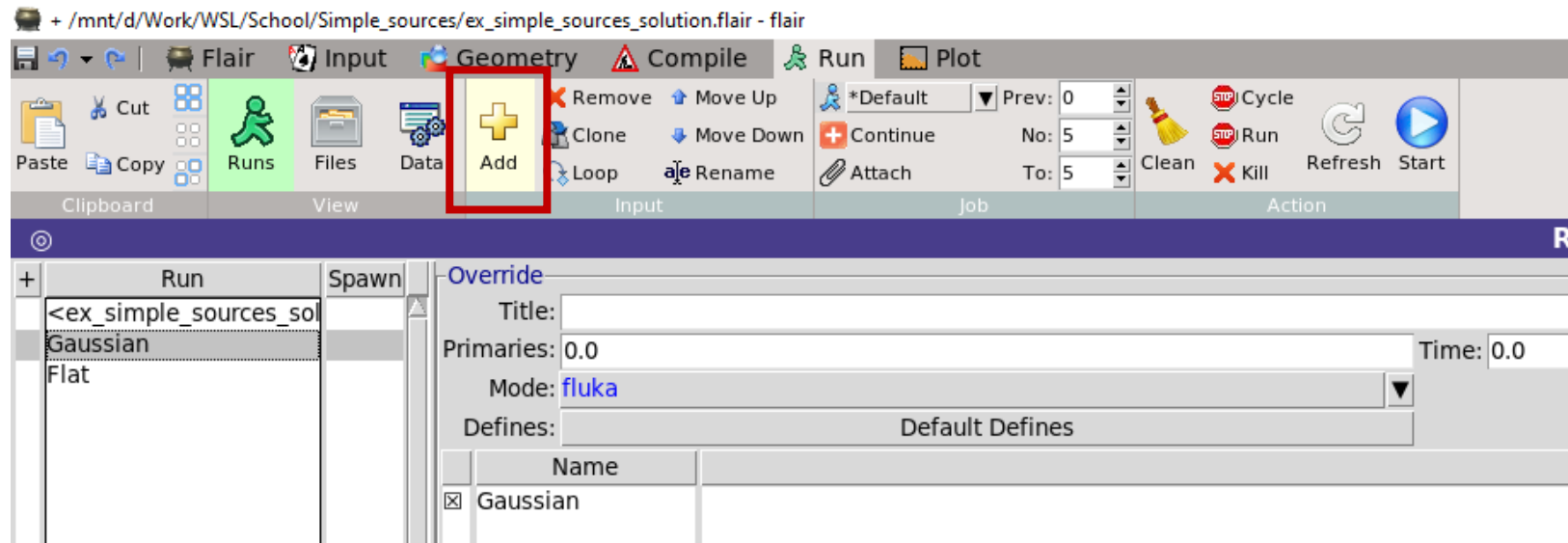


# Creating separate runs

- Define (`#define`) an identifier with the name “**Gaussian**”
- Make the two beams selectable with the conditional preprocessor directives (`#if`, `#else` and `#endif`)

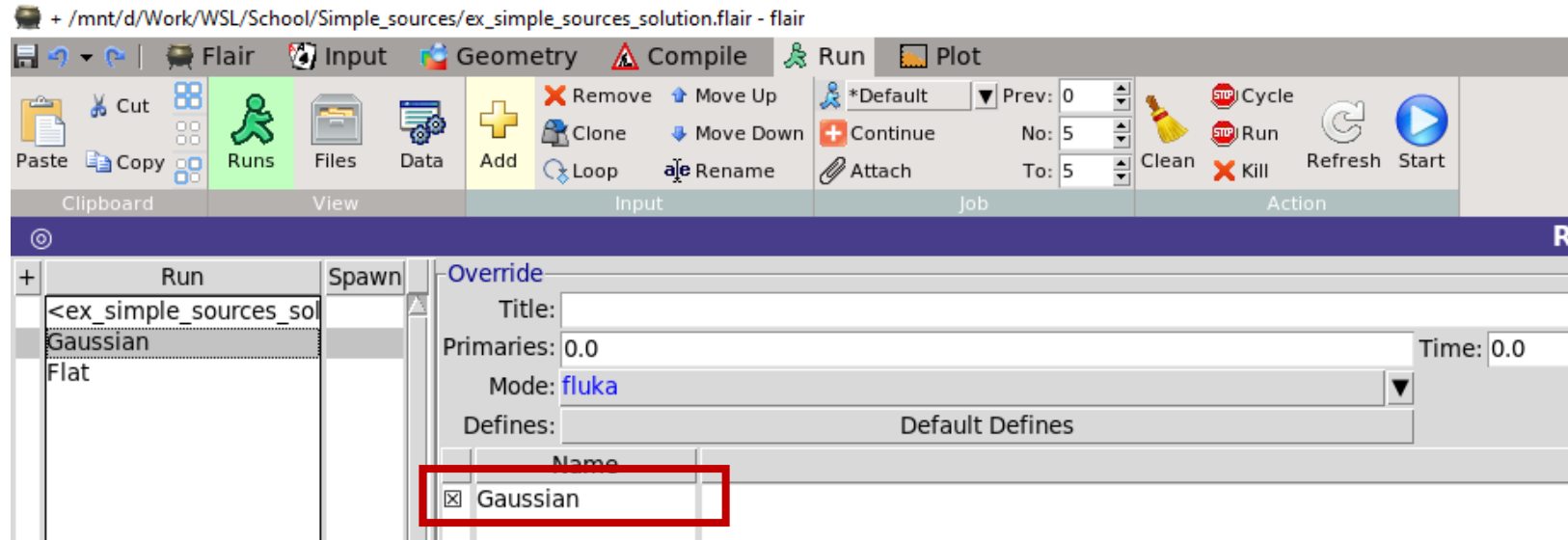
Make sure if the “**Gaussian**” identifier is enabled, the appropriate beam is used

- Create two new runs called “**Gaussian**” and “**Flat**” on the Run tab



# Selecting a beam

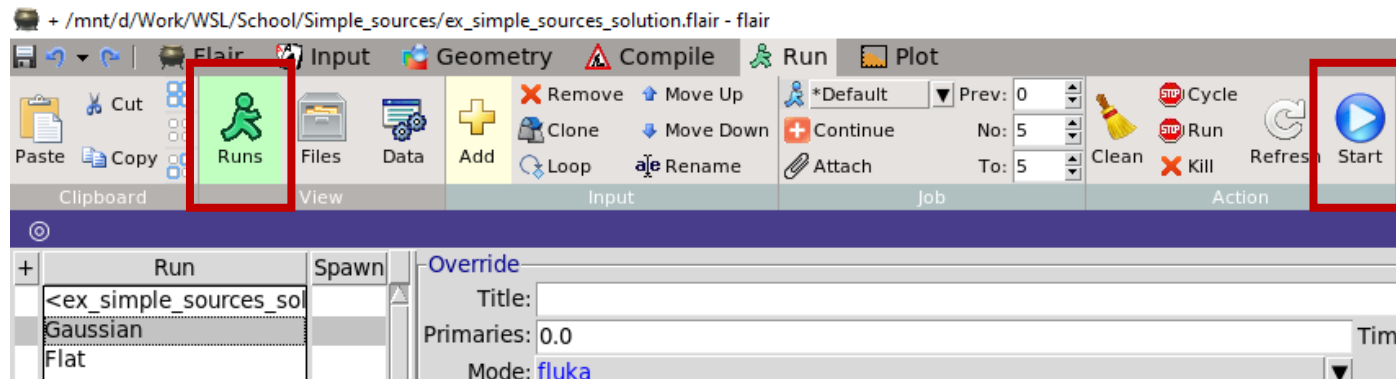
- With a new run, it is possible to enable or disable an identifier without changing it on the Input tab.



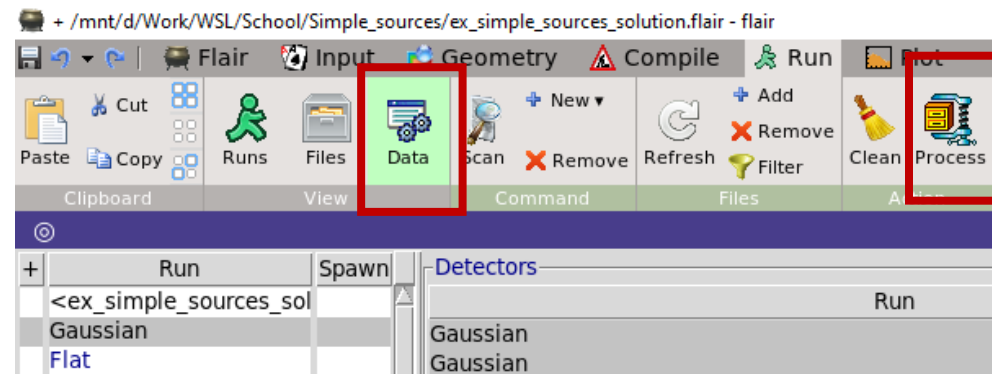
- If the box is checked then the identifier will be enabled, if it is unchecked the identifier will be disabled for this specific run.
  - Set the Gaussian identifier enabled for the Gaussian run
  - Set the Gaussian identifier disabled for the Flat run

# Run and process the simulations

- Run both simulation:
  - Select the name of the run and click **Start** on the Ribbon



- Process both simulations:
  - Click **Data** on the Ribbon, select the name of the run and click **Process** on the Ribbon

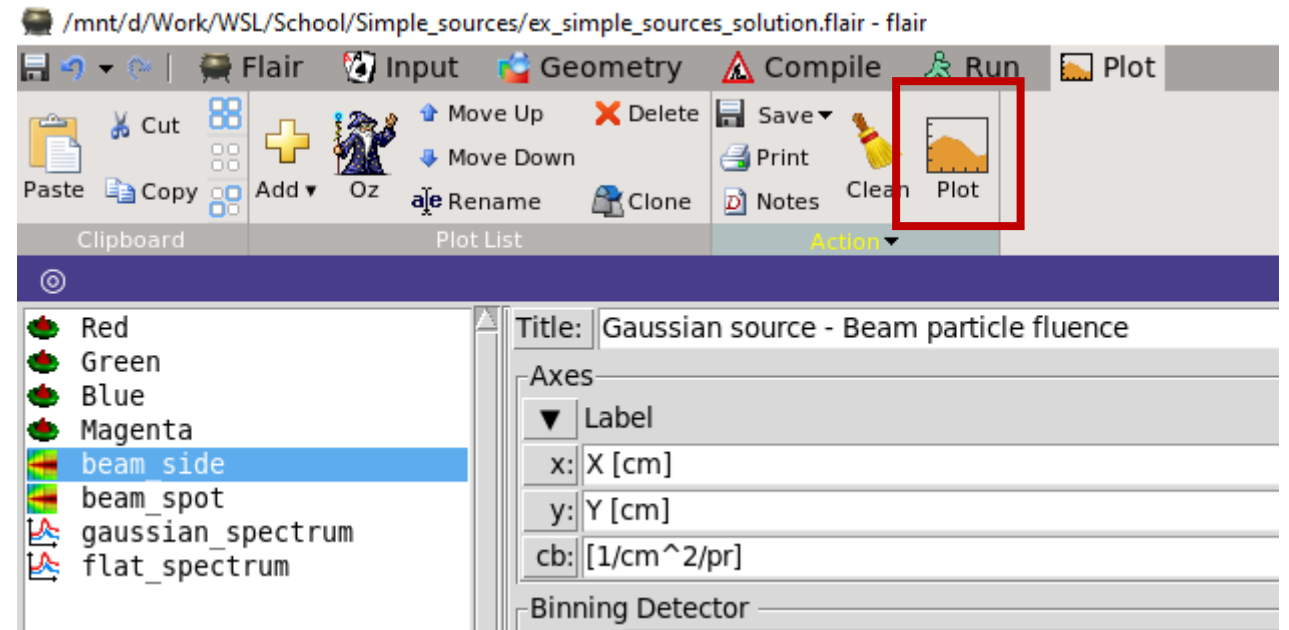




# Plot the results

- 4 plots are already prepared:
  - Side profile of the beam
  - Spot shape of the beam
  - Energy spectrum of the Gaussian beam
  - Energy spectrum of the Flat beam

- To plot select the name of a plot on the left side, then click the **Plot** button on the Ribbon



# Expected results

