



Exercise: advanced geometry

Exercise objectives

- Practice with translations and rotations in Fluka
 - `$start_translat`
 - `$start_transform`
 - `ROT-DEFI`
 - `ROTPRBIN`

Geometry

- Start from the given input file
- Notice that all the geometry elements are there:
 - 1 exp. hall, 1 exp. chamber, 1 collimator, 1 Image Plate detector
(if you don't see them, look in the origin and on different views)
- Notice the use of bounding boxes (container bodies) in the definition of the elements

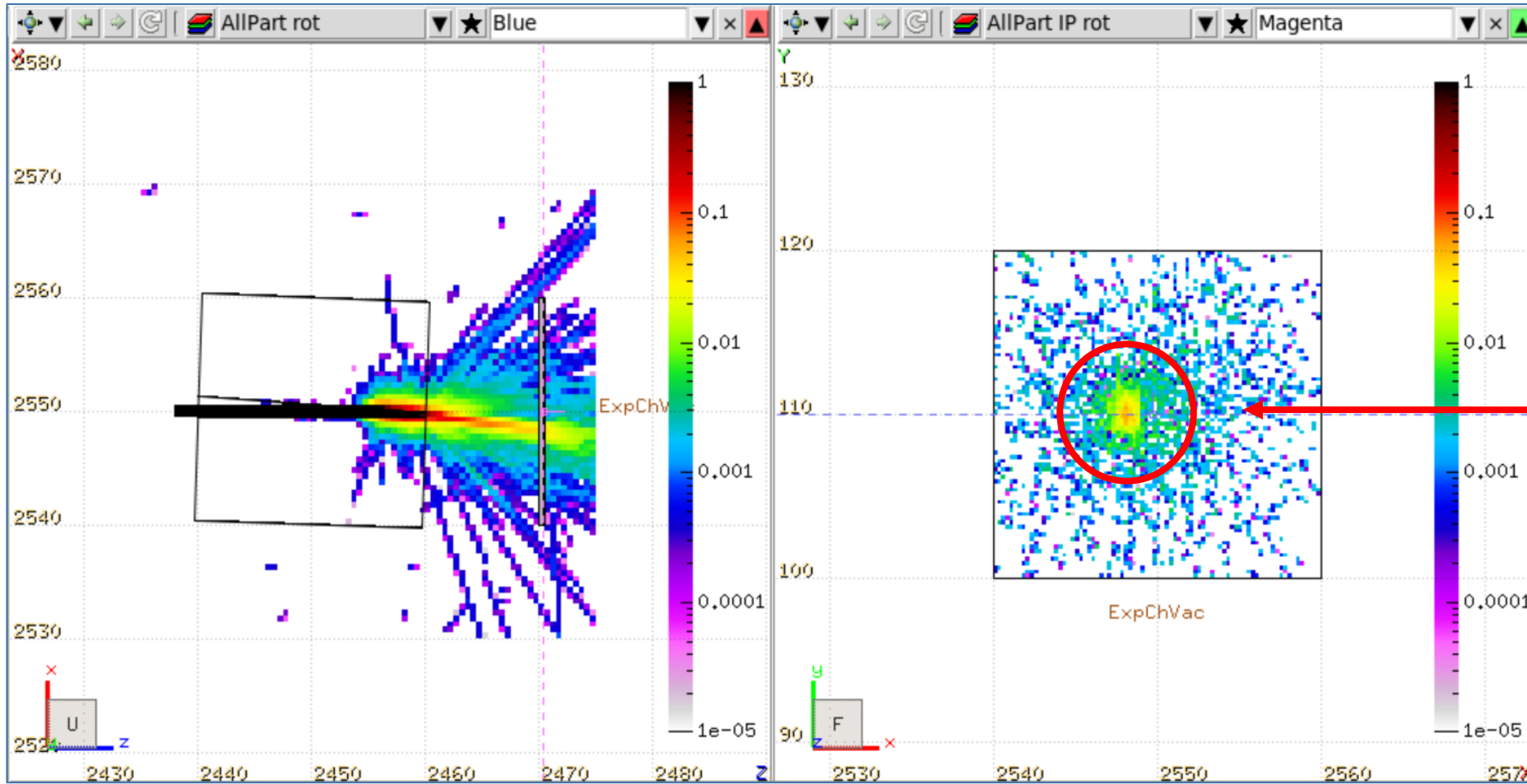
Geometry changes and scoring

- Translate exp. chamber bodies by $\Delta x=2500$ cm, $\Delta y=80$ cm, $\Delta z=2400$ cm
- Translate Image Plate bodies by $\Delta x=2550$ cm, $\Delta y=110$ cm, $\Delta z=2470$ cm
- Transform collimator bodies using two **ROT-DEFI** cards:
 1. Rotation around Y-axis by 2° (inside an “**#if / #endif**” with a **#define** named “**rotation**” as condition)
 2. Translation by $\Delta x=2550$ cm, $\Delta y=110$ cm, $\Delta z=2450$ cm
- Score the energy deposition in the collimator on a grid
 - The **USRBIN** card is already included
 - A **ROTPRBIN** card needs to be associated to the scoring so that it appropriately matches the collimator in case of rotation

Run and look at results

- For the **case with the rotation**, run 5000 primaries (use cycles and spawns)
- Merge the results
- If necessary, adapt the already available layers in the Geometry editor
- Look at the particle fluences for the two cases:
 - (X,Z) plane over the whole geometry (“AllPart rot”)
 - (X,Y) plane over the image plate (“AllPart IP rot”)
- Look at the scoring of the energy deposition on the collimator
- In the geometry editor, try to add a layer (“Edep mesh”) to visualise the rotated **USRBIN** mesh from the input file (i.e. just the mesh definition, not the simulation results)

Result: particle fluence with tilted collimator

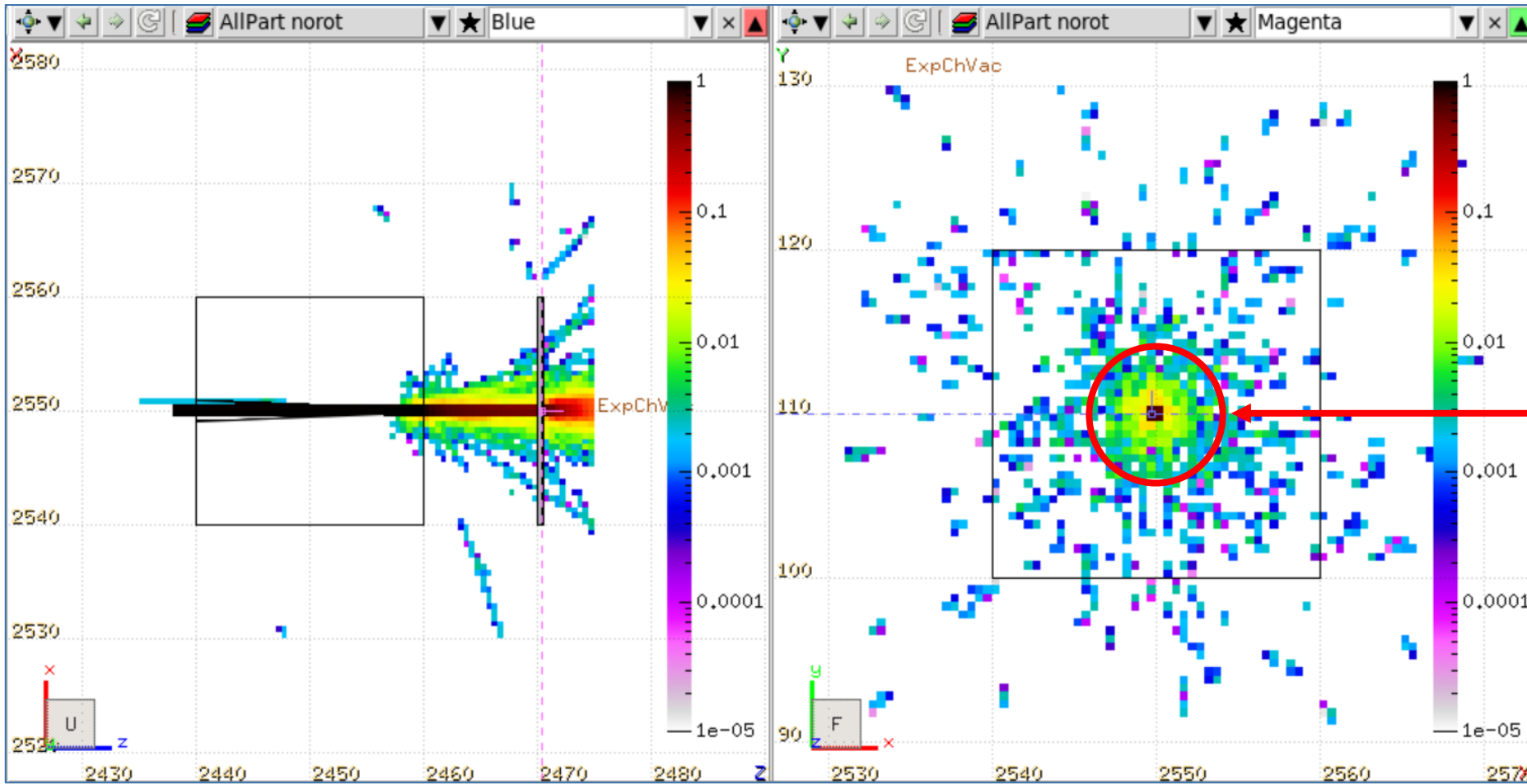


The electron beam does not hit the center of the Image Plate

Particle fluence with straight collimator

- Disable the collimator rotation using the preprocessor instruction
- Run with the [collimator aligned](#)
- Compare the results (impinging point on the Image Plate)

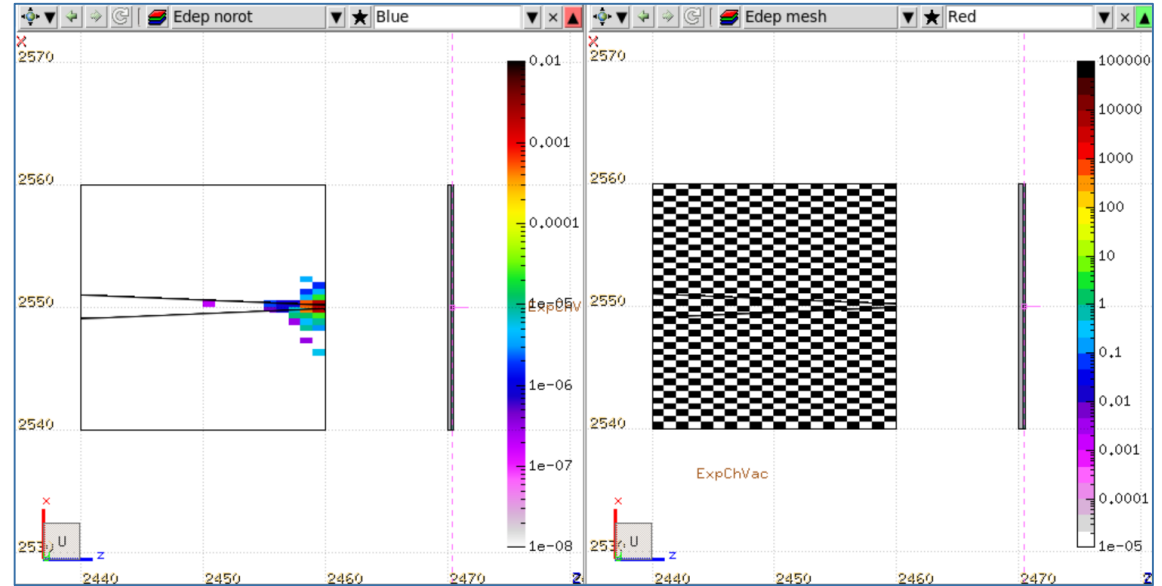
Result: particle fluence with straight collimator



The electron beam hits the center of the Image Plate

Energy deposition

Without collimator rotation



With collimator rotation

