# Flair – Geometry Editor – Part I

Beginners' FLUKA Course

# Starting the Geometry Editor
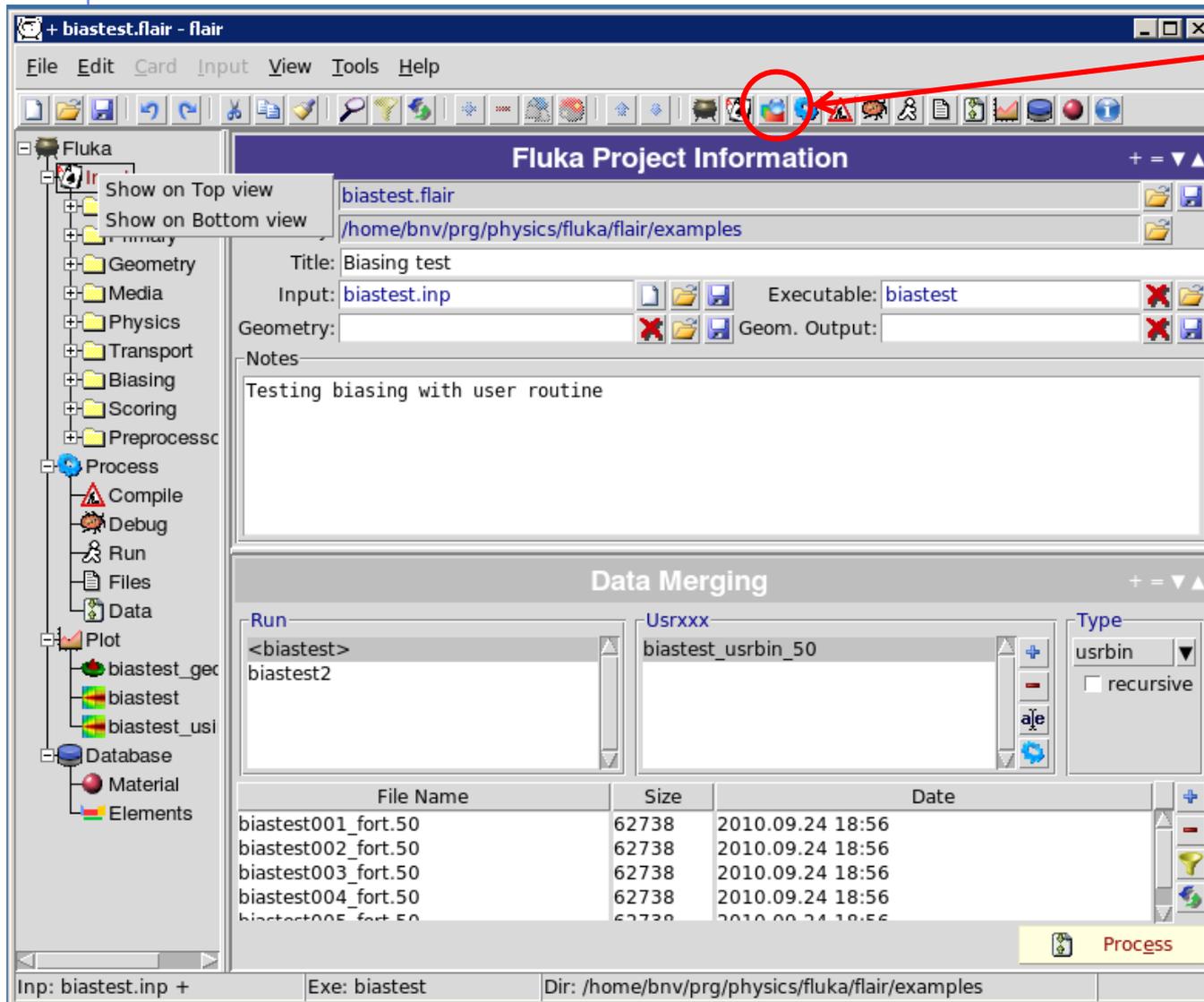


Click on icon
or from Menu
→ View
→ Geometry Editor
or with
[F4] shortcut

● Either start flair
  with option -g

# Geometry editor

- Working on 2D cross sections of the geometry;
- Interactive visual editing of the geometry in 2D;
- Debugging bodies/regions in a graphical way;
- Fast 3D rendering of the geometry;

Pros

- Fast display of complex geometries;
- Many user-customizable layers;
- Graphical editing of the bodies with snapping mechanism to generate accurate coordinates;
- Visual selection and editing of zones w/o the need to know the orientation of bodies;
- Use real curve of bodies with no conversion to vertices/edges;
- Interactive debugging with information of problematic bodies, regions and/or zones;

Cons

- Tricky to orientate in an unknown geometry;
- Difficult to find region using the expression;

# Geometry Editor: Interface



Filter

Filtered Objects

Properties & Attributes

Tools

Borders — Red

Media — Green

Lattice — Blue

3D — Magenta

Automatically refreshes every time the input is changed

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# Viewport axes System
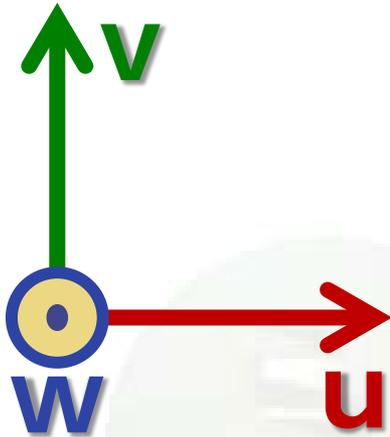
Each viewport is defined by:

- **Origin**      center of viewport
- **Basis**      relative axes system u, v, w. w is coming out of the screen towards the user
- **Extends**    zooming

***Note:***

- Each viewport is facing towards negative **–w**
- If bodies A, B are touching the viewport like on the plot.
- Only body B will be visible
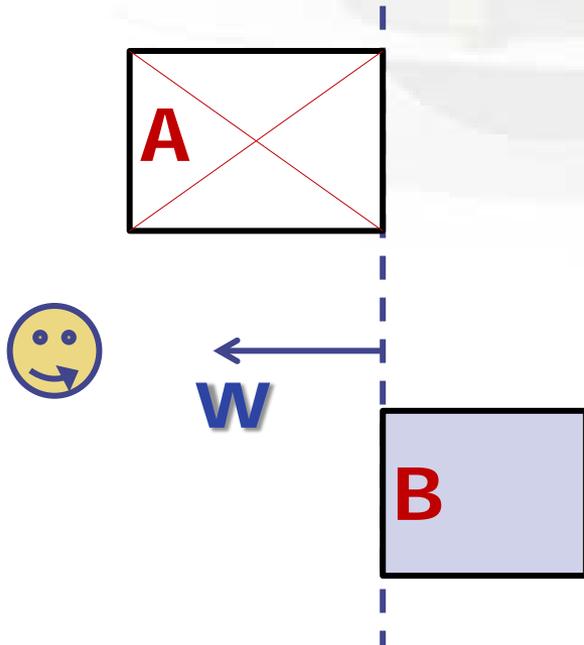
# Navigation - Keyboard

- [*arrows*]                        pan viewport
- Ctrl + [*arrows*]              orbit viewport around **u,v** axes
      + [Shift]                   rotates by 90°
- Page Up/ Page Down      pan viewport front/back
- Ctrl + PgUp/PgDn          rotate viewport around **w** axis
- = / -                             zoom in / zoom out
- o                                  open projection dialog to set the **o**rigin/basis/save/recall etc...
- 0 (zero)                        Center to origin
- 1, 2                              **front [X:Y] / back [-X:Y]**
- 3, 4                              **left [Z:Y] / right [-Z:Y]**
- 5, 6                              **top [Z:X] / bottom [-Z:X]**

*Assuming:*        *Z = direction of the beam (horizontal)*
                        *X = horizontal*
                        *Y = vertical*

# Navigation – Mouse [1/2]

With the left mouse button:

1. Select the appropriate action pan/orbit/zoom with:
   I. Menu → Tools
   II. Toolbar
   III. Keyboard shortcut
2. Click and drag the desired viewport

| | function | key | description |
|---|---|---|---|
| | Pan | x | Pan viewport |
| | Orbit | t | Orbit viewport using a virtual **t**rackball |
| | Zoom | z | Drag area to **z**oom In ([**Ctrl**] to zoom out) |
| | | Shift-Z | Zoom viewport on selected items |
| | | Alt-Left | Go to previous in history projection |
| | | Alt-Right | Go to next in history projection |

# Navigation – Mouse [2/2]

With the **middle** mouse button

- **alone** — Pan/Move viewport
- **Ctrl** — orbit projection using a virtual trackball
- **Ctrl-Middle-Shift** orbit projection using a virtual trackball with steps of 15 degrees
- **Shift** — select rectangle region and zoom into
- **Shift-Middle-Ctrl** select rectangle region and zoom out
- **Wheel** (if any) — zoom in/zoom out
  - **Ctrl-Wheel** — pan/move forward or backward
  - **Ctrl-Shift-Wheel** smoother pan/move forward/backward

💡 When <u>laptop mode </u>is enabled in the <u>Preferences/Geometry</u> then the <u>middle</u> and <u>right</u> buttons are <u>swapped</u>

# Navigation – Viewport lines [1/2]

**Description**:

- Dashed lines represent other viewports (the intersection of other viewports with the current one);

- The center is represented with a square;

- Viewing direction **w** is indicated by a short line;

- When another viewport is outside the view window, the viewport-line will be displayed on the closest edge;

**3D Viewing direction**
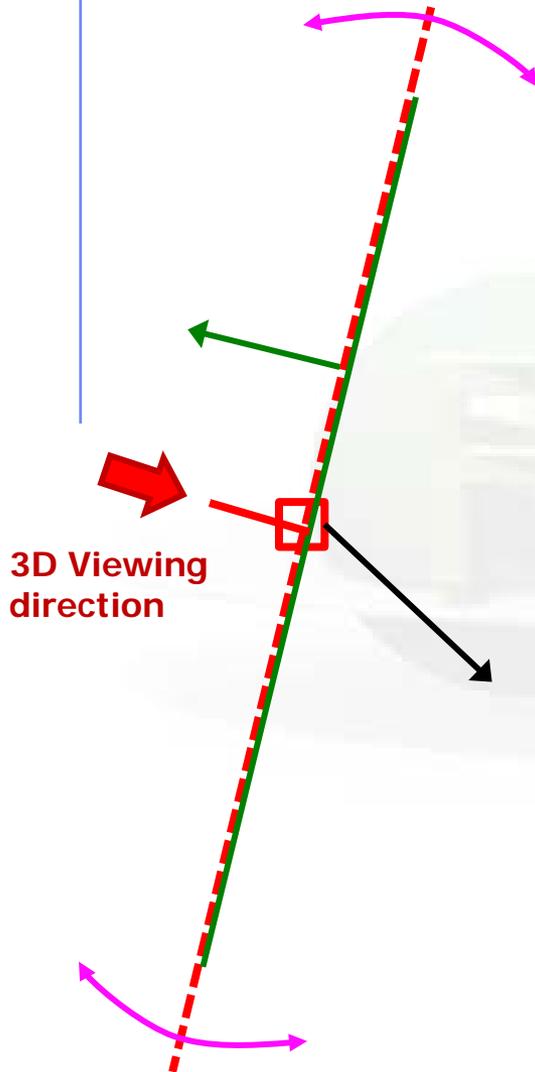
**Actions:** Select [cursor] + left mouse button

- <u>Drag the center</u> square to reposition the viewport

- <u>Drag the line close to the center</u> to reposition the viewport along the vertical **w** axis

- <u>Drag the extremities</u> to rotate it

## Centering Viewports

- When snapping to grid ⊞ is activated
- The center of the viewport will be aligned to the grid (step of 1/10 of the main grid)
- [Shift] key while toggle the snapping action;
- Alternative, it can be centered on the vertices of the selected bodies;
- By dragging a viewport center it always moves the center on the current viewing plane.
- Press [Ctrl] if you want to have a relative move
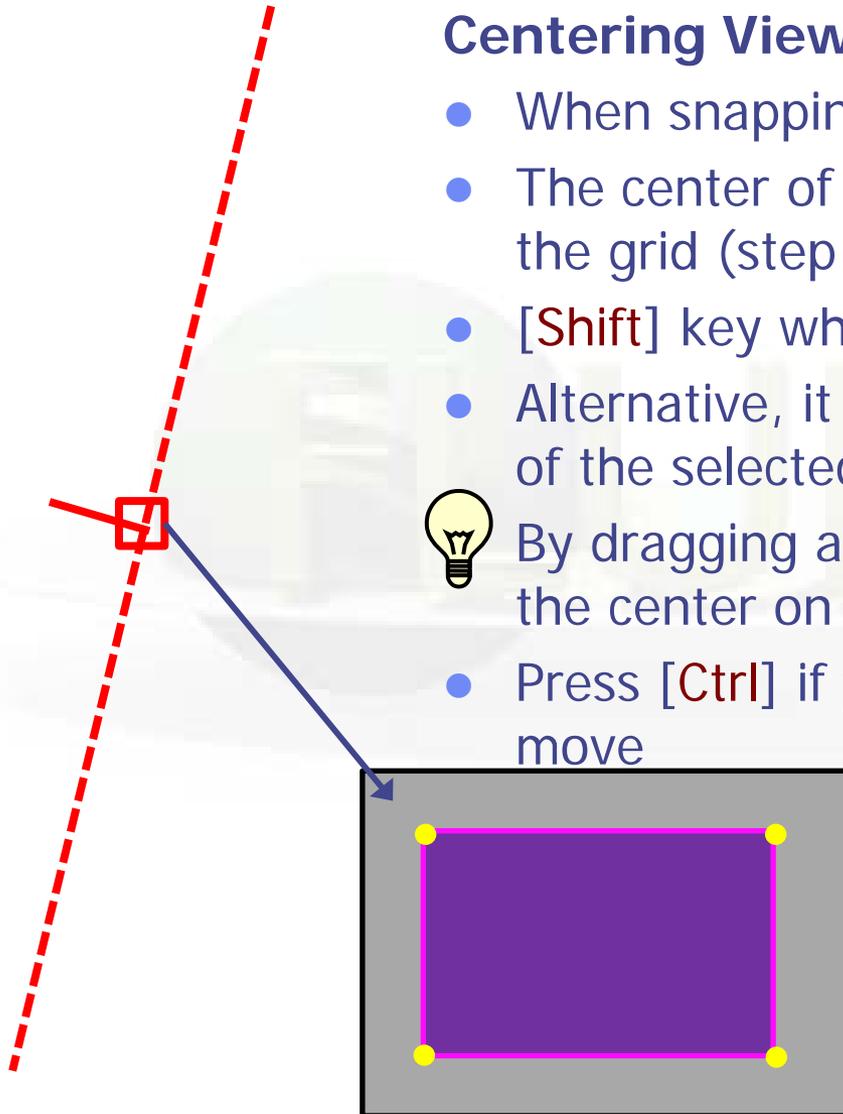
# Navigation – Projection dialog

With the projection [**o**] 🔀 button you can change, move, shift, rotate, save and reload the projection of a viewport



### Set the **o**rigin of the viewport

| Origin | Move | Basis | Euler | Rotate |
|--------|------|-------|-------|--------|
| **x:** 0 | | | | |
| **y:** 0 | | | | |
| **z:** 13000 | | | | |
| | | Ok | Apply | Cancel |

### Rotate around the Cartesian axis

| Origin | Move | Basis | Euler | Rotate |
|--------|------|-------|-------|--------|
| **Rx:** 0 | | | | |
| **Ry:** -0 | | | | |
| **Rz:** 0 | | | | |
| | | Ok | Apply | Cancel |
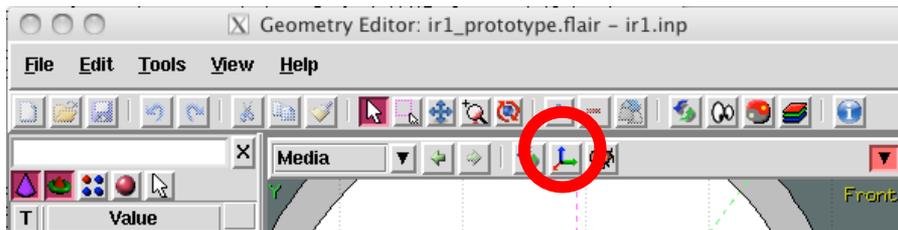
### Shift the coordinate system

| Origin | Move | Basis | Euler | Rotate |
|--------|------|-------|-------|--------|
| Δu: | | | | |
| Δv: | | | | |
| Δw: | | | | |
| | Ok | Apply | Cancel | |

### Change the reference axis

| Origin | Move | Basis | Euler | Rotate |
|--------|------|-------|-------|--------|
| **u:** 1.0 | | 0.0 | | 0.0 |
| **v:** 0.0 | | 1.0 | | 0.0 |
| x-y | x-z | y-z | swap | -u | -v | norm |
| | Ok | Apply | Cancel | |

### Rotate around the (u,v,w) axis

| Origin | Move | Basis | Euler | Rotate |
|--------|------|-------|-------|--------|
| **Ru:** | | | | |
| **Rv:** | | | | |
| **Rw:** | | | | |
| | Ok | Apply | Cancel | |
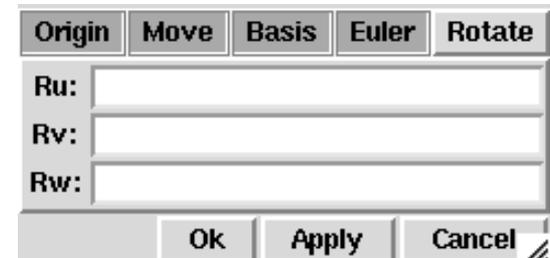
# Debugging Geometry Errors [1/2]

Undefined region

Overlapping regions
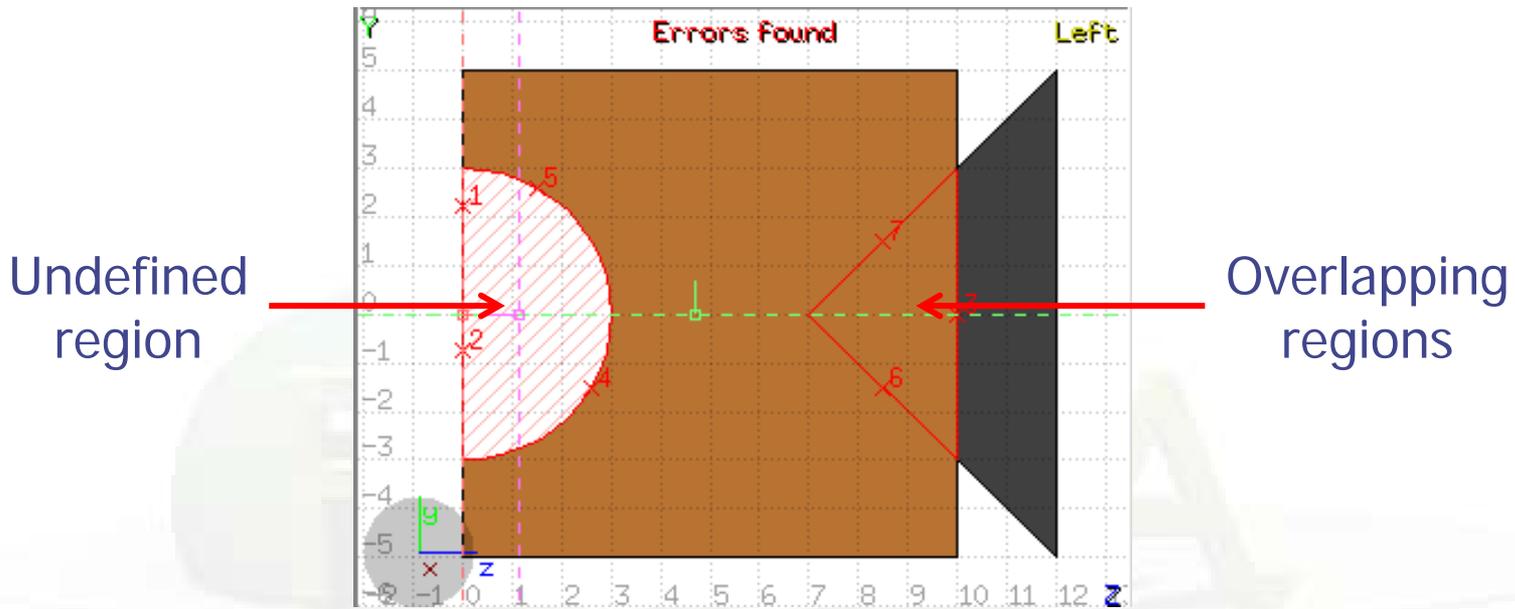
**Errors found** notifies that are errors in the geometry (on the current projection):

- The areas affected by the errors are outlined with a **Red** stroke:
  - Areas filled with a full color correspond to overlapping regions;
  - Areas filled with red lines correspond to a missing region definition;
  - Body segments that are involved in the errors are numbered;
- Clicking the 🐞 icon [Ctrl-g] displays the dialog with the errors.
- Touching surfaces are checked against **10** significant digits
- Non-strictly geometrical errors (i.e. missing Material Assignment to a region, non recognized cards) are also notified;

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**Geometry Errors** window showing a table:

| # | x | y | z | body | Regions on +body | Regions on -body |
|---|---|---|---|------|------------------|------------------|
| 1 | 0.0 | 2.25 | 0.0 | target | | VOID |
| 2 | 0.0 | -0.75 | 0.0 | target | | VOID |
| 3 | 0.0 | -1.5598633E | 10.0 | target | TARGET.CONE | CONE |
| 4 | 0.0 | -1.5 | | | | TARGET |
| 5 | 0.0 | 2.59807621 | | | | TARGET |
| 6 | 0.0 | -1.5 | 8.5 | cone | TARGET,CONE | TARGET |
| 7 | 0.0 | 1.5 | 8.5 | cone | TARGET,CONE | TARGET |

```
Error: Duplicate body 'cone'
Error: Body 'cone' Invalid height |Z|=0
Warning: Region 'CONE' not assigned any material
Warning: Region 'BOX' not assigned any material
Error: Duplicate region 'CONE'
Warning: Region 'CO...
```

Buttons: Show | Select | Write | Refresh | Close

**Input File Errors or Warnings**

**x, y, z** — Coordinates of the error (on the surface of body)

**body** — Body with the x,y,z point on surface generating the error

**+body** — Regions found on the **+** side of the body.
Regions where the body should be subtracted to remove the error

**-body** — Regions found on the **−** side of the body.
Regions that the body should be intersected to remove the error

**+/-** — are defined according to the normal on the surface, **+** refers to outside, **-** to inside

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