

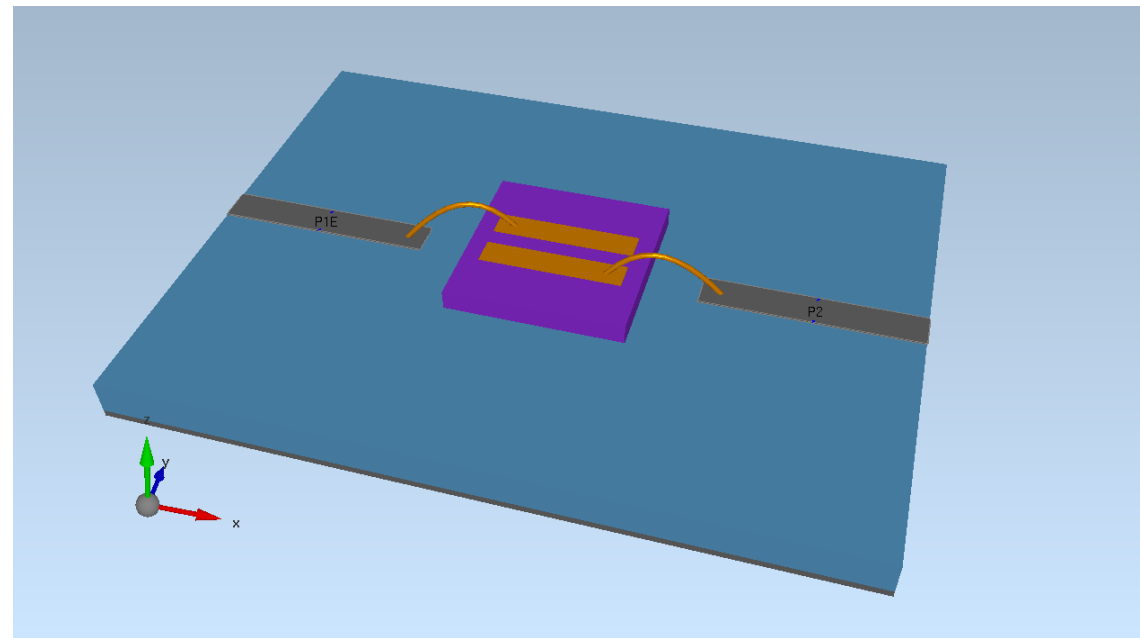
EMPIRE XPU Tutorial

3D Design - Introduction



Overview

- 3D Design Mode
- Cursor Snap
- Views
- Groups and Properties
- Components
- Sources
- Working with groups
- Changing objects
- Creating basic objects
- Creating library objects
- Copy operations
- Field Monitors
- Mesh
- Simulation
- Results



Start

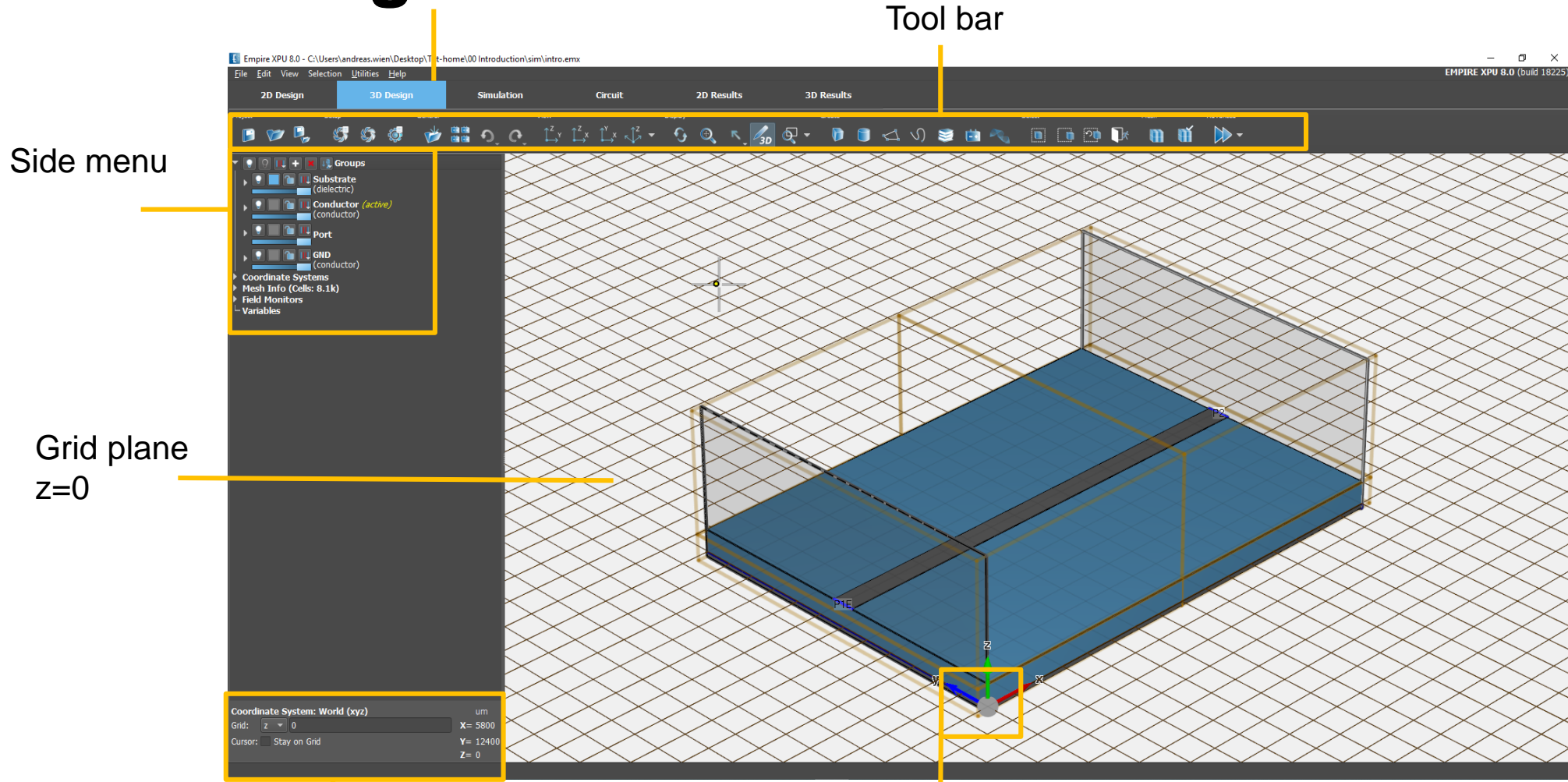
Help:

- Simulation flow and basic features are explained in „Getting Started.pdf“
- Complete manual is available in EMPIRE-Manual-800.pdf
- Videos are available at:
<https://www.youtube.com/channel/UCb38NsUTmqSSL5IWNG7vPhg>
- Send questions to empire.support@imst.de (include input file .gym if applicable)

Step 1:

- Start Empire XPU
- Select “Templates”, OK
- Select File → “Save as”
- Create a new folder, optionally rename, OK

3D Design Mode



Side menu

Tool bar

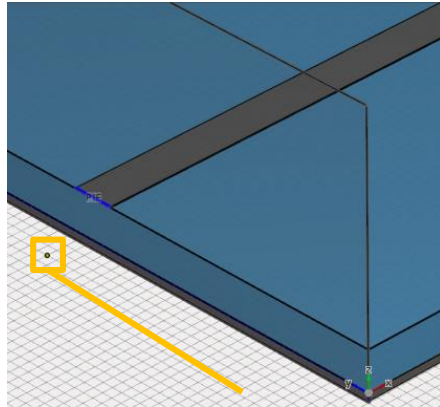
Grid plane
 $z=0$

Coordinate system
Grid plane
Cursor position

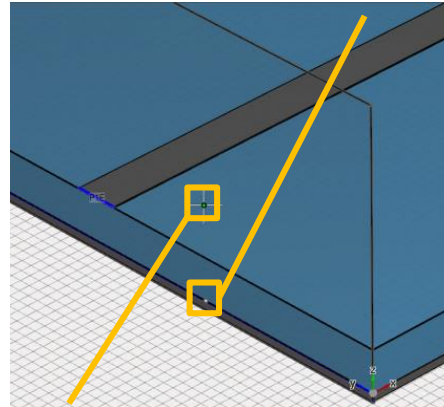
Coordinate system
Origin

Cursor Snap

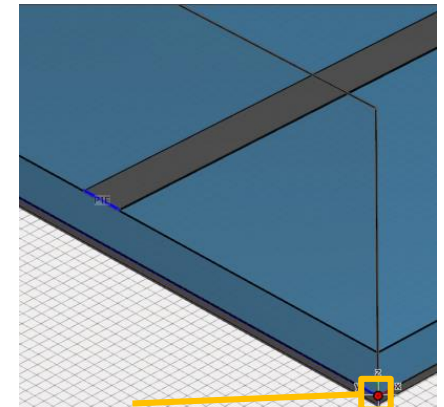
Cursor projection on grid (grey dot)



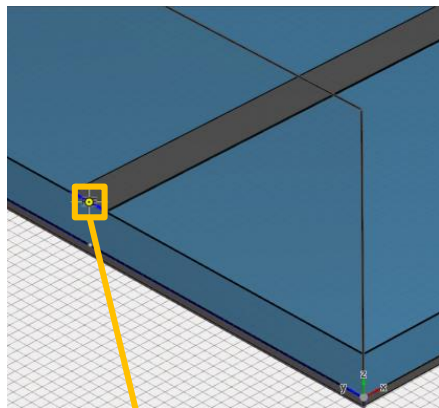
Snap on grid (yellow dot)



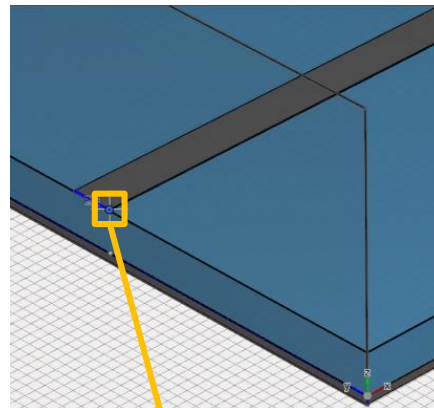
Snap on surface (green dot)



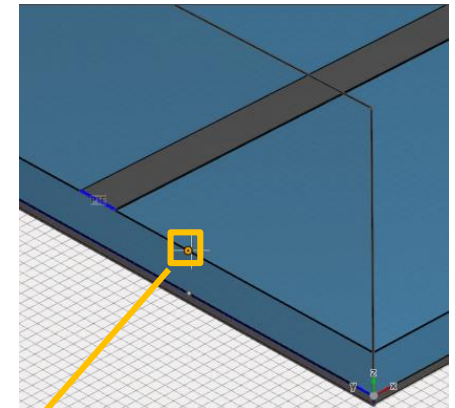
Snap on origin (red circle)



Snap on mid point (yellow circle)

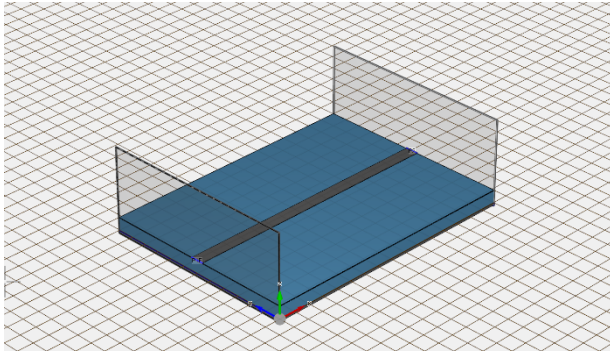


Snap on vertex (blue circle)

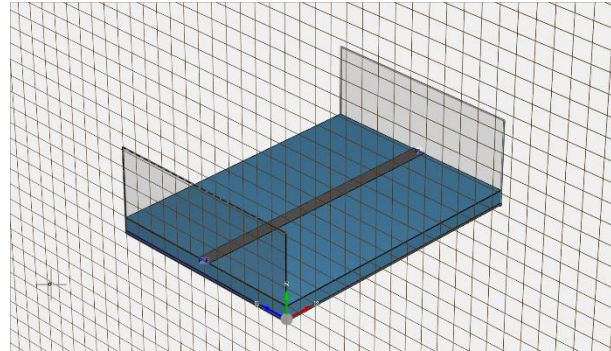


Snap on edge (orange circle)

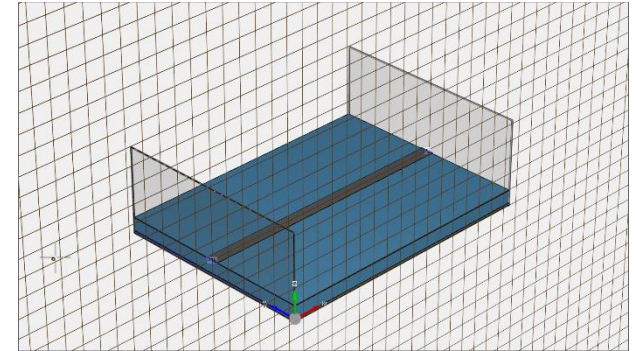
Grid



$z=\text{const}$

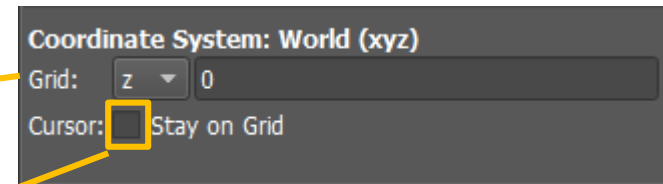


$x=\text{const}$



$y=\text{const}$

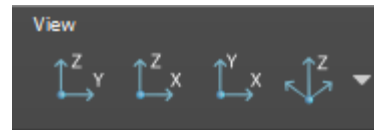
- Default: WCS (world coordinate system):
- Set grid:
 - Enter grid plane
 - Press space bar at cursor position
- If unchecked, cursor snaps on surface of objects



Views

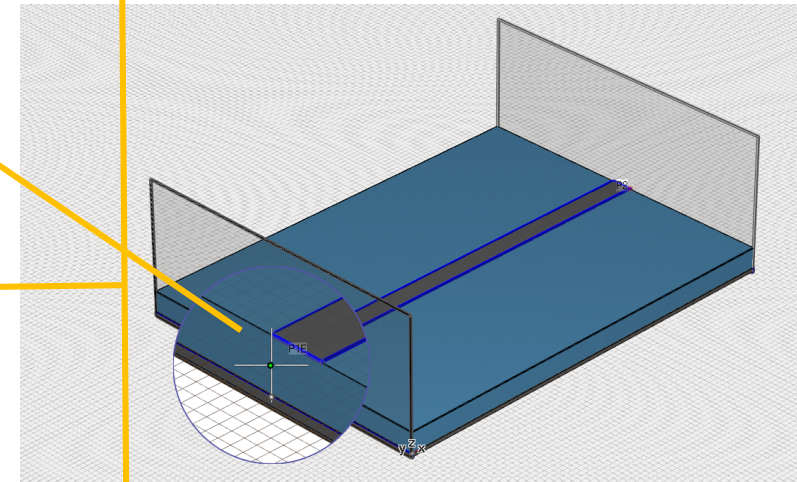
Step 2

- Press View Icons
- Return to iso-z view
- Zoom:
 - Wheel forward / backward (zoom is centered to cursor position)
 - Use Page up / down keys
 - Use Zoom Icons on top
 - Shift + Wheel opens a lens at cursor position
- Pan:
 - Drag middle mouse button
 - Pan mode: Drag left button
- Rotate:
 - Drag right mouse button
 - Rotate mode: Drag left button
- Zoom extents
- Selection mode



Zoom window

Zoom extents (z shortcut)



Groups and properties

The image shows two parts of the software interface. On the left is the 'Groups' list, and on the right is the 'Property Editor - Dielectric' window.

Groups List (Left):

- Substrate (dielectric):** This group is highlighted with a yellow box. A yellow line labeled 'Name' points to its name. Another yellow line labeled 'Edit Property' points to the 'Edit Property' icon (a lightbulb) next to it. Below this group, the height is set to 'Height: z=0...381'.
- Components (1):** This group contains one component:
 - Conductor (active):** This component is highlighted with a yellow box. A yellow line labeled 'Active group' points to the '(active)' text. Another yellow line labeled 'Color' points to the color swatch next to it. Below this component, the height is set to 'Height: z=-76.2...0'.
 - Port**
 - GND (conductor)**
 - Gold (conductor):** This component is highlighted with a yellow box. A yellow line labeled 'Property' points to the 'Gold' text.

Property Editor - Dielectric (Right):

- The 'Material selection' tree on the left shows the hierarchy: Material Property > Dielectric > Rogers-TMM-10.
- The 'General' tab is active, showing various parameters for the 'Rogers-TMM-10' material:

| Parameter | Value |
|---|---------------|
| Name | Rogers-TMM-10 |
| Geometric Priority (10...250) | 100 |
| Electric Parameters | |
| Rel. Permittivity | 9.20000 |
| Electric Loss Tangent | 2.20000e-03 |
| Conductivity in 1/(Ohm*m) | 0 |
| Thermal Parameters | |
| Conductivity in W/K/m | 7.60000e-01 |
| Surface Heatsink Coefficient (W/m^2/K) | 20 |
| Surface Radiation Emission Coefficient (rel.) | 1 |
| SAR/EI/AV/ACD Parameters | |
| SAR/EI/AV/ACD mass density in g/cm^3 | 0 |
| Add to User Database | |
| Target Category | Arlon |
- The 'Material properties' label points to the parameter table.

Step 3:

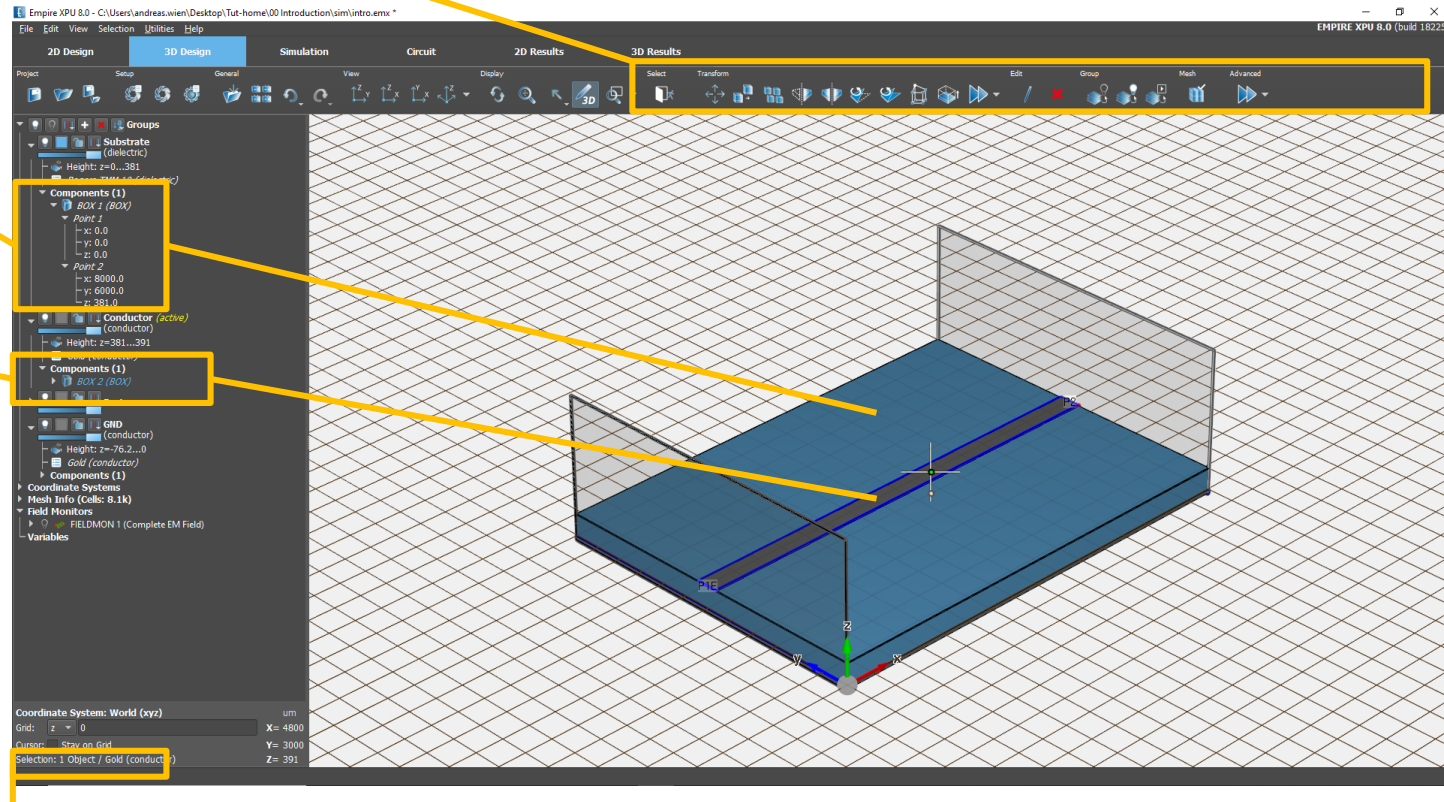
- Open Groups list in Side menu
- Double Click on Property in group Substrate
- OK, Close group list

Components and selections

Case sensitive toolbar (depend on selections)

Object coordinates

Selected object

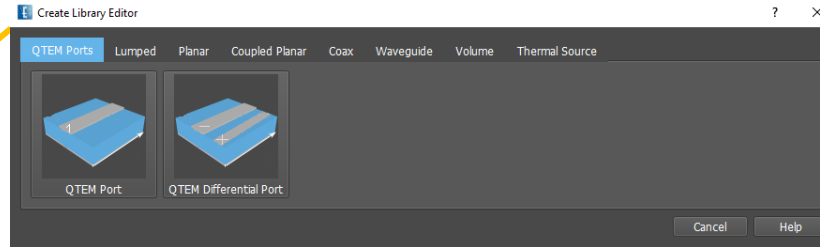


Selections

Step 4:

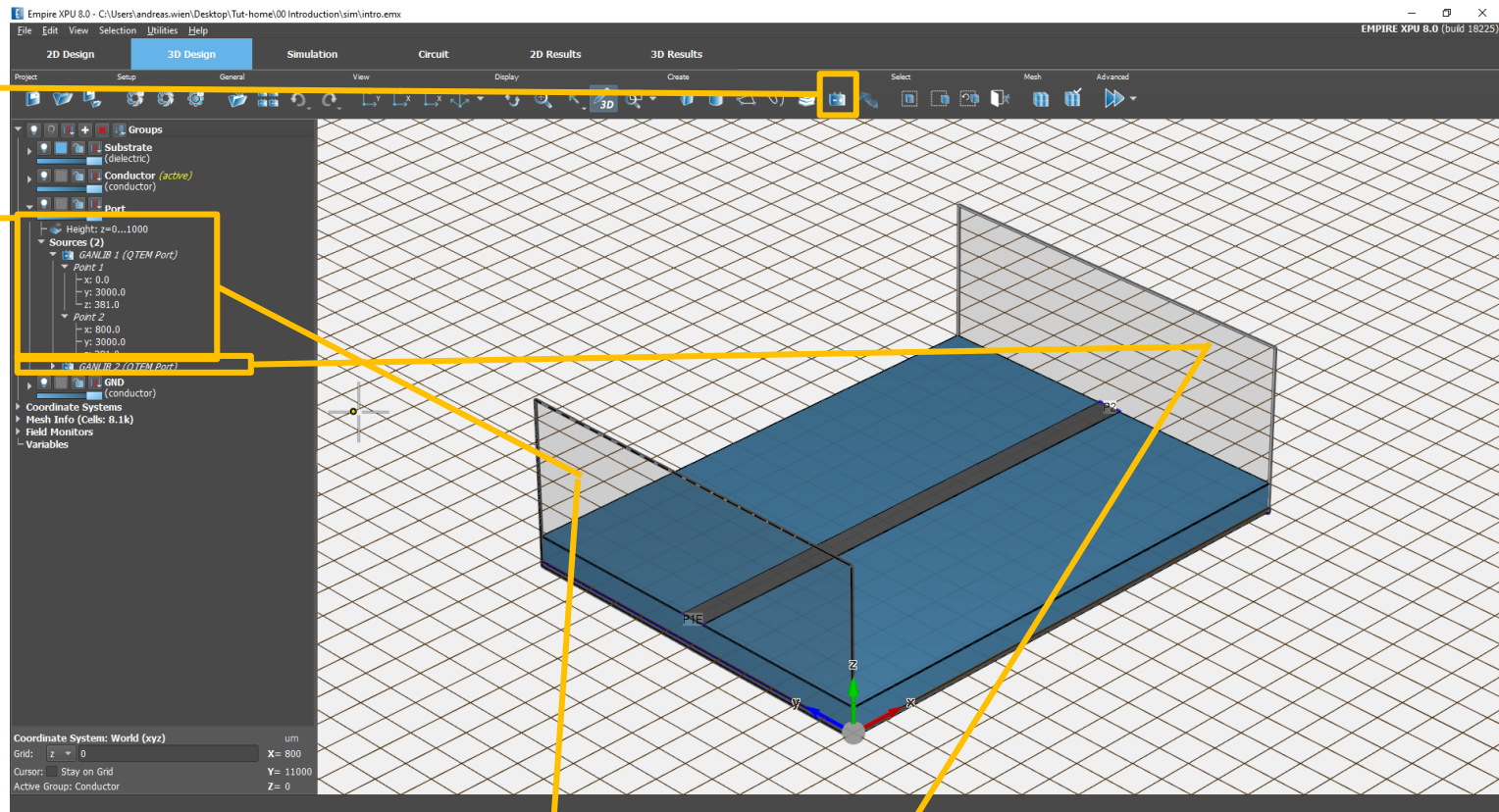
- Open Group Conductor - Components
- Select: Left click in side menu or on object face
- Deselect: Esc key, 2nd left click or Clear button

Sources and excitations



Source Library
(creation)

Source list
coordinates
and
parameters



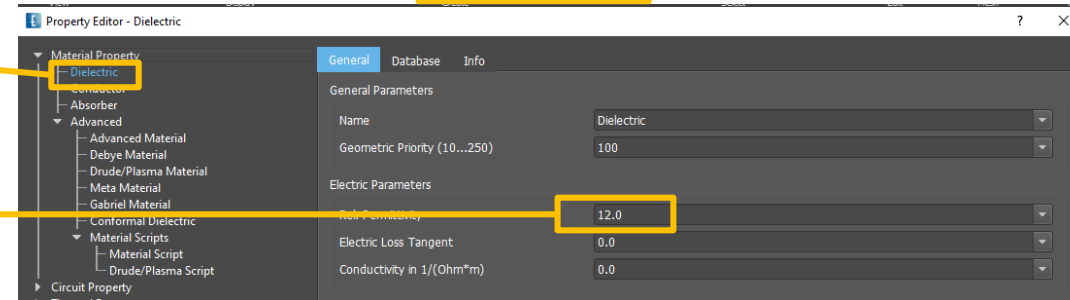
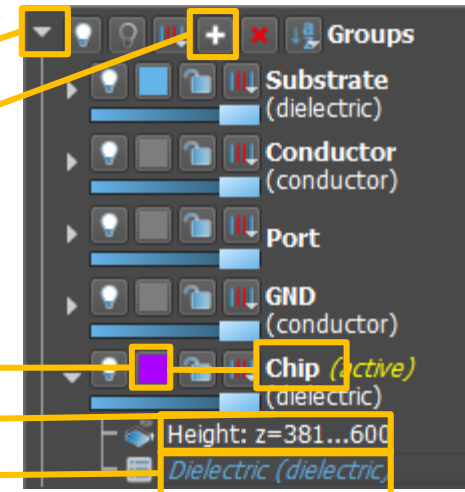
P1E: Excited
QTEM port

P2: non excited
QTEM port

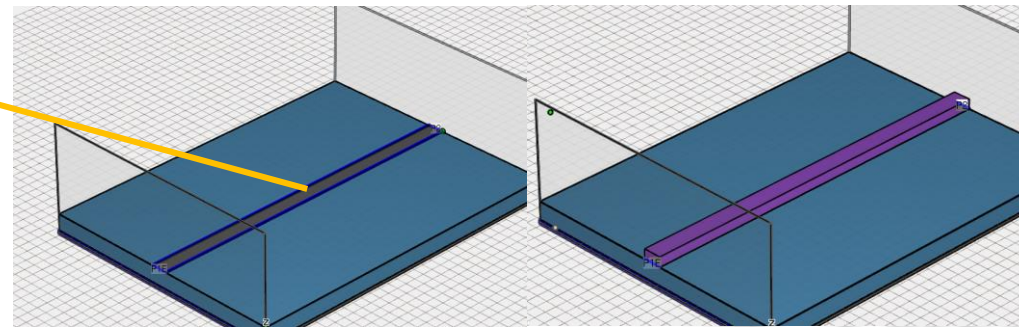
Working with Groups

Step 5

- Open Group list
- Click Create group
- Rename (left click on group name), recolor
- Double Click „Height“ z=381...600
- Double Click Property
- Dielectric
- Permittivity: 12





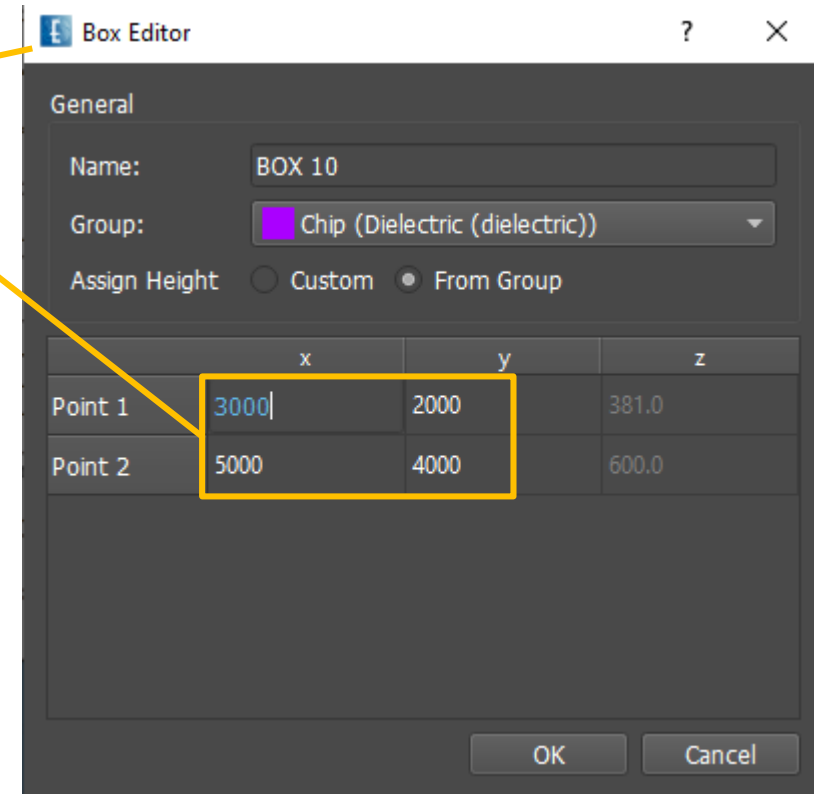
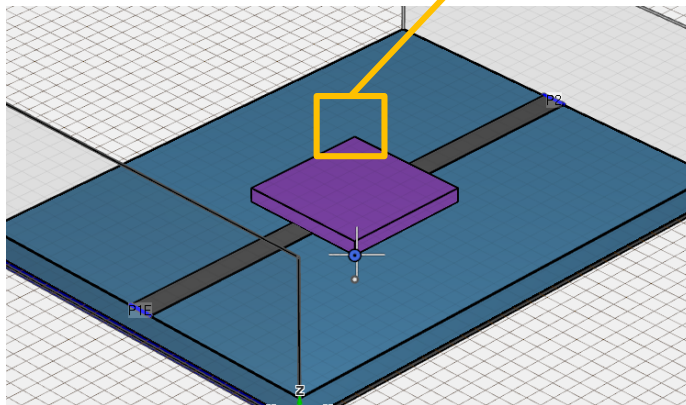
- Left click on Center strip
- Right click on group name "Chip"
- Select „Copy and set height...“



Changing Objects

Step 6

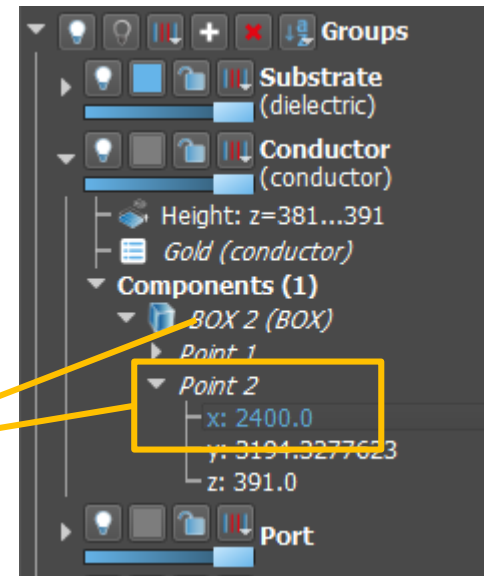
- Right click on group name „Chip“
- Select group's object 
- Click Edit/Open object 
- Either:
 - Overwrite coordinates (double click on value)
 - Or right click on „Point“, Pick coordinate
 - Move cursor to x,y coordinate
- OK, Esc



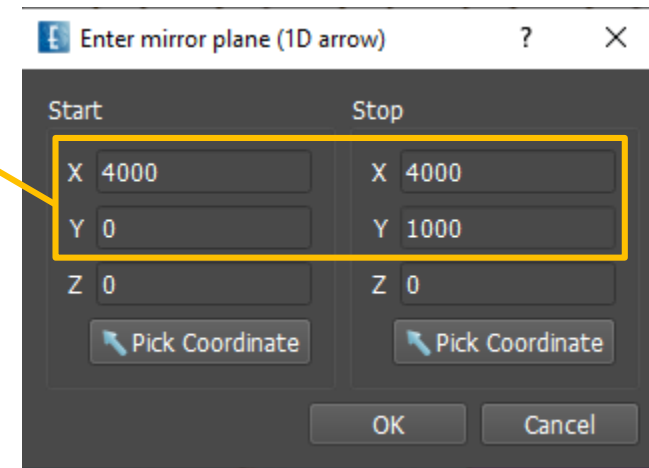
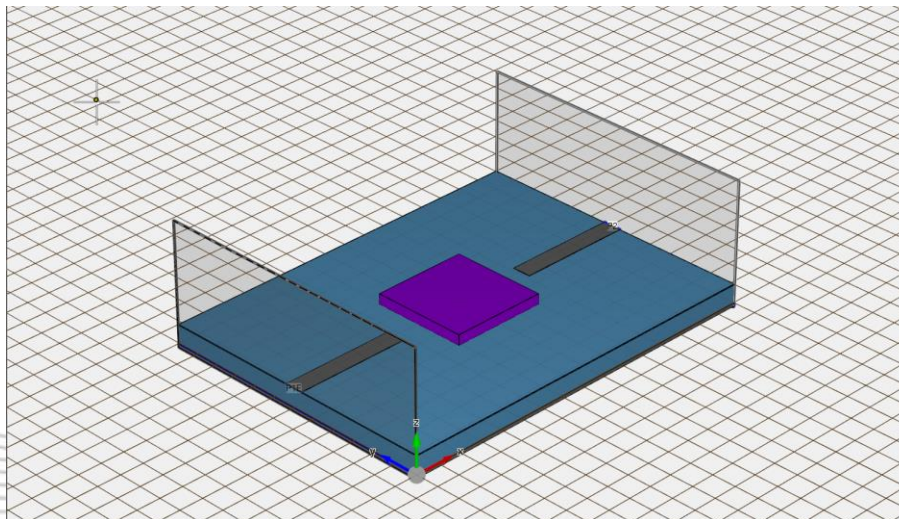
Changing Objects 2

Step 7

- Open Group „Conductor“ - Components
- Open Box 2
- Set Point 2: x=2400 (double click)
- Select Object (click on Box 2)
- Click Copy & Mirror
- Enter Mirror Plane (x=4000, y=0...1000):




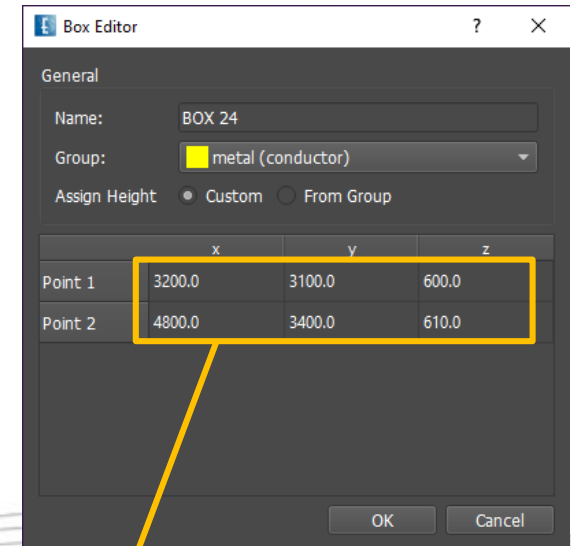
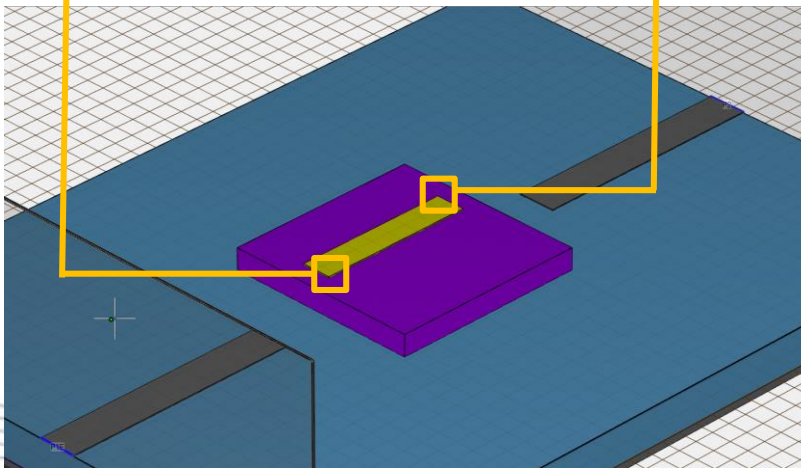
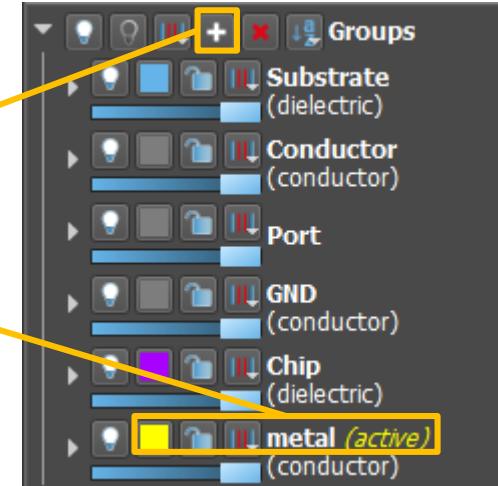
Result



Creating basic objects

Step 8

- Create new group, change color and name
- Zoom in (wheel forward)
- Click Create Box
 - Left click at $x=3200, y=3100^*$
 - Left click at $x=4800, y=3400$
 - Zoom in (wheel forward)
 - Left click at $dw=10$ ($z= 610$)
 - Zoom extents 



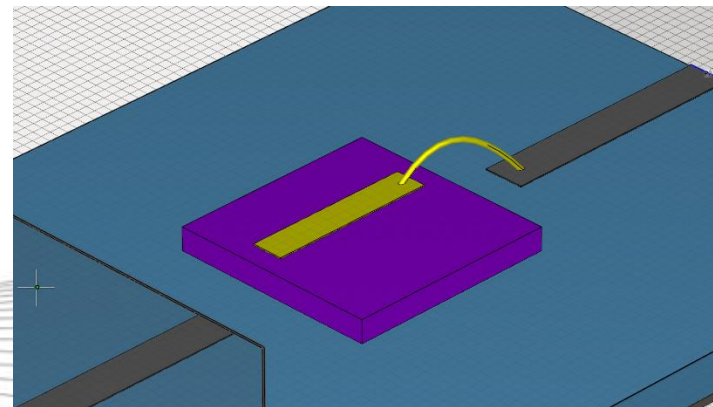
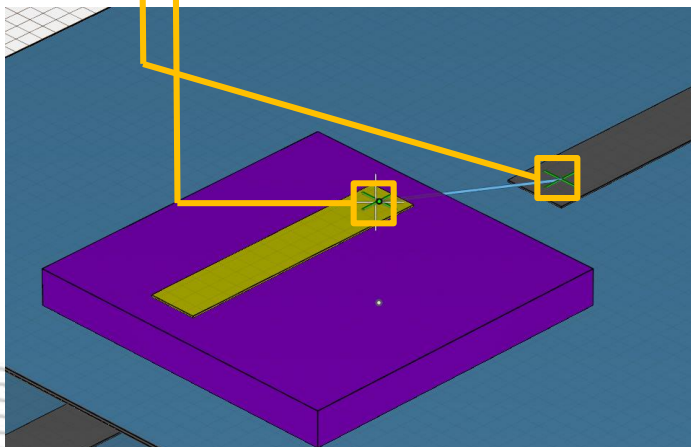
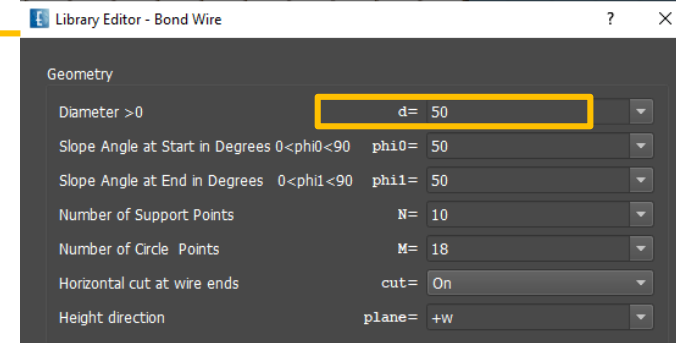
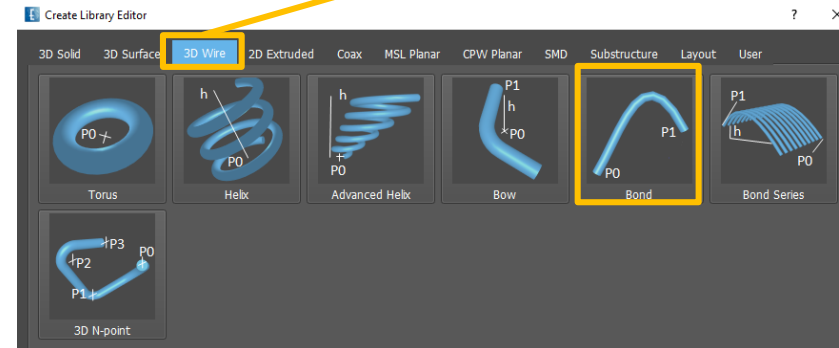
**Comment:
Use arbitrary clicks and adjust values*

Creating library objects



Step 9


- Click Create Library Object
- Select 3D Wire - Bond
- Left click at x=5800, y=3000
- Zoom in
- Left click at x=4700, y=3250
- Click „Edit Settings“
- Enter Wire Diameter: 50
- Press Close




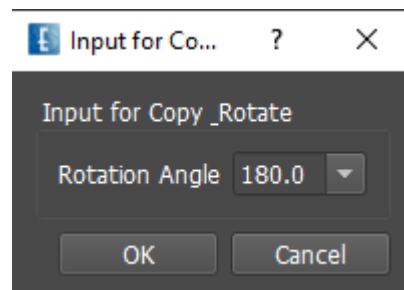
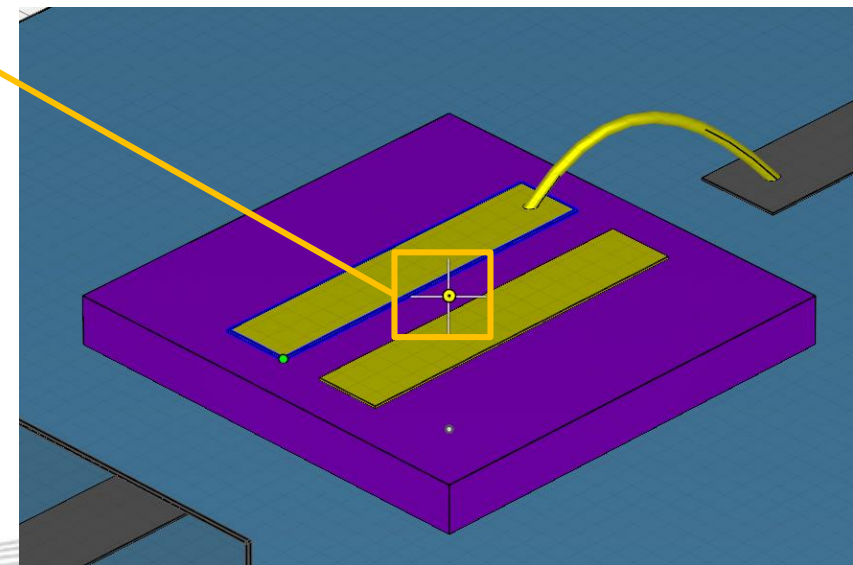
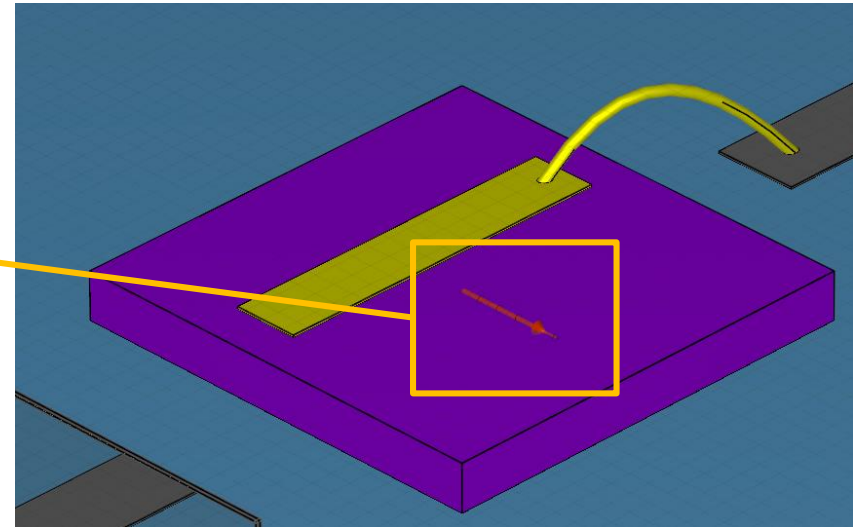
Z-position is obtained from object surface

Copy & Rotate

Step 10

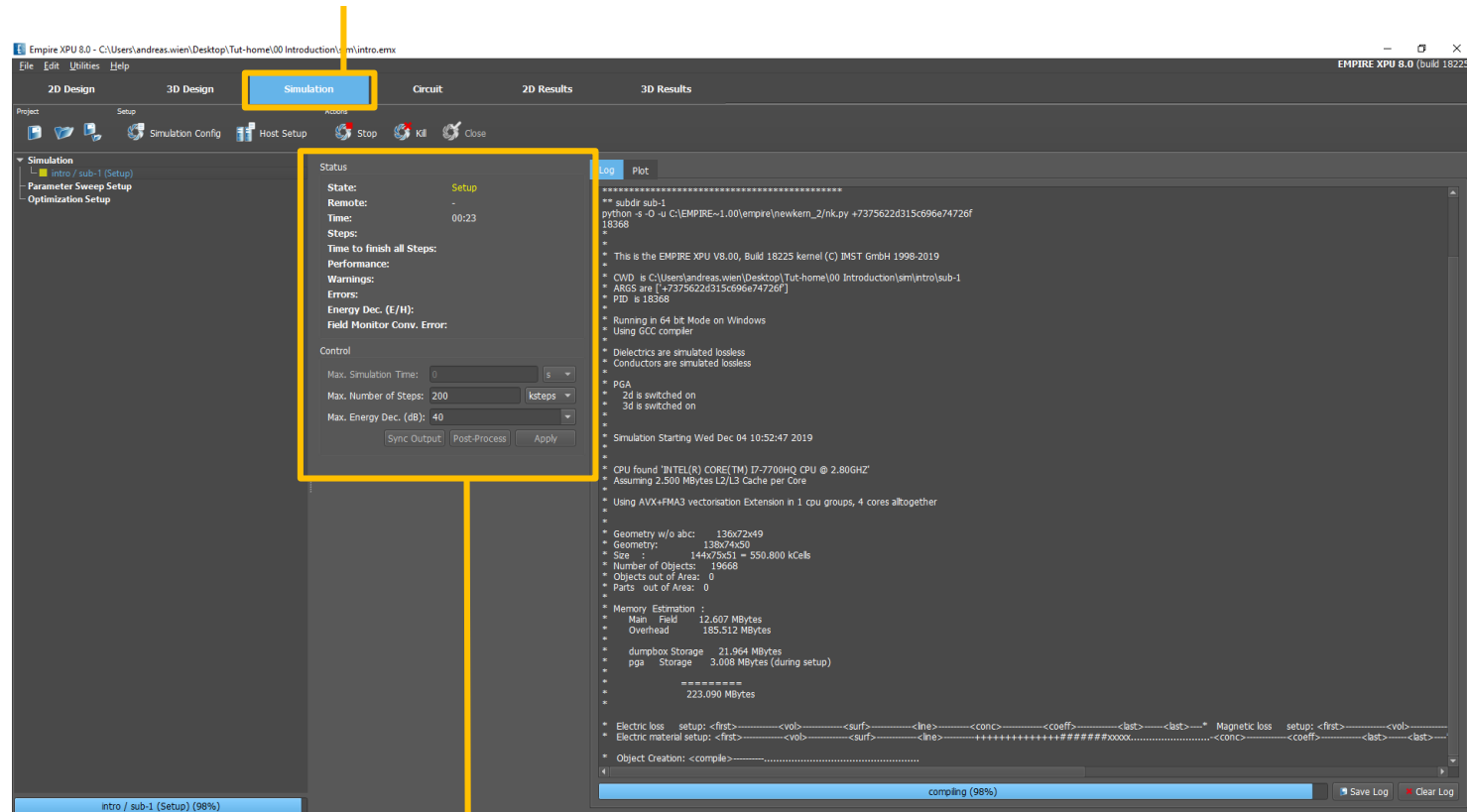
- Left drag arrow with $dy=-500$
- Left click on strip
- Click Copy 

- Shift + left click at $x=4000, y=3000$ as rotation axis point
- Left click on Bond Wire 
- Click Copy & Rotate
- Enter 180 (degree) for rotation angle



Simulation

Simulation Tab: Extended Setup and Log Window



Status and Performance

Step 11

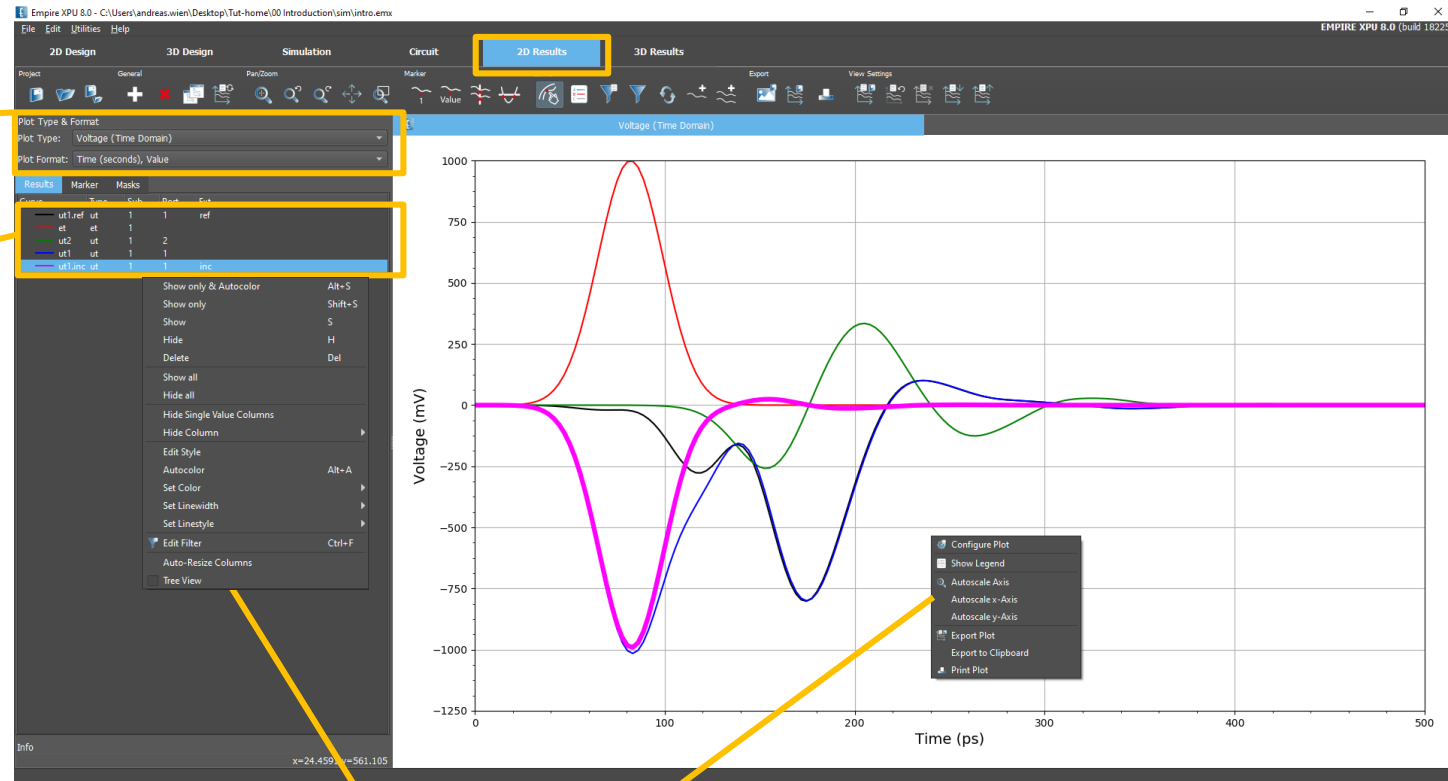
- Click Start Simulation
- Confirm Message

Plot results

2D Result tab

Result type and format

List of available results



Right click for configuration menus

Animation results

Field Animation

Animation control

Monitor selection

Right click on Monitor to Edit

Right click on planes to add markers

