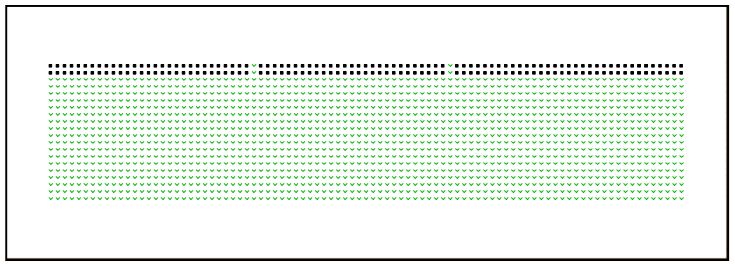
3.b Array Instances

- What they are
- How to define them
- How they interact
- How to control their priority

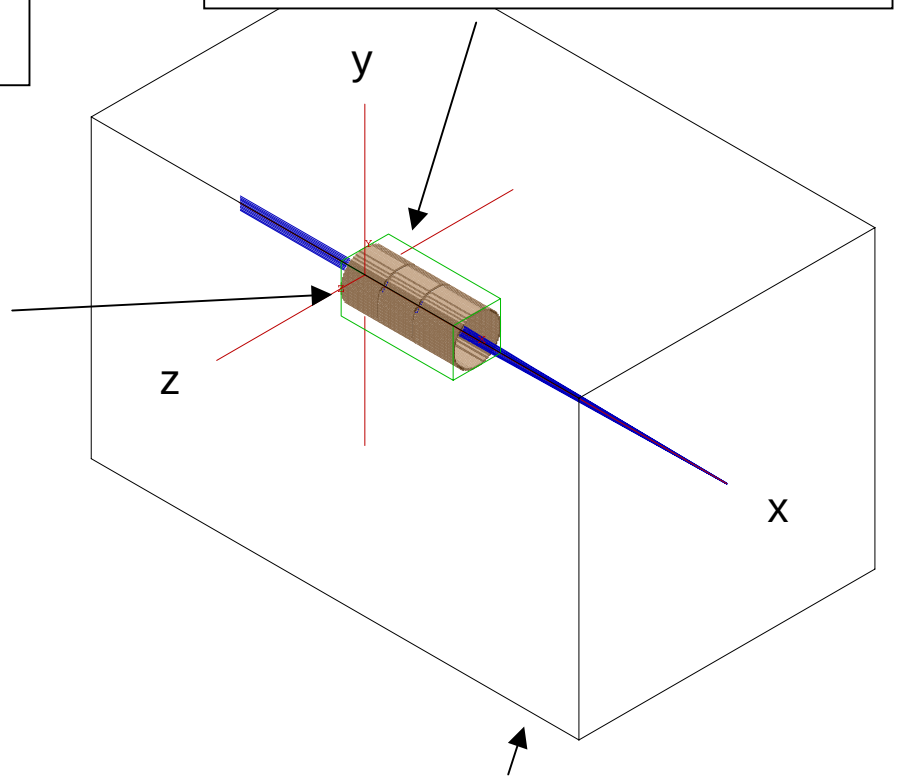
What is an Array Instance?

A Projected Volume Image of a Potential Array



Potential Array
2D Cylindrical
Mirrored in y

Array Instance Volume



Workbench Volume

Why are Instances Useful?

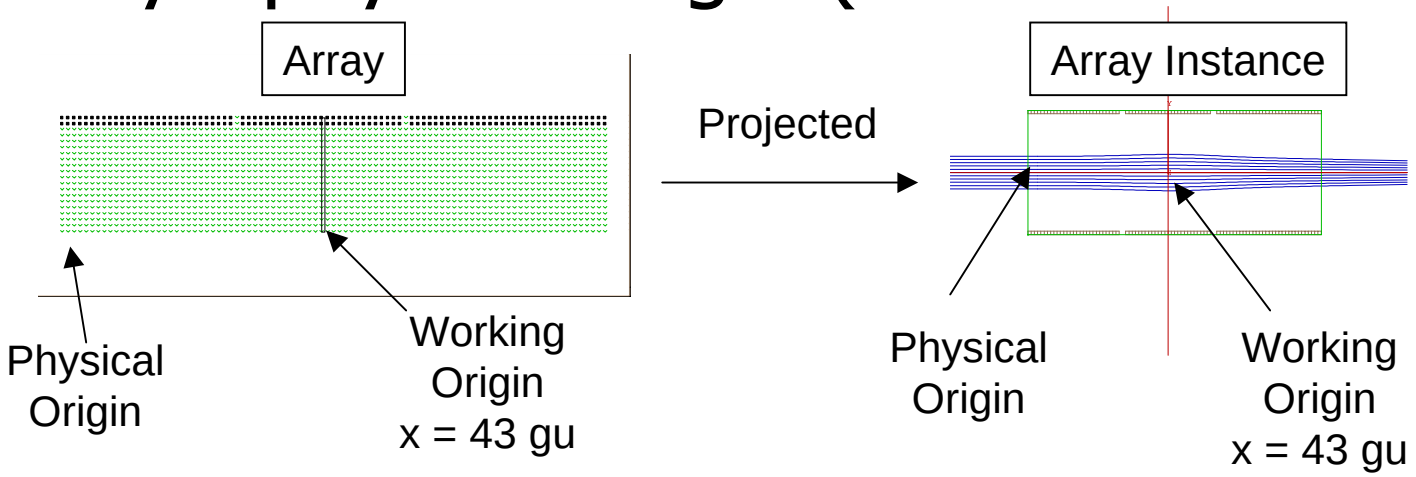
- Links PAs into the virtual workbench world
- Electrostatic and magnetic fields in same volume
- Allows higher density arrays in certain regions (e.g. sources).
- Supports simulation of beam lines with separated optics stages.

How Instances are Defined

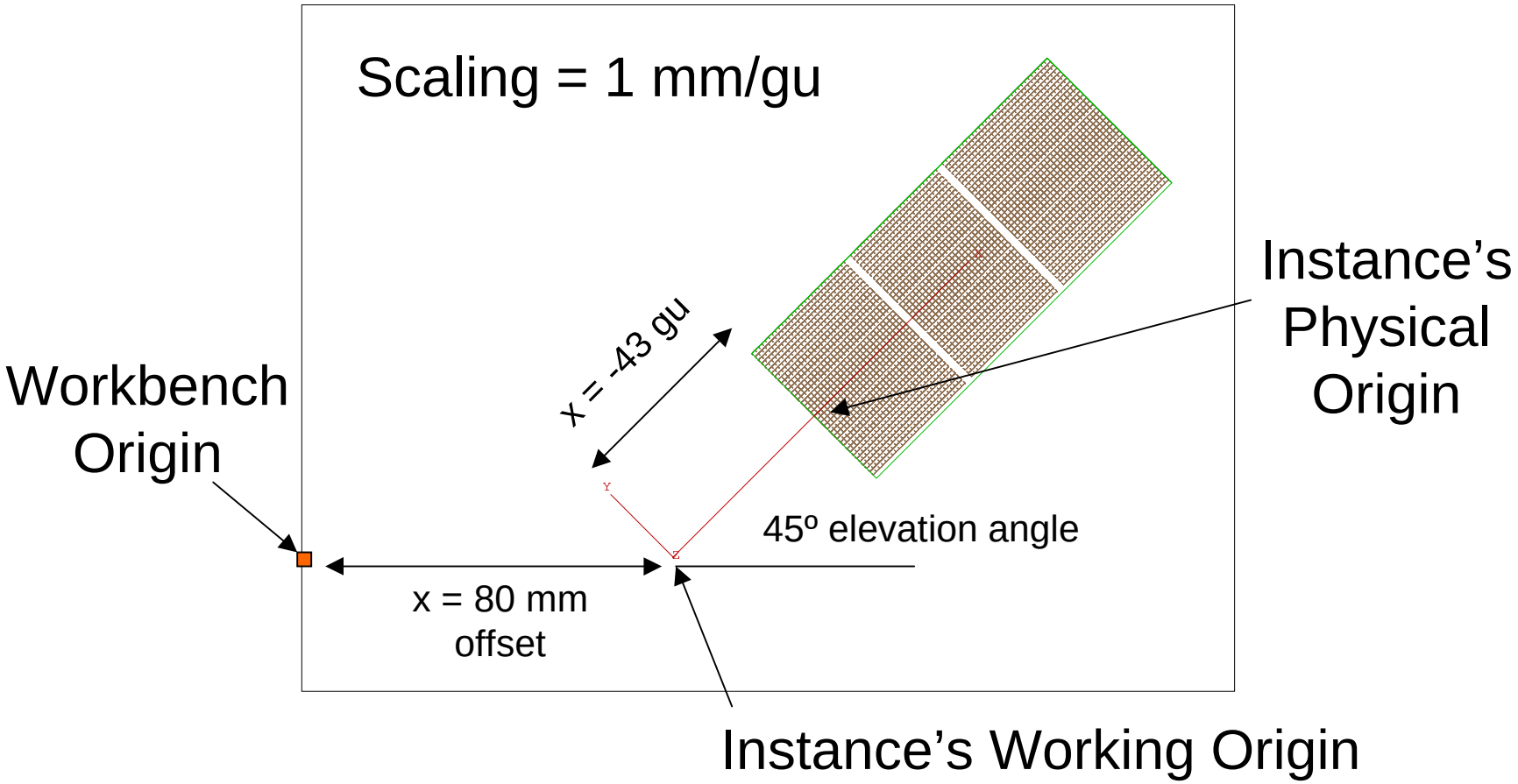
- Working Origin
- Offset of Working Origin from WB Origin
- Scaling in mm/gu
- Orientation Angles from Working Origin in
  - Azimuth
  - Elevation
  - Rotation

Working Origin

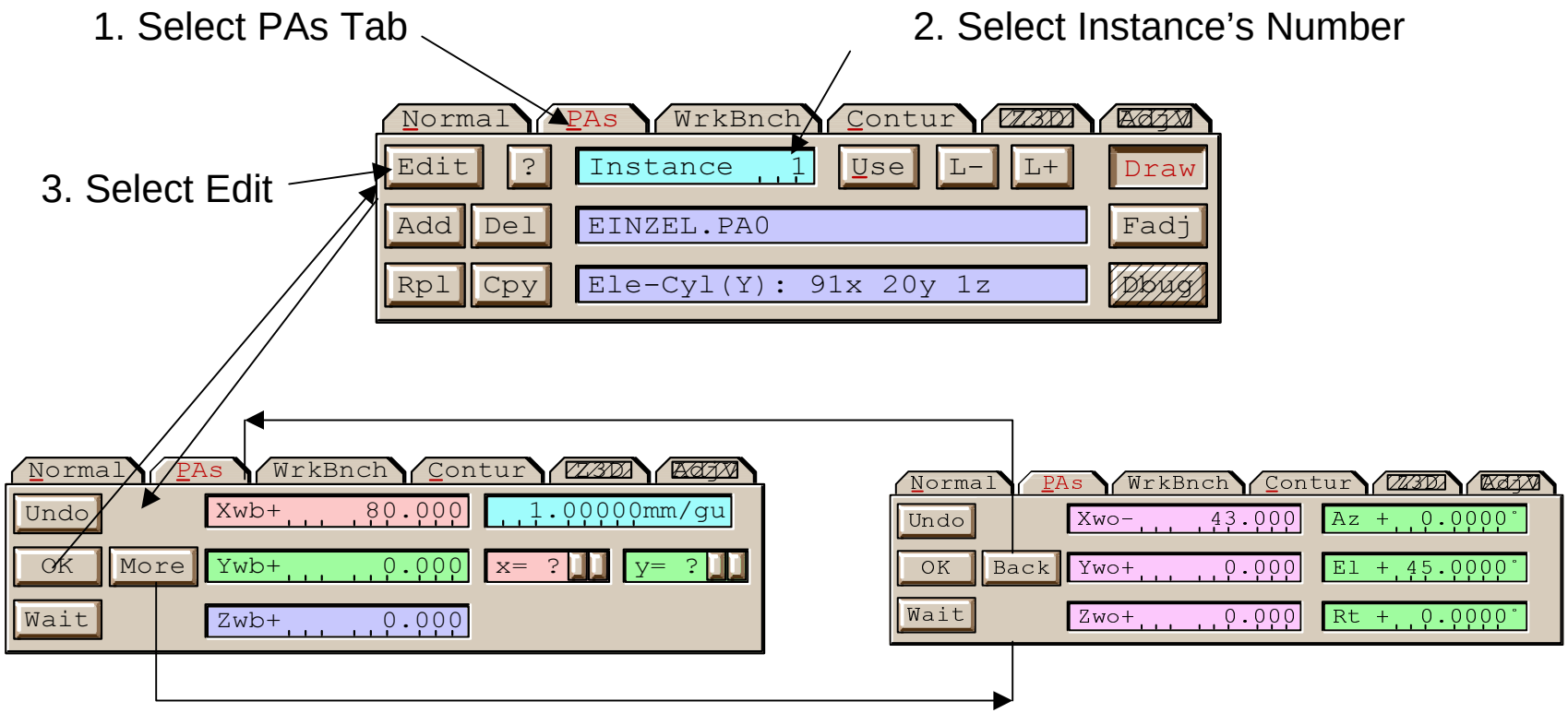
- Working Origin is the reference point for all positioning, scaling and orientations
- It is defined in terms of an offset from the array's physical origin (0 offset is default)



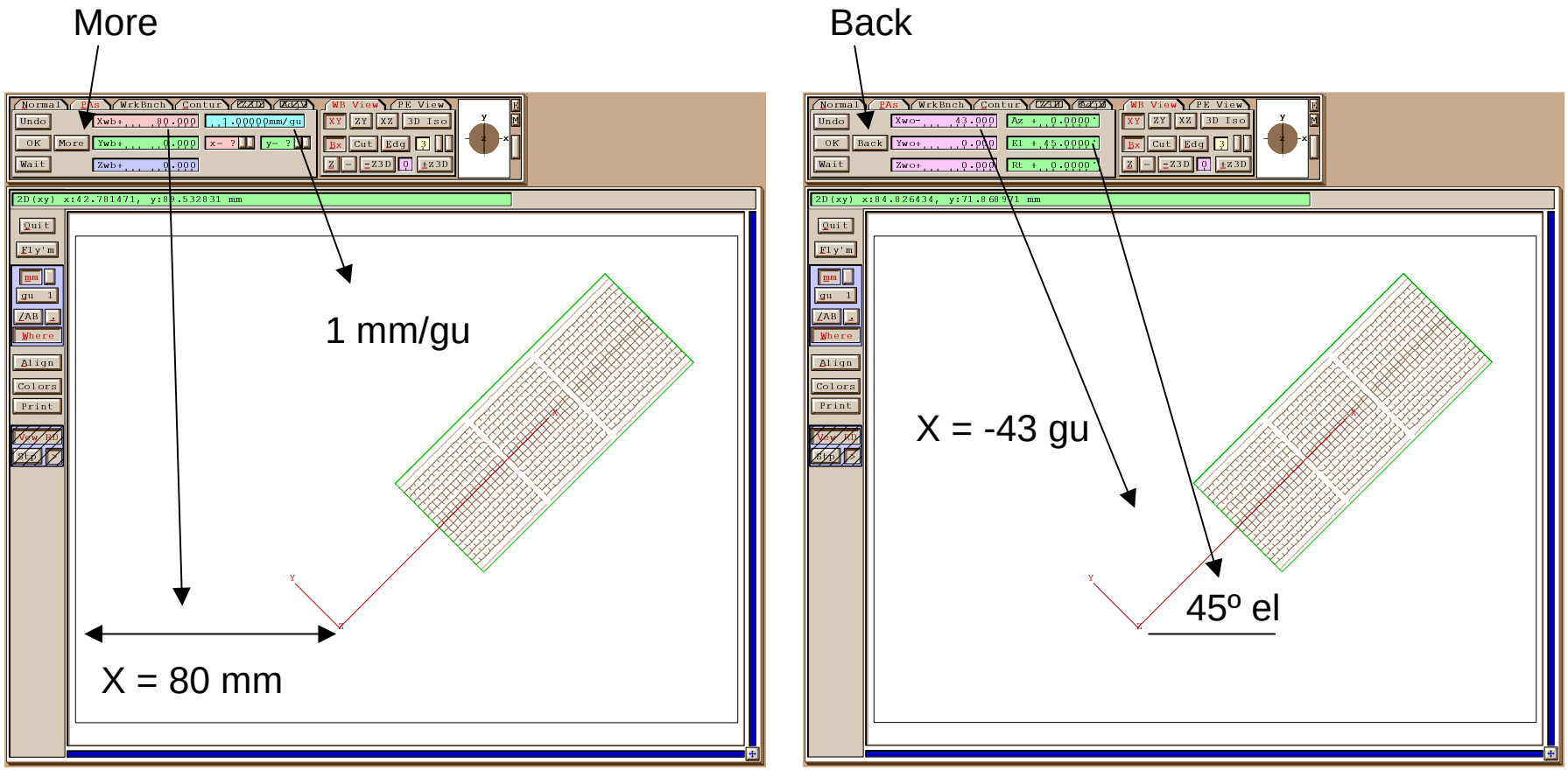
Instance Positioning, Scaling, and Orientation



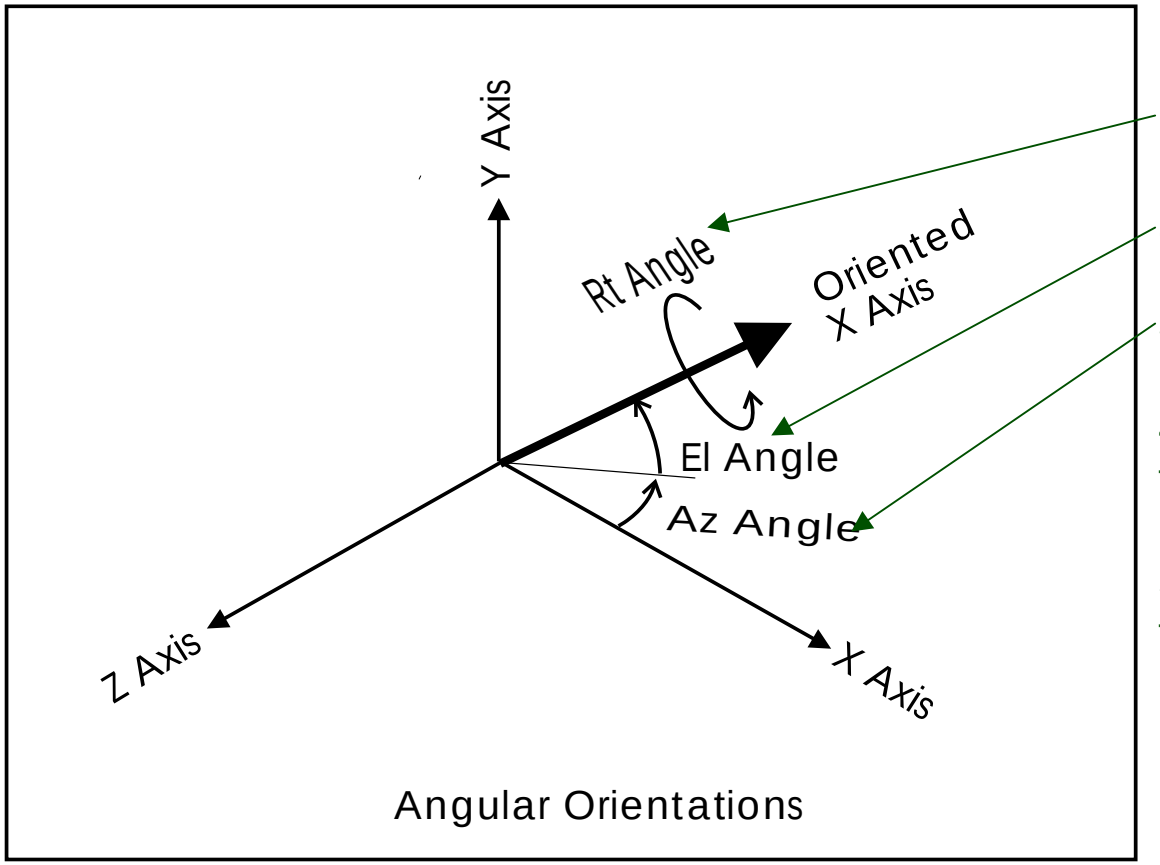
Editing an Instance



SIMION Instance Editing



Order of Orientations and displacements

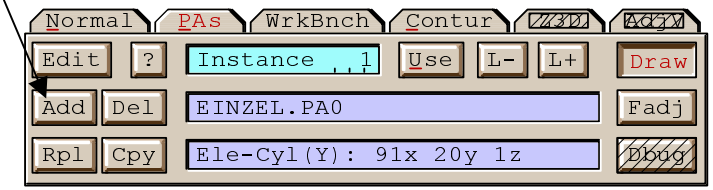


1. Rt angle
2. El angle
3. Az angle
4. Working Origin offset from array physical origin
5. Working Origin offset from workbench origin

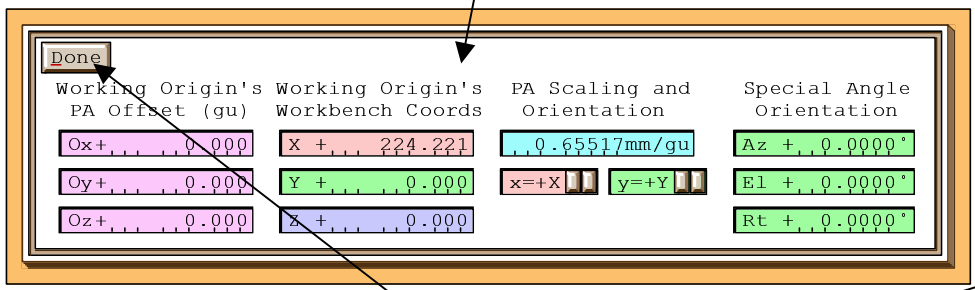
Adding an Instance

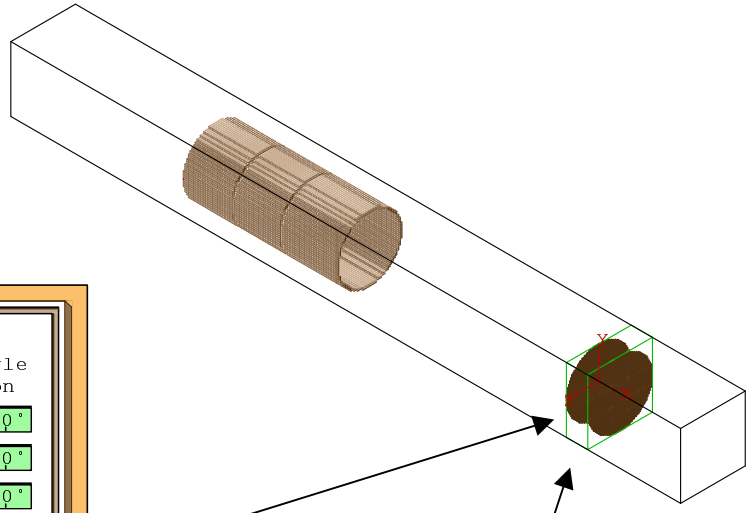
1. Mark Volume

2. Click Add



3. Edit Instance Definition





4. Click Done

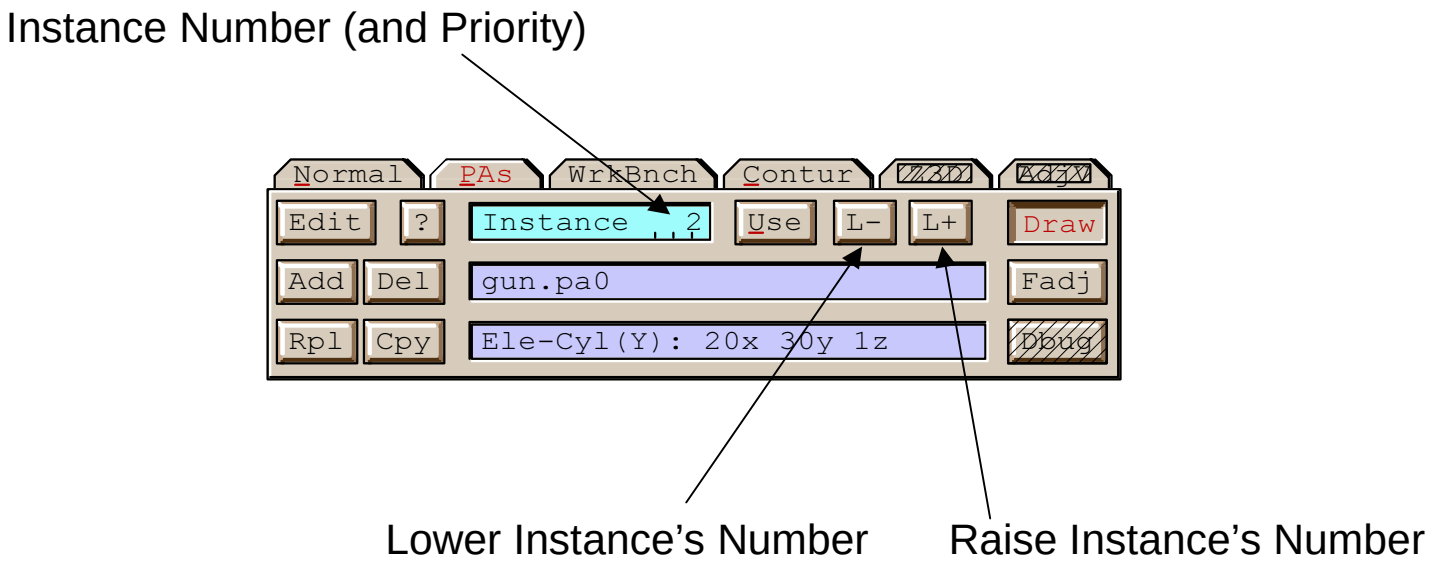
New Array Instance

Instance Rules

- Instance Fields are Separate
  - Each instance is an isolated island.
  - Only linear acceleration fields are assumed when ions fly between instances of differing electrostatic potentials (won't work with RF).
  - Instance Fields that overlap do NOT merge.
  - Overlapping instance volumes defer to the highest priority instance.

Instance Priority

- The instance with the highest number has the highest priority



Other Instance Options