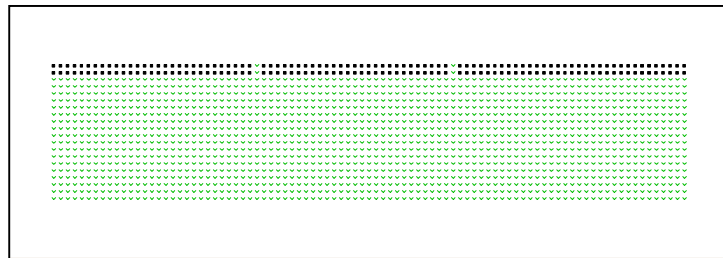# 3.b Array Instances

- What they are
- How to define them
- How they interact
- How to control their priority
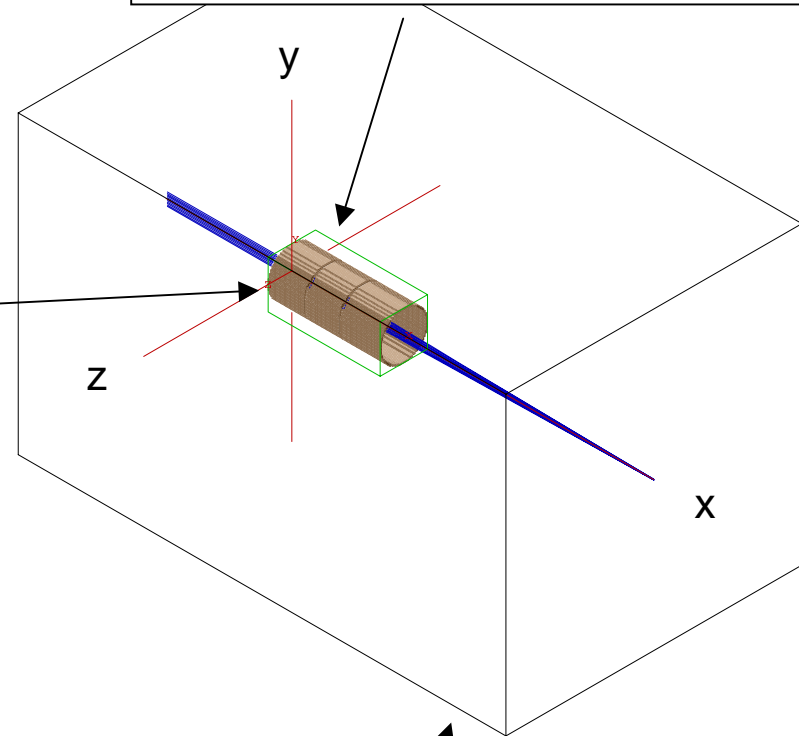
What is an Array Instance?

A Projected Volume Image
of a Potential Array

Array Instance Volume

Potential Array
2D Cylindrical
Mirrored in y

Workbench Volume

y

z

x

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.
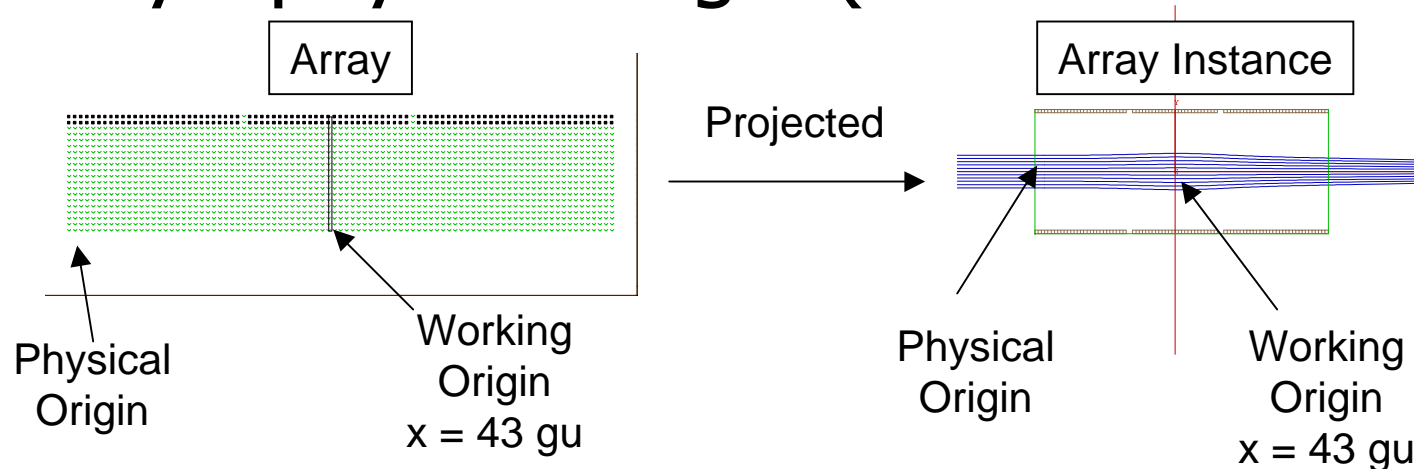
How Instances are Defined

- 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)

Array

Projected

Array Instance

Physical Origin

Working Origin
x = 43 gu

Physical Origin

Working Origin
x = 43 gu

Instance Positioning, Scaling, and Orientation

Scaling = 1 mm/gu

Workbench Origin

x = -43 gu

Instance's Physical Origin

45º elevation angle

x = 80 mm offset

Instance's Working Origin
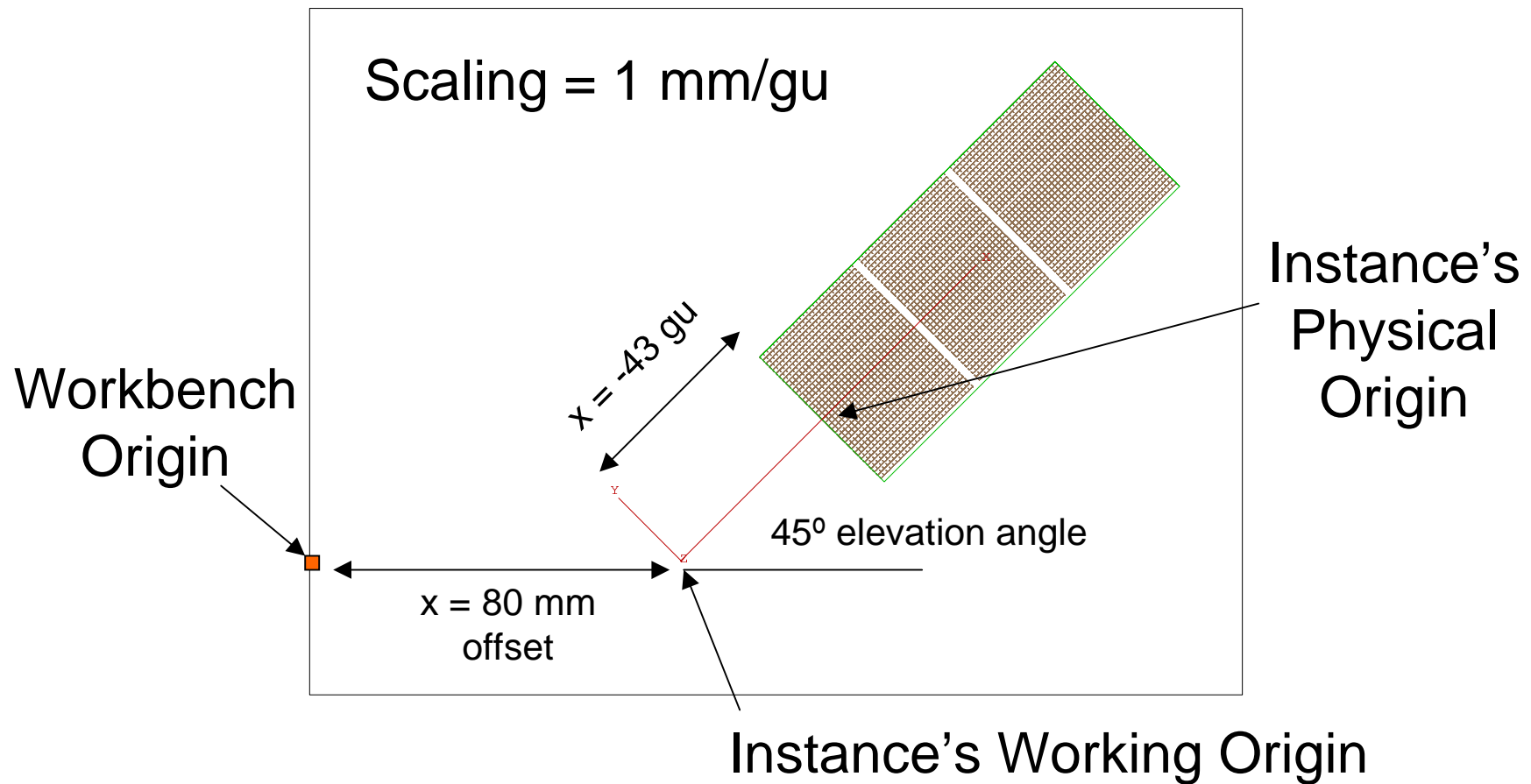
Editing an Instance

1. Select PAs Tab

2. Select Instance's Number

3. Select Edit

Normal	PAs	WrkBnch	Contur	3D	Adj

Edit ? Instance ..1 Use L- L+ Draw

Add Del EINZEL.PA0 Fadj

Rpl Cpy Ele-Cyl(Y): 91x 20y 1z Dbug

Normal	PAs	WrkBnch	Contur	3D	Adj

Undo Xwb+ ....80.000 ....1.00000mm/gu

OK More Ywb+ ....0.000 x= ? y= ?

Wait Zwb+ 0.000

Normal	PAs	WrkBnch	Contur	3D	Adj

Undo Xwo- ....43.000 Az +..0.0000°

OK Back Ywo+ ....0.000 El +.45.0000°

Wait Zwo+ ....0.000 Rt +..0.0000°
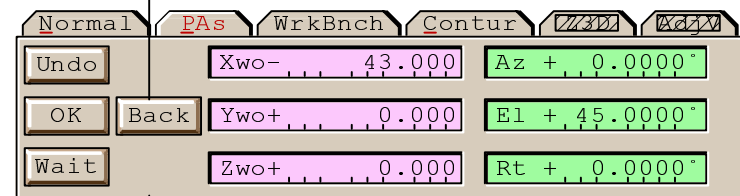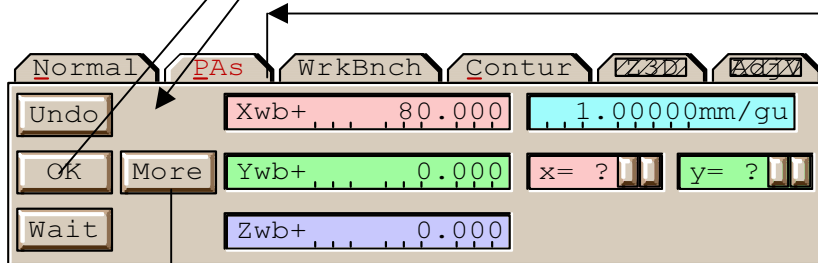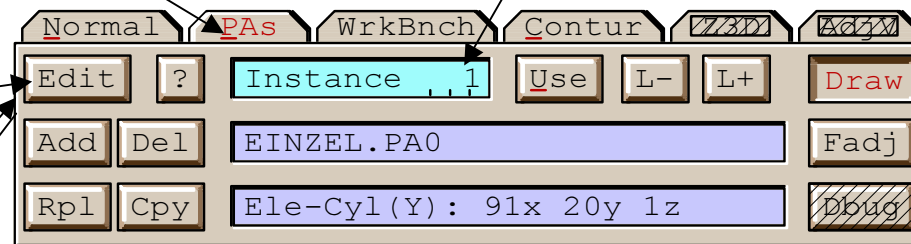
SIMION Instance Editing

More

Back

1 mm/gu

X = 80 mm

X = -43 gu

45° el
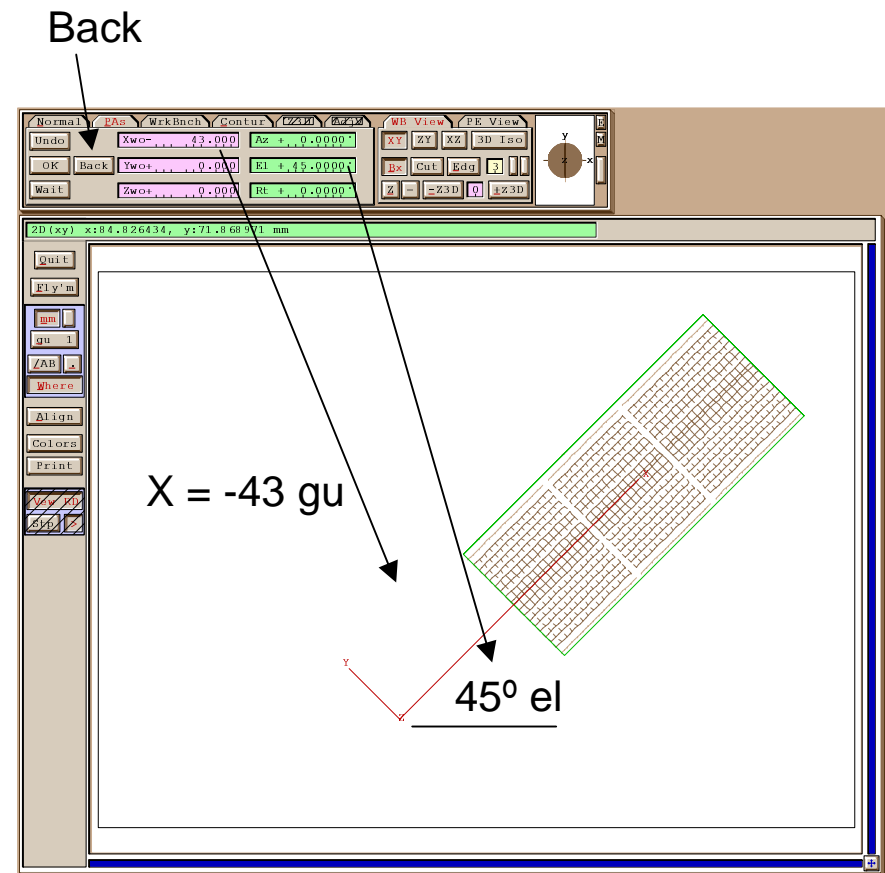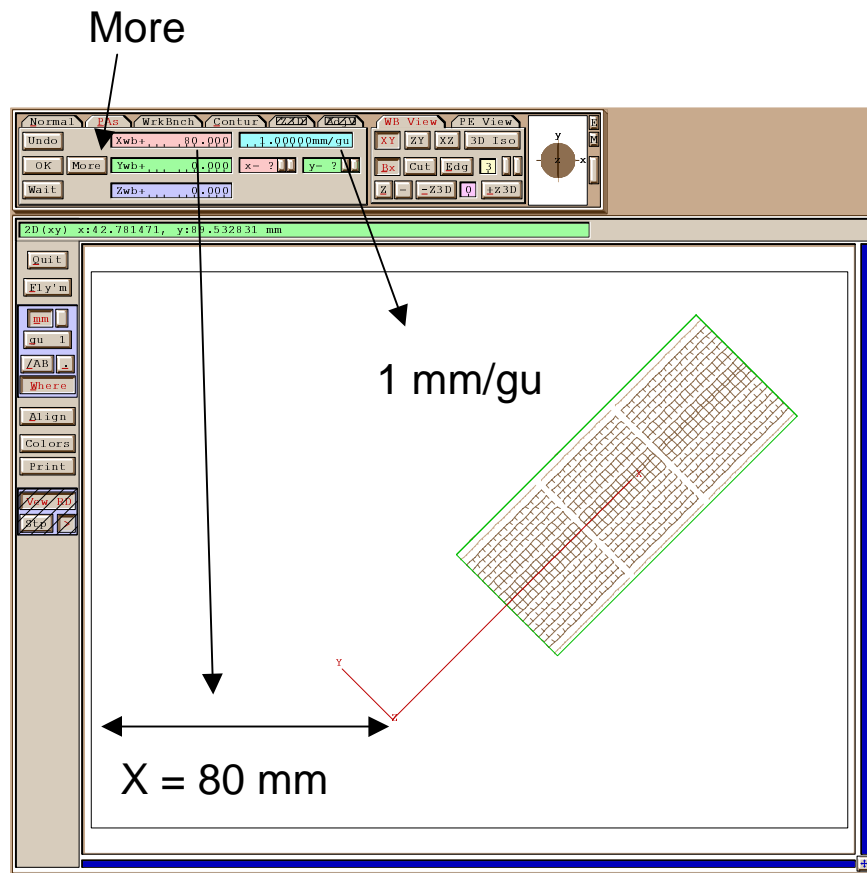
Order of Orientations and displacements

1. Rt angle

2. El angle

3. Az angle

4. Working Origin offset from array physical origin

5. Working Origin offset from workbench origin

Angular Orientations

Adding an Instance

2. Click Add

1. Mark Volume

Normal	PAs	WrkBnch	Contur	3D	AGM

Edit	?	Instance 1	Use	L-	L+	Draw
Add	Del	EINZEL.PA0				Fadj
Rpl	Cpy	Ele-Cyl(Y): 91x 20y 1z				Dbug

3. Edit Instance Definition

Done

Working Origin's PA Offset (gu)	Working Origin's Workbench Coords	PA Scaling and Orientation	Special Angle Orientation
Ox+ 0.000	X + 224.221	0.65517mm/gu	Az + 0.0000°
Oy+ 0.000	Y + 0.000	x=+X y=+Y	El + 0.0000°
Oz+ 0.000	Z + 0.000		Rt + 0.0000°

4. Click Done

New Array Instance

Instance Rules

▌ Instance Fields are Separate
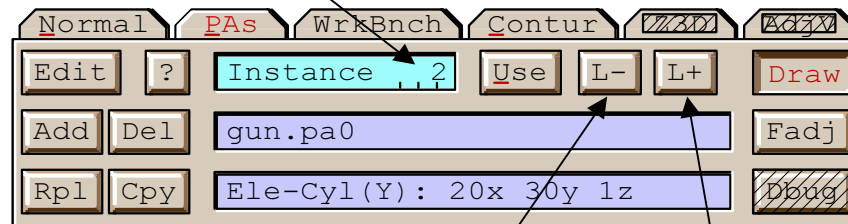
  ▎ Each instance is an isolated island.

  ▎ 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

Instance Number (and Priority)

Normal	PAs	WrkBnch	Contur	///3D/	Adjx
Edit	?	Instance 2	Use	L-	L+	Draw
Add	Del	gun.pa0			Fadj
Rpl	Cpy	Ele-Cyl(Y): 20x 30y 1z			Dbug

Lower Instance's Number   Raise Instance's Number

Other Instance Options

Display Instance's Parameters

Use instance under mouse cursor in View

Draw Instance in View

Delete Instance

Normal	PAs	WrkBnch	Contur	3D	AdjV

Edit	?	Instance 2	Use	L-	L+	Draw
Add	Del	gun.pa0				Fadj
Rpl	Cpy	Ele-Cyl(Y): 20x 30y 1z				Dbug

Replace Instance

Copy electrodes from intercepting higher instances into currently selected instance's potential array (must be 3D)

Fast Adjust Instance Potentials

Access Instance's User Programs (belong to array)