

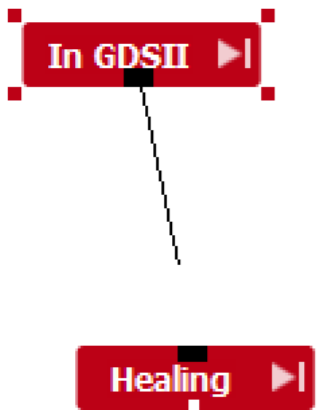
# BEAMER

Radial PEC, Powerful Filter & the new Fields module

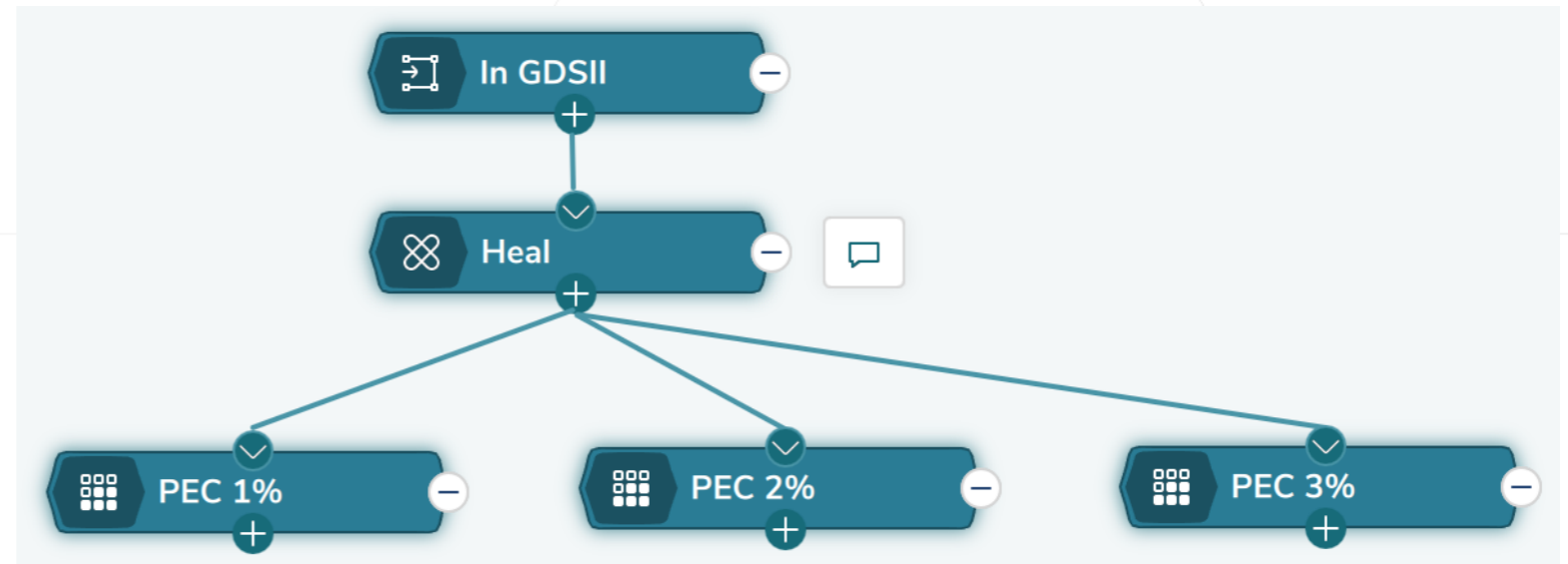
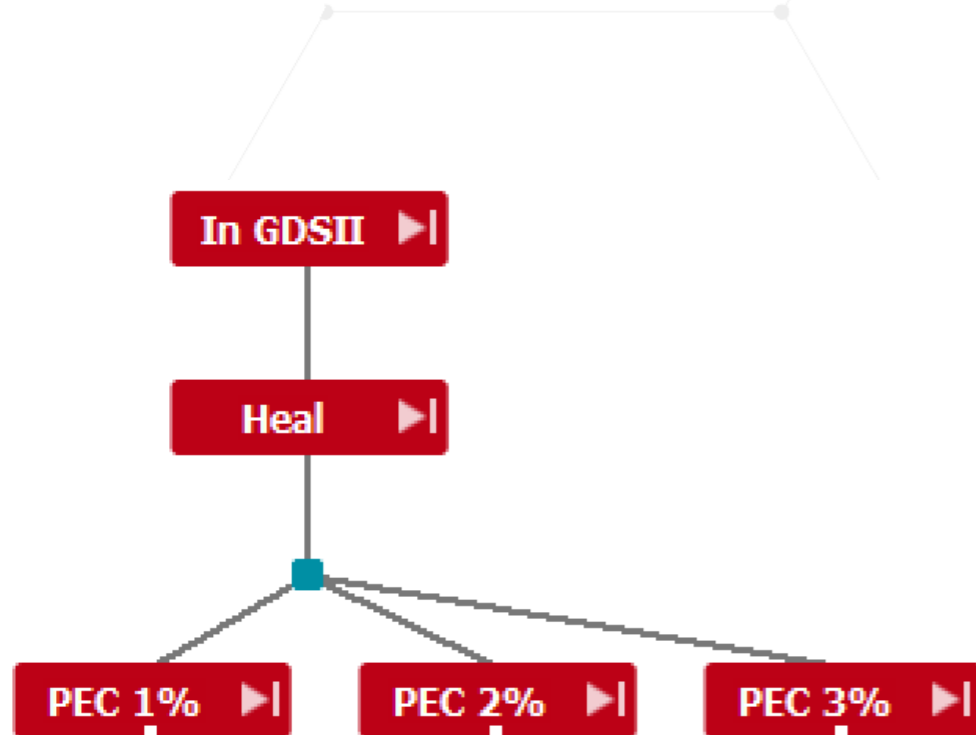
- New features:
  - PEC module
  - Fields module
  - Generate sleeves with ease
  
- Some underutilized modules
  - Filter
  - Corner PEC

# New features

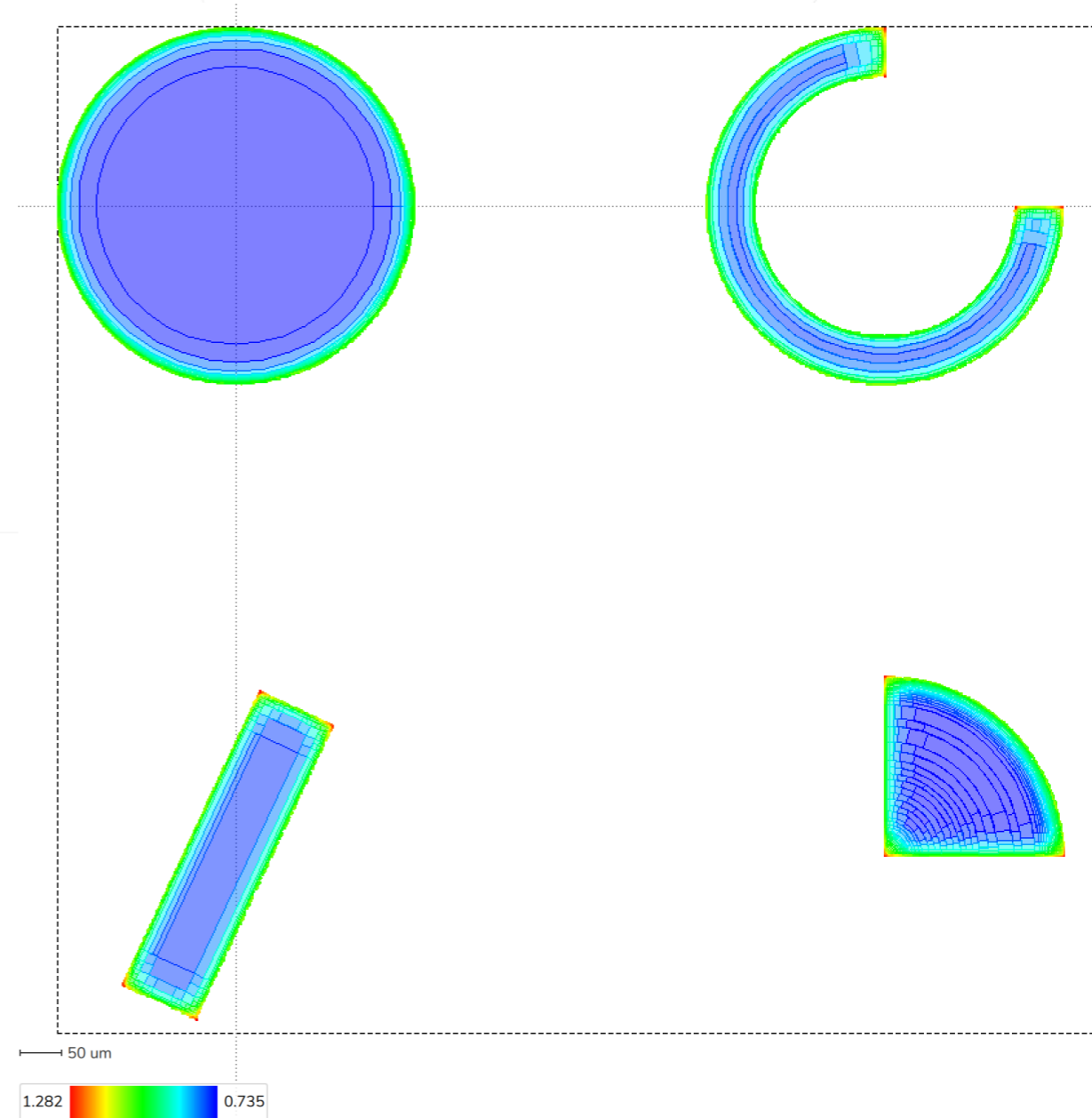
- Say goodbye to finding the node to connect your module
- With the new version, each module has a built in node
- This makes connecting to the other modules quite seamless



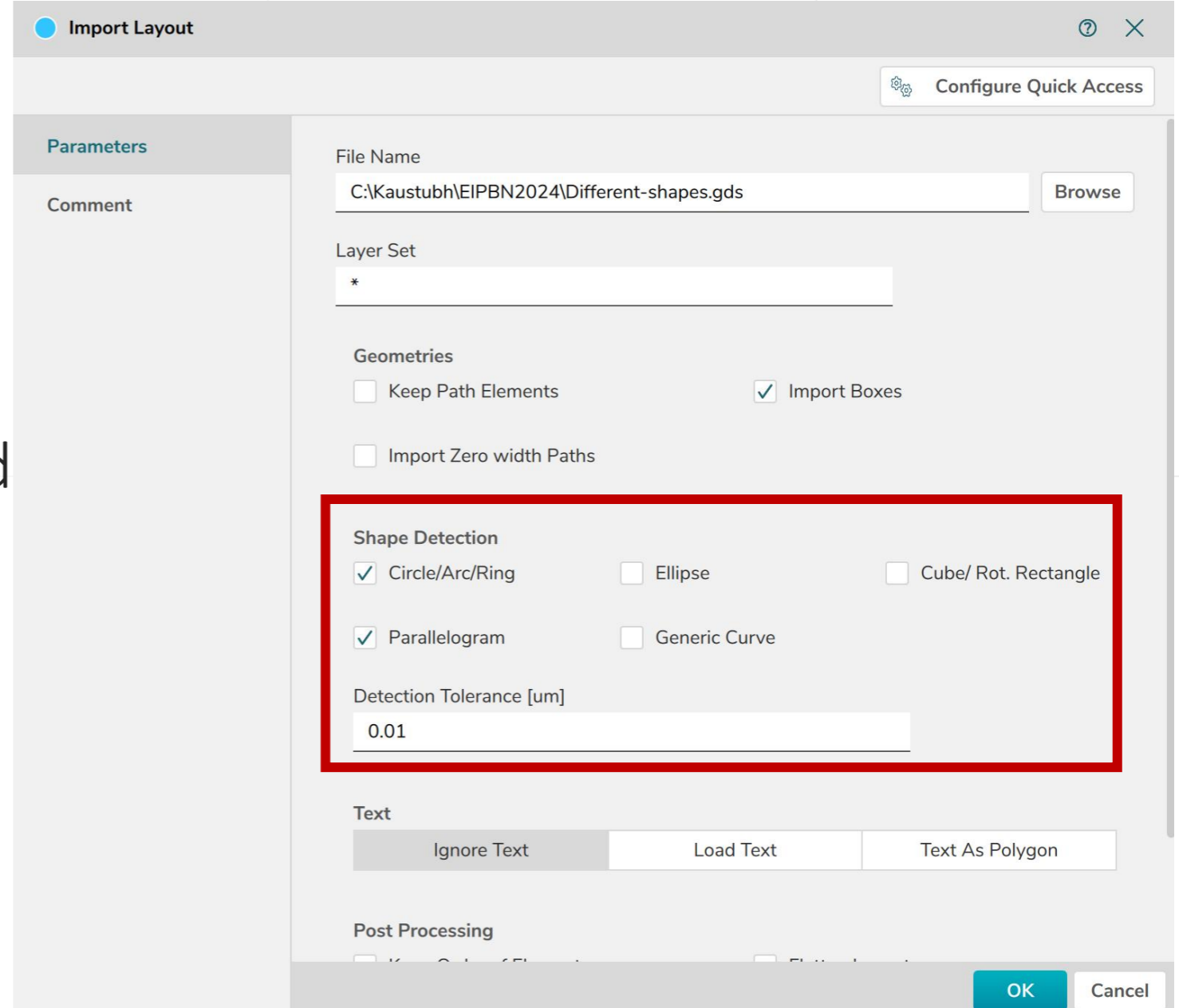
- This also means that you no more need a split node for multiconnections



- Generic element types like Circles / Arcs / Rotated Rectangles are maintained during fracturing
- Please note that this options is currently only supported for long range PEC



- At the import, under “Shape Detect”, you’ll only see the options that your license allows
- Use tolerance to make sure that the shapes are correctly detected
- Now if you run PEC, you’ll see much smarter fractures



**Import Layout**

Configure Quick Access

**Parameters**

Comment

File Name  
C:\Kaustubh\EIPBN2024\Different-shapes.gds Browse

Layer Set  
\*

**Geometries**

Keep Path Elements  Import Boxes

Import Zero width Paths

**Shape Detection**

Circle/Arc/Ring  Ellipse  Cube/ Rot. Rectangle

Parallelogram  Generic Curve

Detection Tolerance [um]  
0.01

**Text**

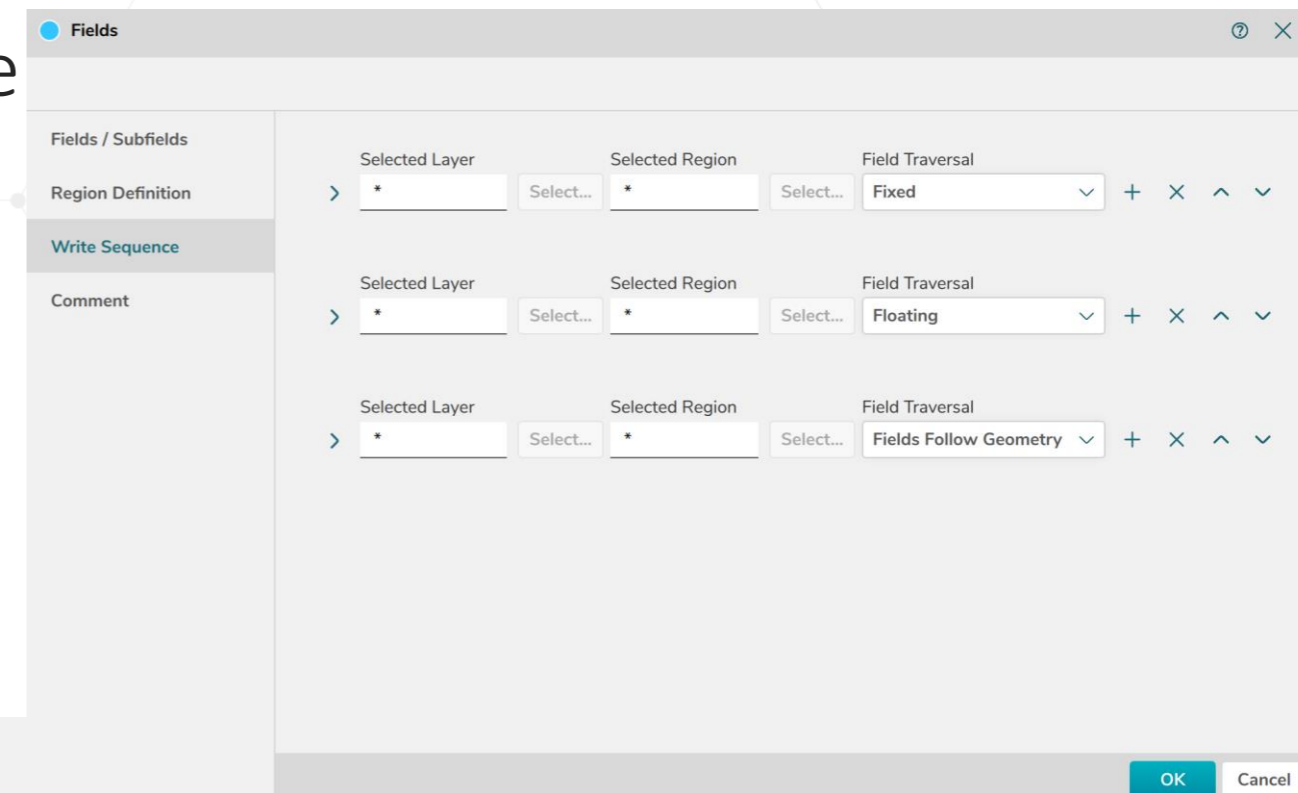
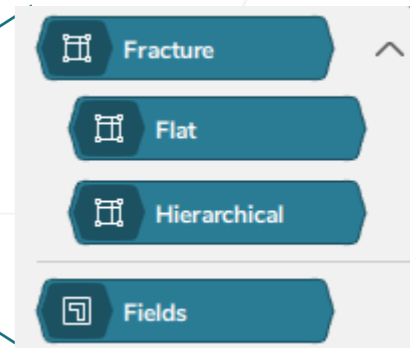
Ignore Text Load Text Text As Polygon

**Post Processing**

OK Cancel

- V6 Fracture had a dual purpose of Fracture control and Field control – often needing only one of both.
- V7 splits these functions into two standalone modules and streamlines the usage.
- This gives more power and flexibility to each of these modules
- When FIELDS module is in a flow, please use “Cell to Field” in the export

**Fracture**



Field Placement

Fixed

Floating

Manual

Cell To Field



# A short FIELDS overview

## Write Sequence

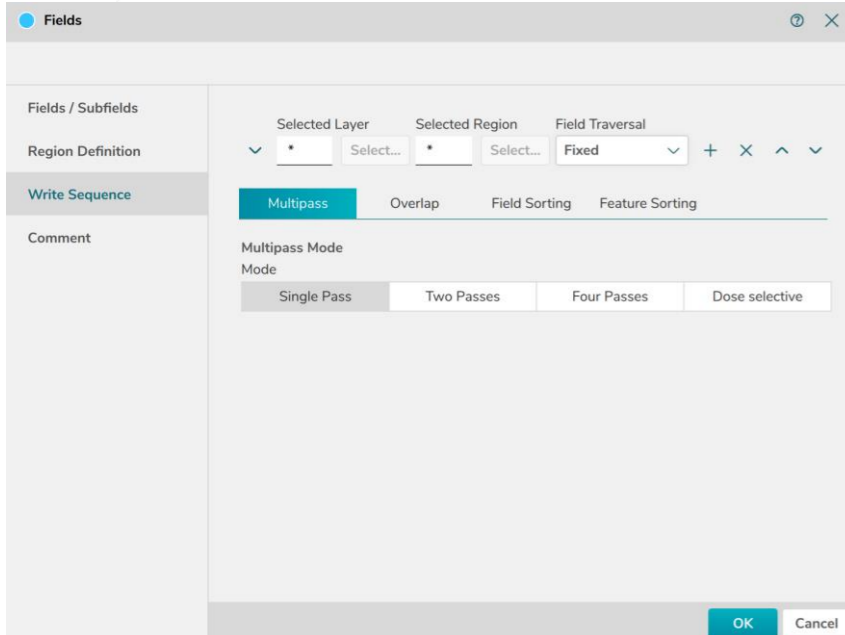
- Setup the write sequence and mode for regions or layers
- Fine control of in field writing

## Region Definition

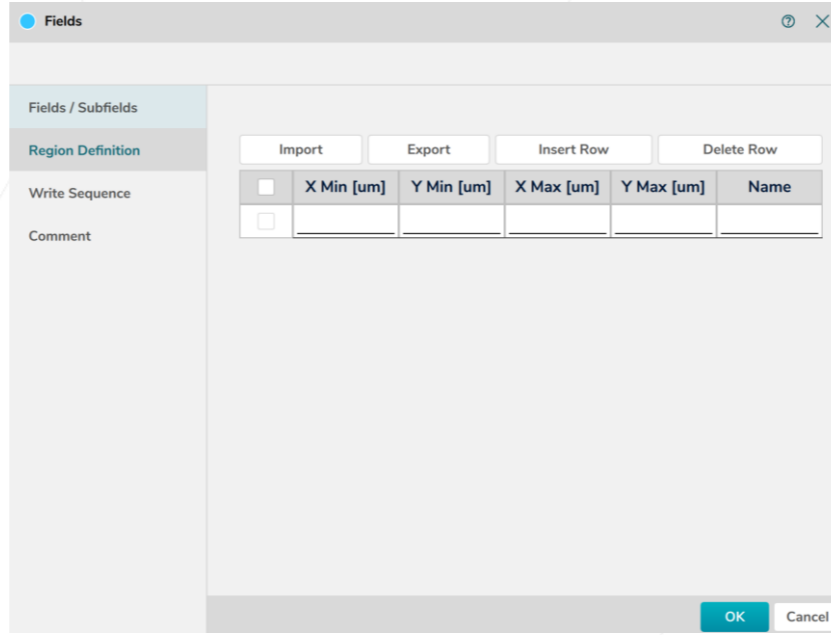
- Specify what regions to use by populating a table
  - Manually
  - Interactively

## Fields/Subfields

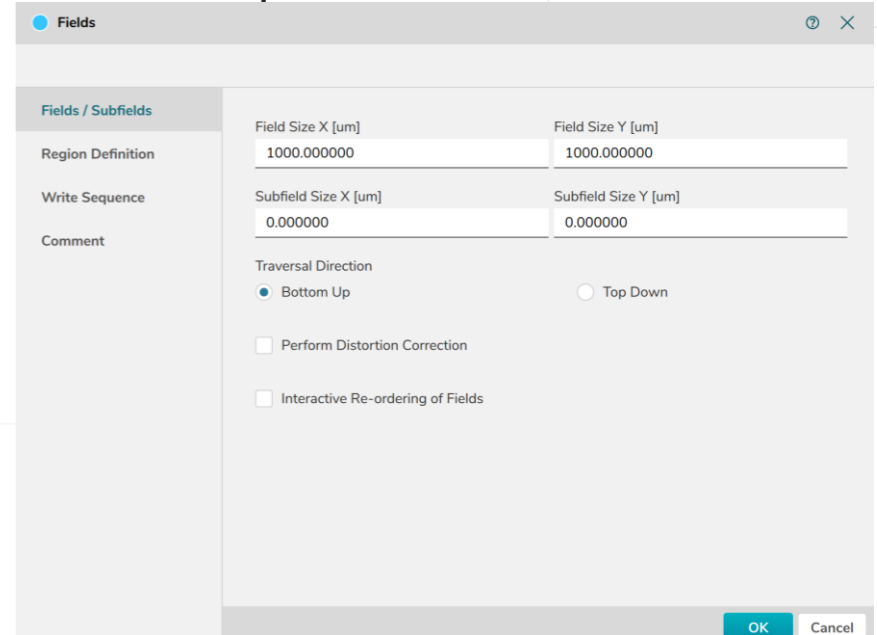
- Specify field and subfield parameters
- Control traversal direction
- Setup distortion



The 'Fields' dialog box is shown with the 'Write Sequence' tab selected. The 'Region Definition' section shows 'Selected Layer' and 'Selected Region' both set to '\*' and 'Field Traversal' set to 'Fixed'. The 'Write Sequence' section has 'Multipass' selected, with 'Overlap', 'Field Sorting', and 'Feature Sorting' options. The 'Multipass Mode' section shows 'Single Pass' selected, with 'Two Passes', 'Four Passes', and 'Dose selective' options. The 'Comment' field is empty. 'OK' and 'Cancel' buttons are at the bottom.

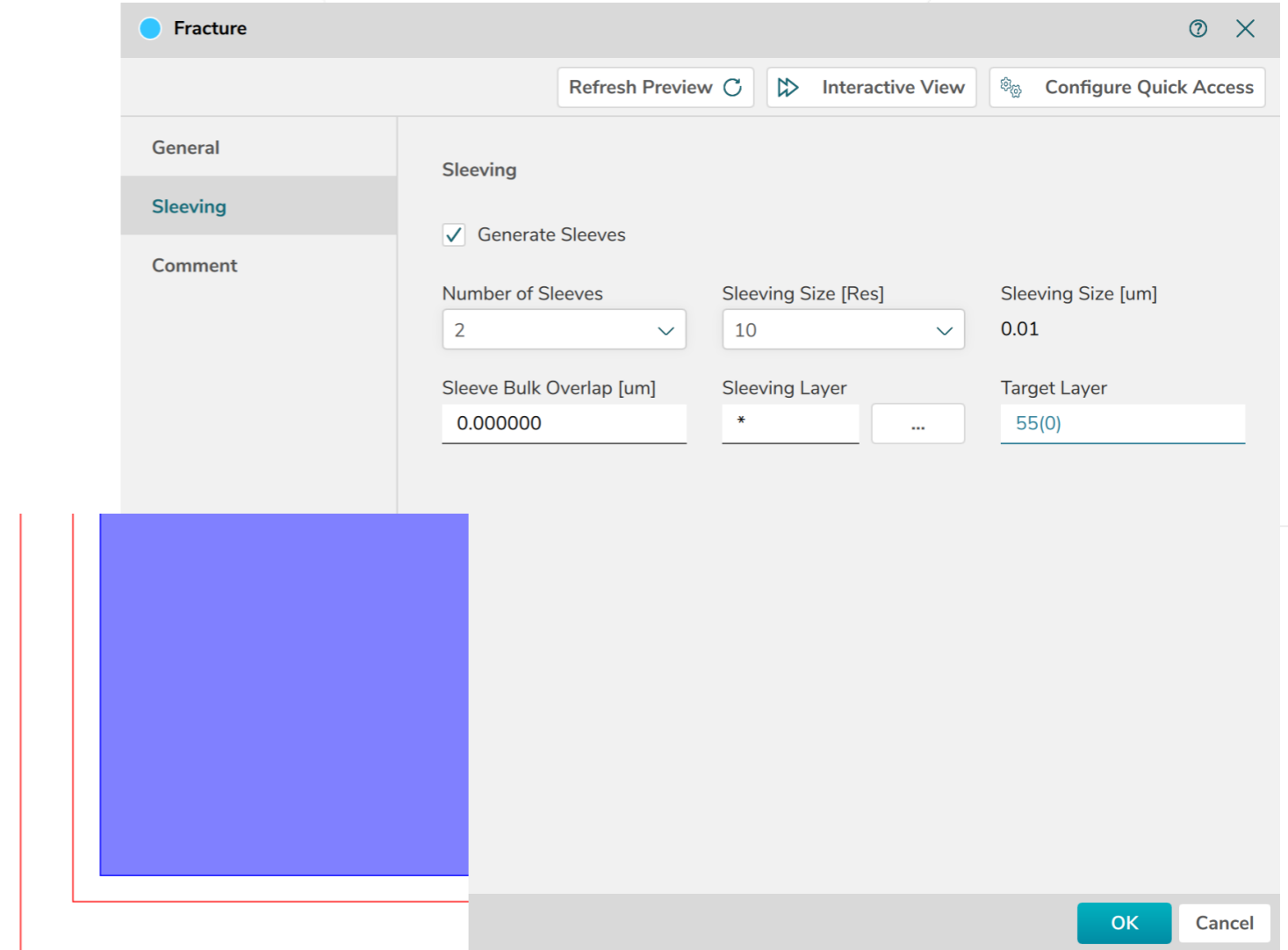


The 'Fields' dialog box is shown with the 'Region Definition' tab selected. The 'Region Definition' section has 'Import', 'Export', 'Insert Row', and 'Delete Row' buttons. Below is a table with columns: X Min [um], Y Min [um], X Max [um], Y Max [um], and Name. The table is currently empty. The 'Write Sequence' and 'Comment' sections are visible but not active. 'OK' and 'Cancel' buttons are at the bottom.



The 'Fields' dialog box is shown with the 'Fields / Subfields' tab selected. The 'Region Definition' section has 'Field Size X [um]' and 'Field Size Y [um]' both set to 1000.000000. The 'Write Sequence' section has 'Subfield Size X [um]' and 'Subfield Size Y [um]' both set to 0.000000. The 'Traversal Direction' section has 'Bottom Up' selected, with 'Top Down' as an option. There are checkboxes for 'Perform Distortion Correction' and 'Interactive Re-ordering of Fields'. The 'Comment' field is empty. 'OK' and 'Cancel' buttons are at the bottom.

- The old way of creating sleeves used a bunch of BEAMER operations like BIAS and XOR, making the flow a little complicated
- With the Sleeving function built into the fracture module, creating sleeves can be done in just a few clicks



Fracture

Refresh Preview Interactive View Configure Quick Access

General  
Sleeving  
Comment

Sleeving

Generate Sleeves

Number of Sleeves: 2  
Sleeving Size [Res]: 10  
Sleeving Size [um]: 0.01

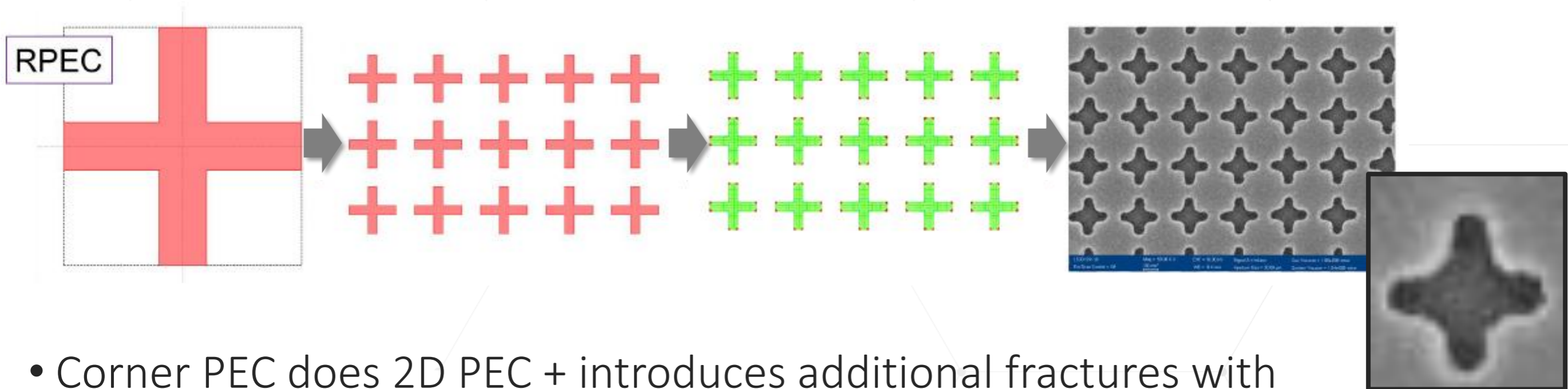
Sleeve Bulk Overlap [um]: 0.000000  
Sleeving Layer: \*  
Target Layer: 55(0)

OK Cancel

← 0.005 um

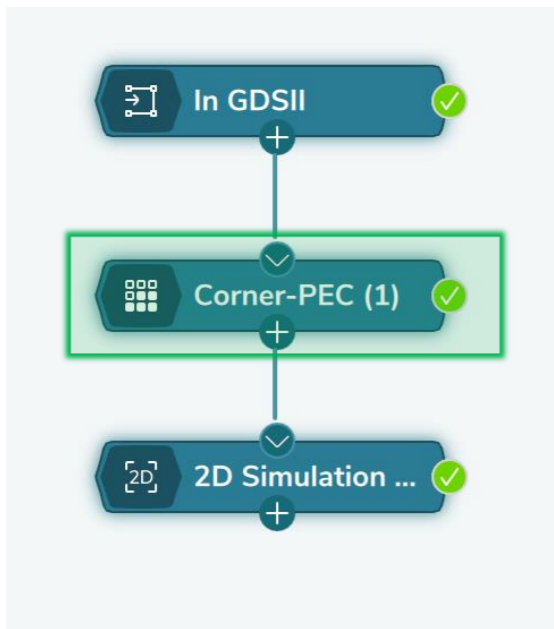
# Some underutilized modules

- For some applications such as Plasmonics, shape fidelity and corner sharpening might become critical and require additional correction



- Corner PEC does 2D PEC + introduces additional fractures with manual control
- This allows to target corners, outline preserved

- Corner PEC introduces an “Edge” of desired width and allows to specify relative doses factors for edge, bulk and corners individually.



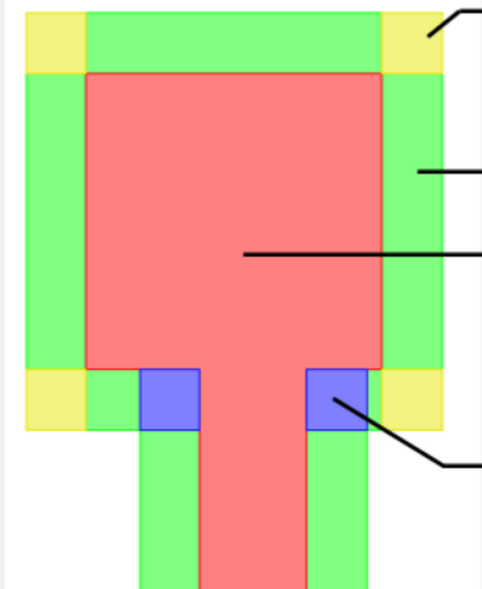
Layer Selection: \*

Size: 0.05

Corner Extension: 1.000000

Relative Dose Assignments

Bulk	1	Edge	1
Inner Corner	0.5	Outer Corner	1.5



Outer Corner

Edge

Bulk

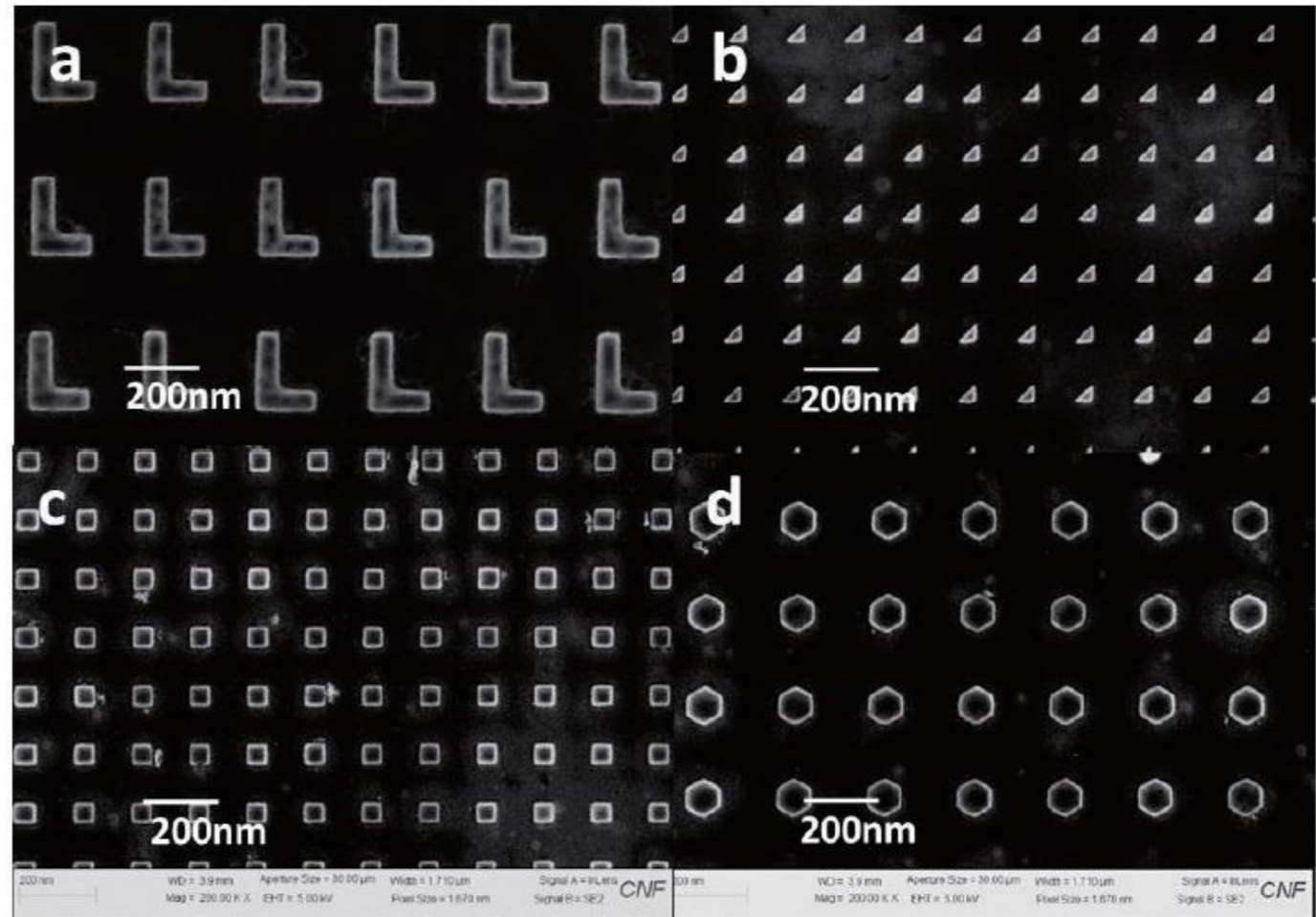
Inner Corner

## Electron Beam Lithography using Corner PEC

“Staying Sharp Improving  
Corners at the Nanoscale”

Presented by  
Amrita Banerjee, PhD  
Research Associate

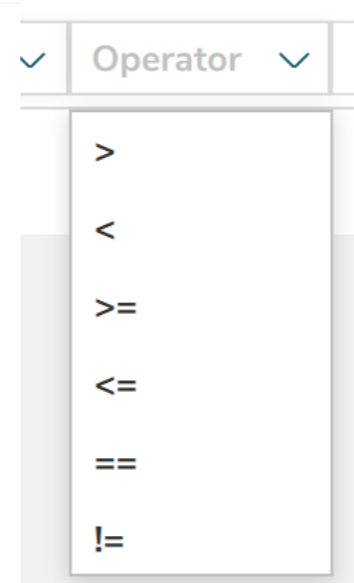
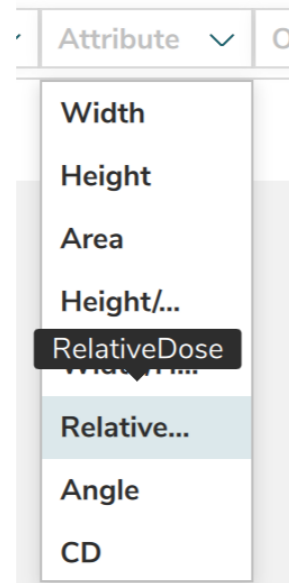
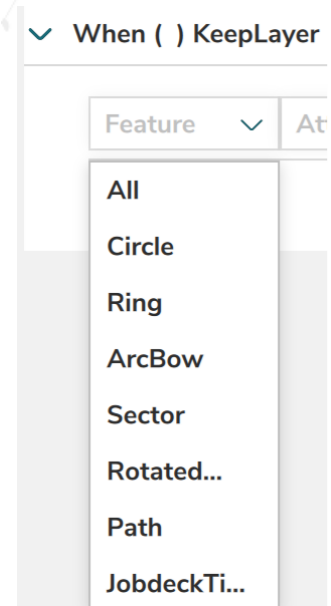
May 28, 2019



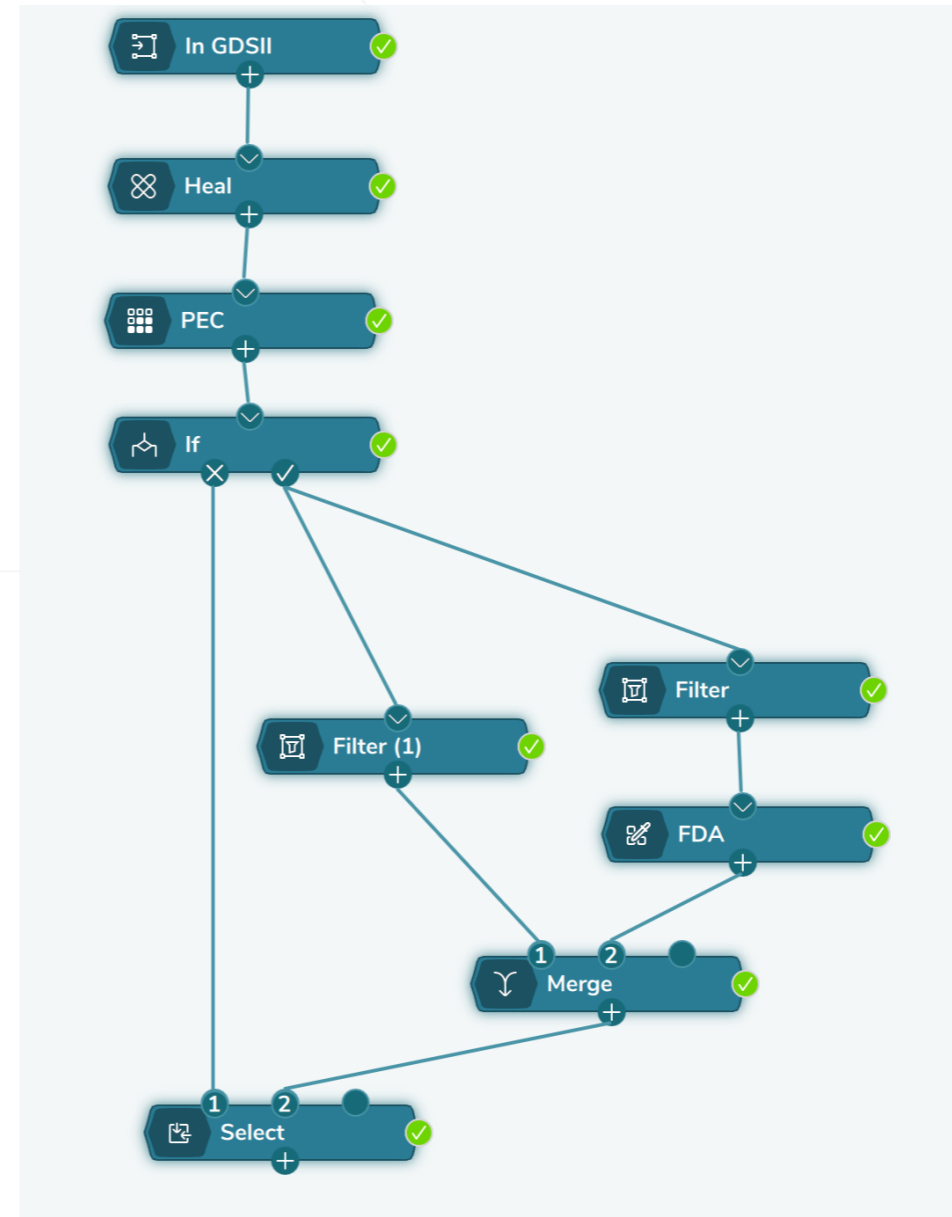
E-beam lithography of features using BEAMER corner-PEC and lower temperature bake of HSQ- (a) L shapes, (b) right angled triangles, (c) squares and (d) hexagons.

- Did you know you can filter out structures based on CD, height, width, relative dose, and a bunch of such parameters combined?

- How? → Using the  module



- You can filter out structures below a defined dose
- Once you have this, you can use the FDA to correct the dose and merge it back to the flow
- To improve testing inside your flow, you can also use this along with the IF module





# Thank You!

support@genisys-gmbh.com



## Headquarters

GenISys GmbH  
Eschenstr. 66  
D-82024 Taufkirchen (Munich)  
GERMANY

📞 +49 (0)89 954 5364 0

📠 +49 (0)89 954 5364 99

✉ info@genisys-gmbh.com

## USA Office

GenISys Inc.  
P.O. Box 410956  
San Francisco, CA  
94141-0956  
USA

📞 +1 (408) 353 3951

✉ usa@genisys-gmbh.com

## Japan / Asia Pacific Office

GenISys K.K.  
German Industry Park  
1-18-2 Hakusan Midori-ku  
Yokohama 226-0006  
JAPAN

📞 +81 (45) 530 3306

📠 +81 (45) 532 6933

✉ apsales@genisys-gmbh.com