

# LAB

## What's New LAB 5.4.0

# Modules

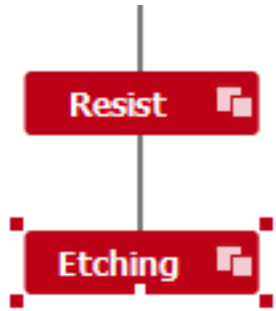
# Laser Simulation DWL

## Laser Exposure

Region	Stack	Tool	Simulation	Analysis	Label/Comment
Machine Type		DWL			
DWL Head		Gauss HIMT VPC DWL			
Wavelength [nm]		405			
Pixel Size [nm]		100			
Number of Gray-Tone Levels		0			
NA		0.9			
Focus Offset [um]		0.000000			
Flare Background		0.000000			
Exposure Dose [mJ/cm <sup>2</sup> ]		1.000000			
<input checked="" type="radio"/> Wafer Parameter					
Beam Size FWHM [nm]		600			
<input type="radio"/> Tool parameter					
Gaussian Beam Radius [mm]		1.160740			
Focal Length [mm]		2			

- Enhanced support of the HIMT DWL tool
- Selecting the DWL Tool will preset the simulation parameters

Machine Type	DWL
DWL Head	2mm
Wavelength [nm]	
Pixel Size [nm]	
Number of Gray-Tone Levels	



Etch Node Settings

General Result Settings Label/Comment

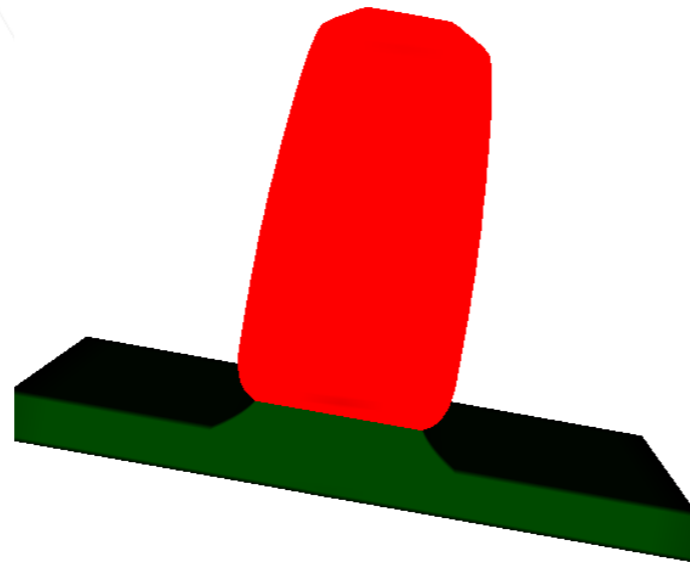
Etch time [s] 30

Etch Type

Wet  Dry

Etch rate values [nm/s]:

Material	Isotropic
AZ3312	1
Si-crystalline	3



AZ3312  
Si-crystalline

- The Etching module allows simulating of resist and substrate etching with known etch rates.
- The module has been improved where the substrate is now etched without requiring an intermediate layer.

# Separate Sidewall Angle Definition

Projection Exposure

Mask Stack Tool Simulation Analysis Label/Comment

Mask Parameter

IncomingLayout  Dark Field  Bright Field  Phase Edit...

Layer(s) \*

Corner Rounding Parameters

Corner Rounding Inner Radius [nm] 50.000000 Outer Radius [nm] 50.000000

Region Definition

	X Min [um]	Y Min [um]	X Max [um]	Y Max [um]	Name
<input checked="" type="checkbox"/>	-0.8	-0.5	0.8	0.5	R1
<input type="checkbox"/>					

Metrology Definition

	Center X [um]	Center Y [um]	Orientation	Target CD [um]	Name
<input type="checkbox"/>					

Threshold [m/cm<sup>2</sup>]: 0.500000 Reference layer (CSE): \*

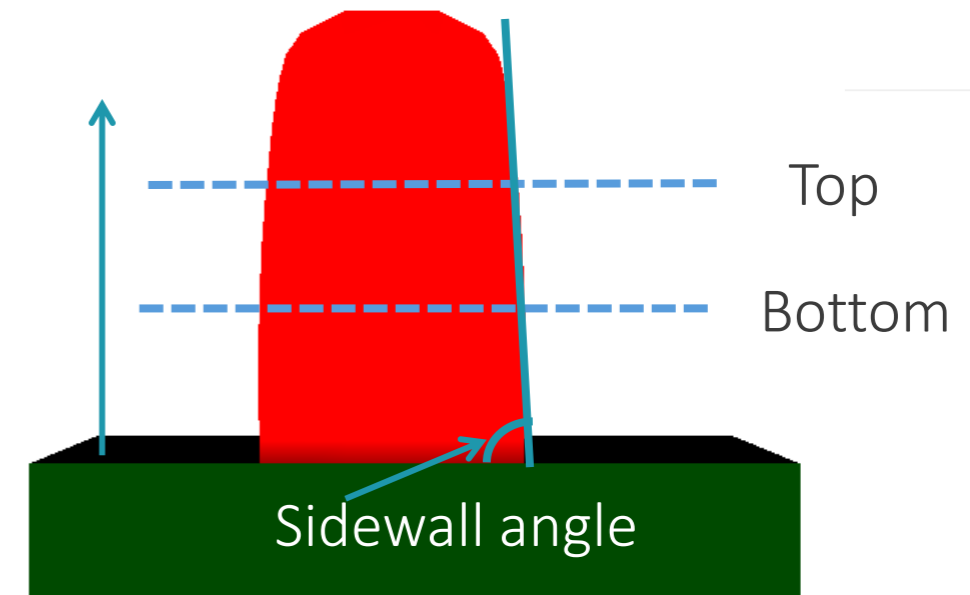
Metrology position settings

Bottom (%): 10.000000 Center (%): 50.000000 Top (%): 90.000000

Sidewall angle

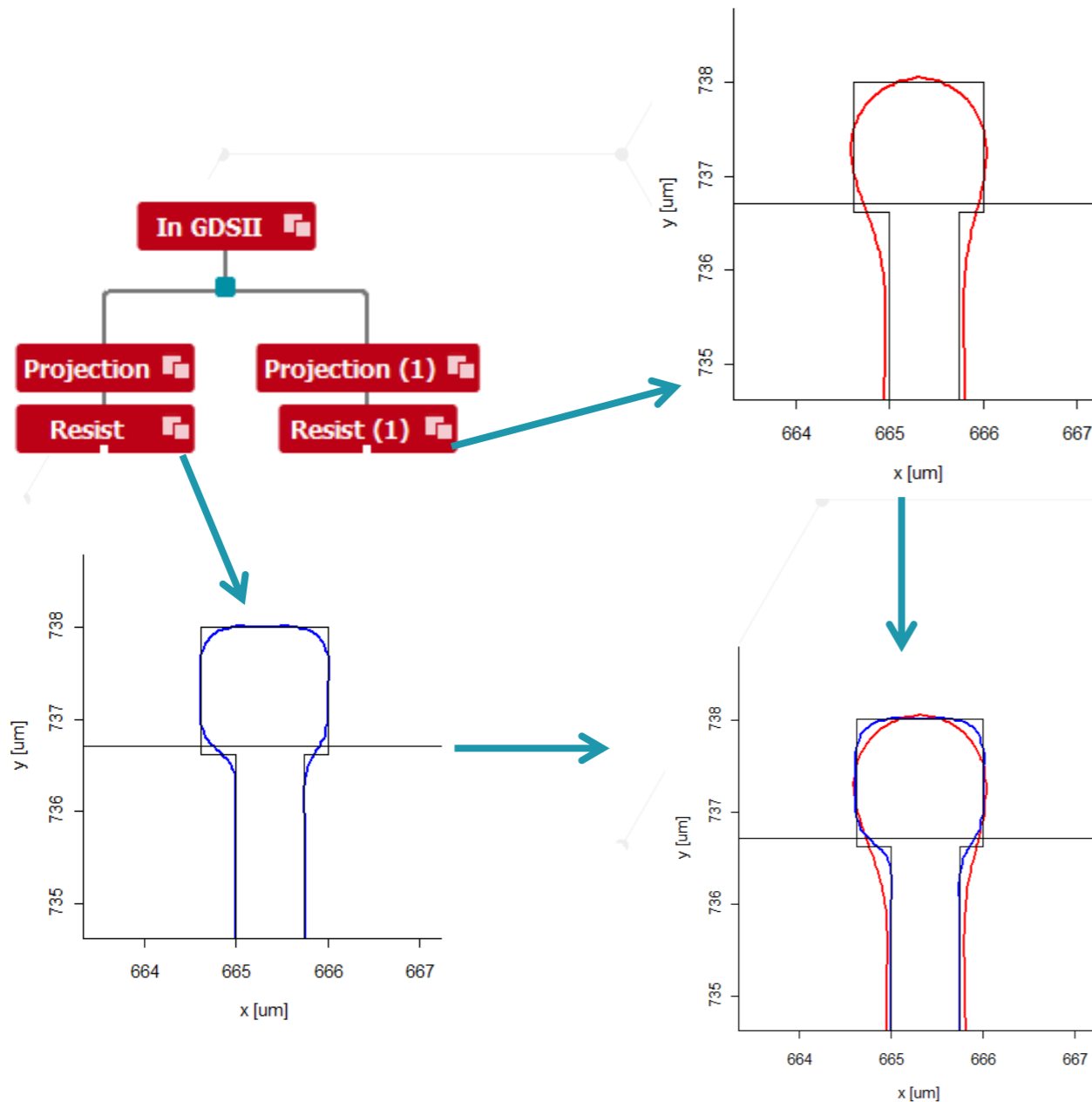
Bottom (%): 45.000000 Top (%): 55.000000

- Sidewall Angle calculation now allows separate relative height value definition.
- Enhanced sidewall angle calculation accuracy



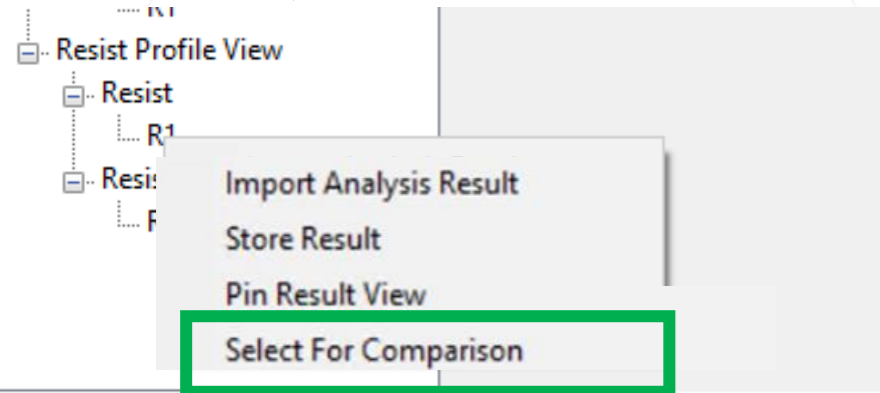
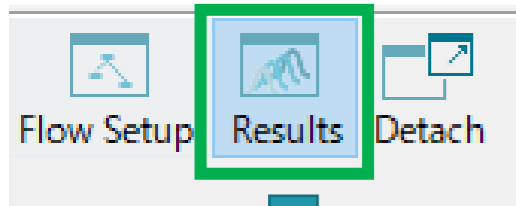
# Analysis & Viewing

# Contour Comparison

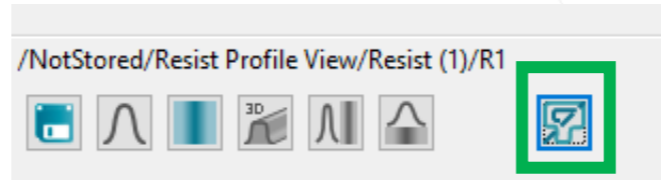


- LAB 5.4 allows the user to compare contour lines from different simulations in one 2D plot.
- Contour comparison is available in „Results“ panel.

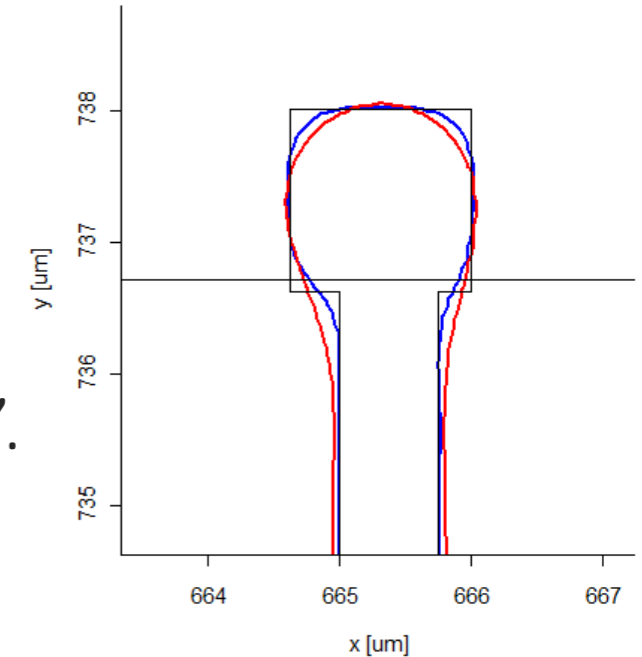
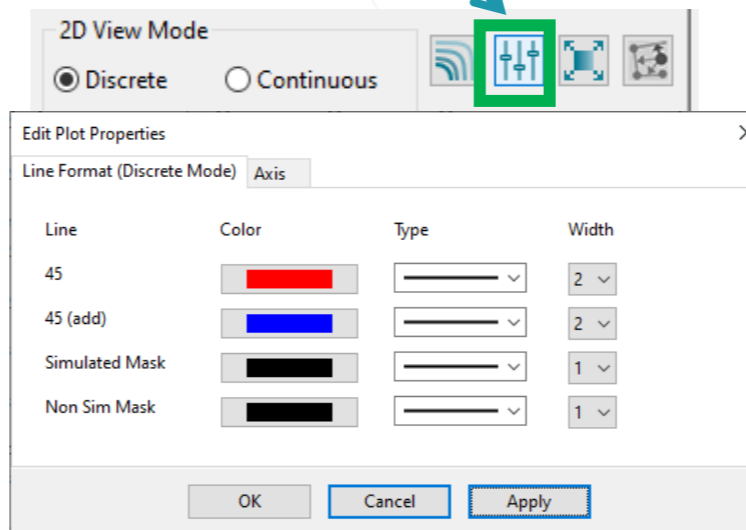
# Contour Comparison Procedure



1. Select the view for comparison
2. Click on another image of the same type and contour image is selected.

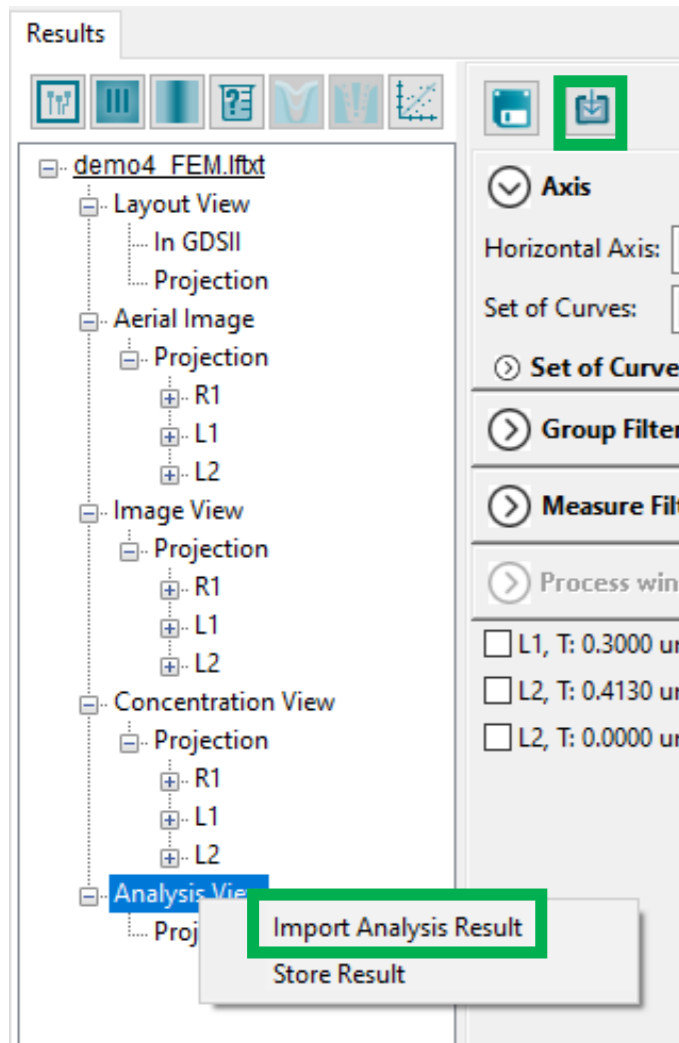


3. Activate the comparison by "Show Comparison Contours" button
4. The contour properties is available via the "2D format dialog".





# Import Metrology Data



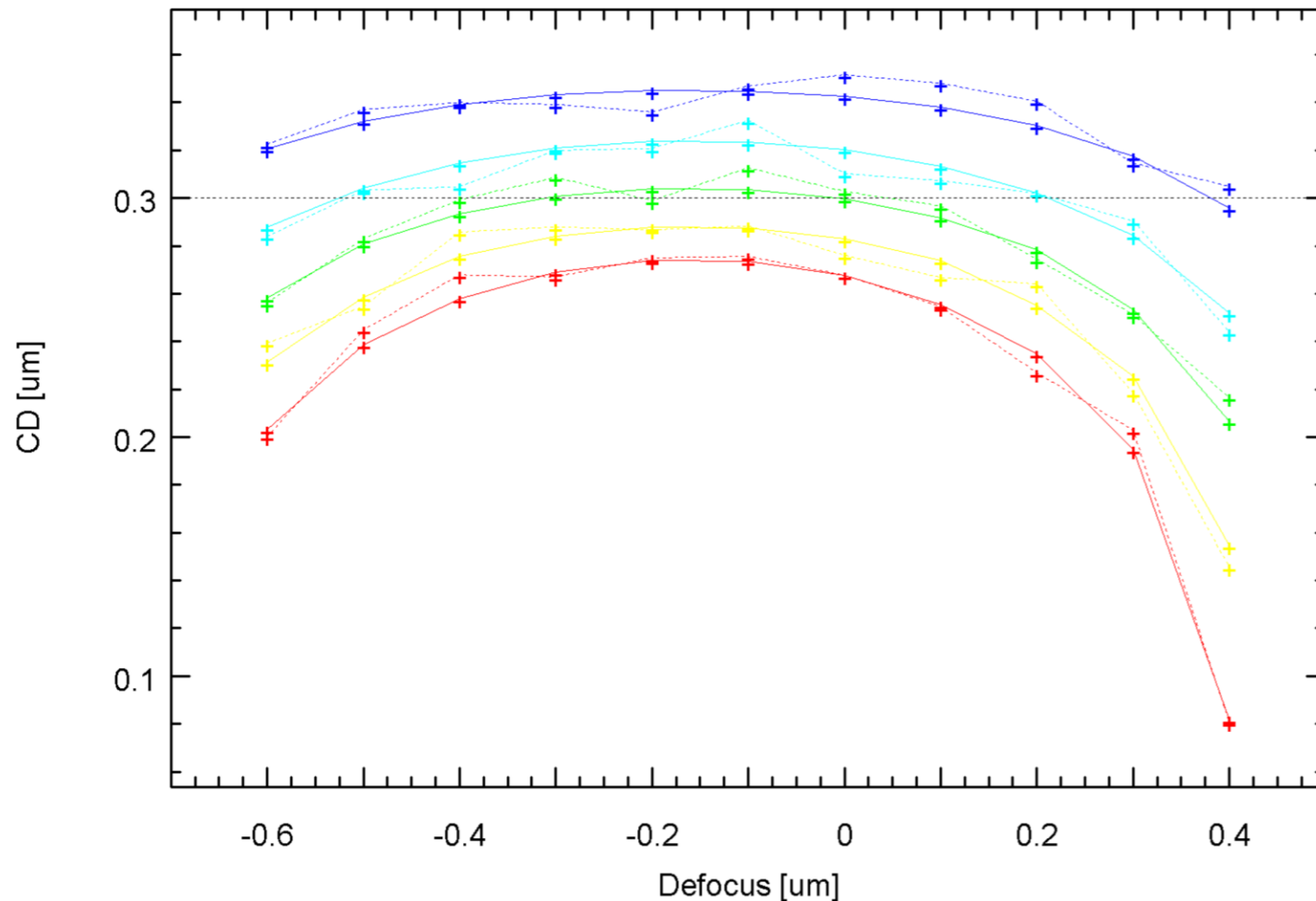
2. Click "Import Data..." button on another analysis view

1. Right click on the result tree to import

- In the result tree, the user has now the possibility to import external metrology data to create his own analysis.
- The format of the data file is in table style.
- Two ways to import the metrology data

# Metrology Data Comparison

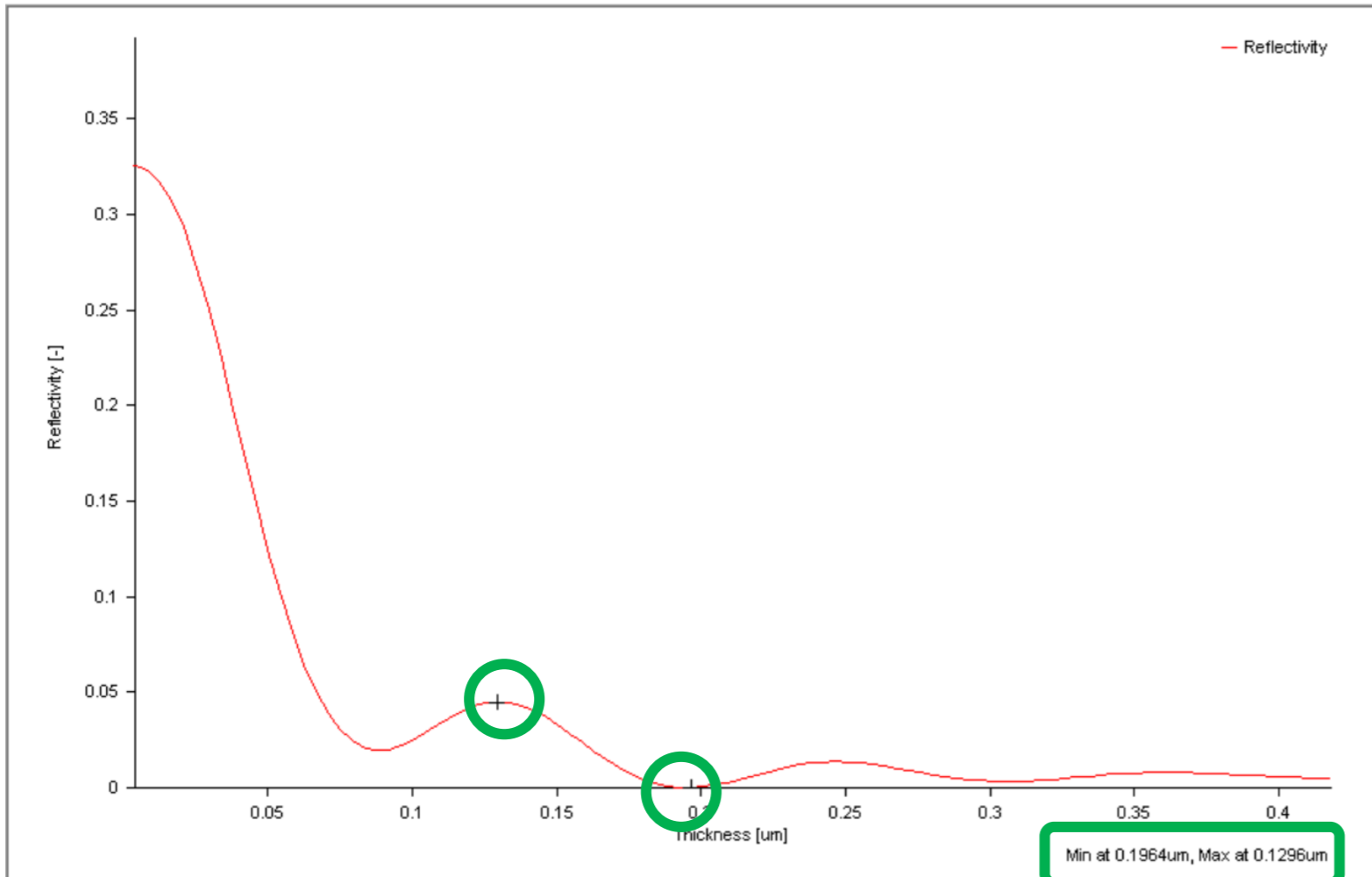
Analysis View



- The imported metrology data can be compared with the simulation result.
  - Imported data from the result tree is compared via „Select for Comparison“.
  - Direct imported data by „Import Data...“ button is compared in the same plot.

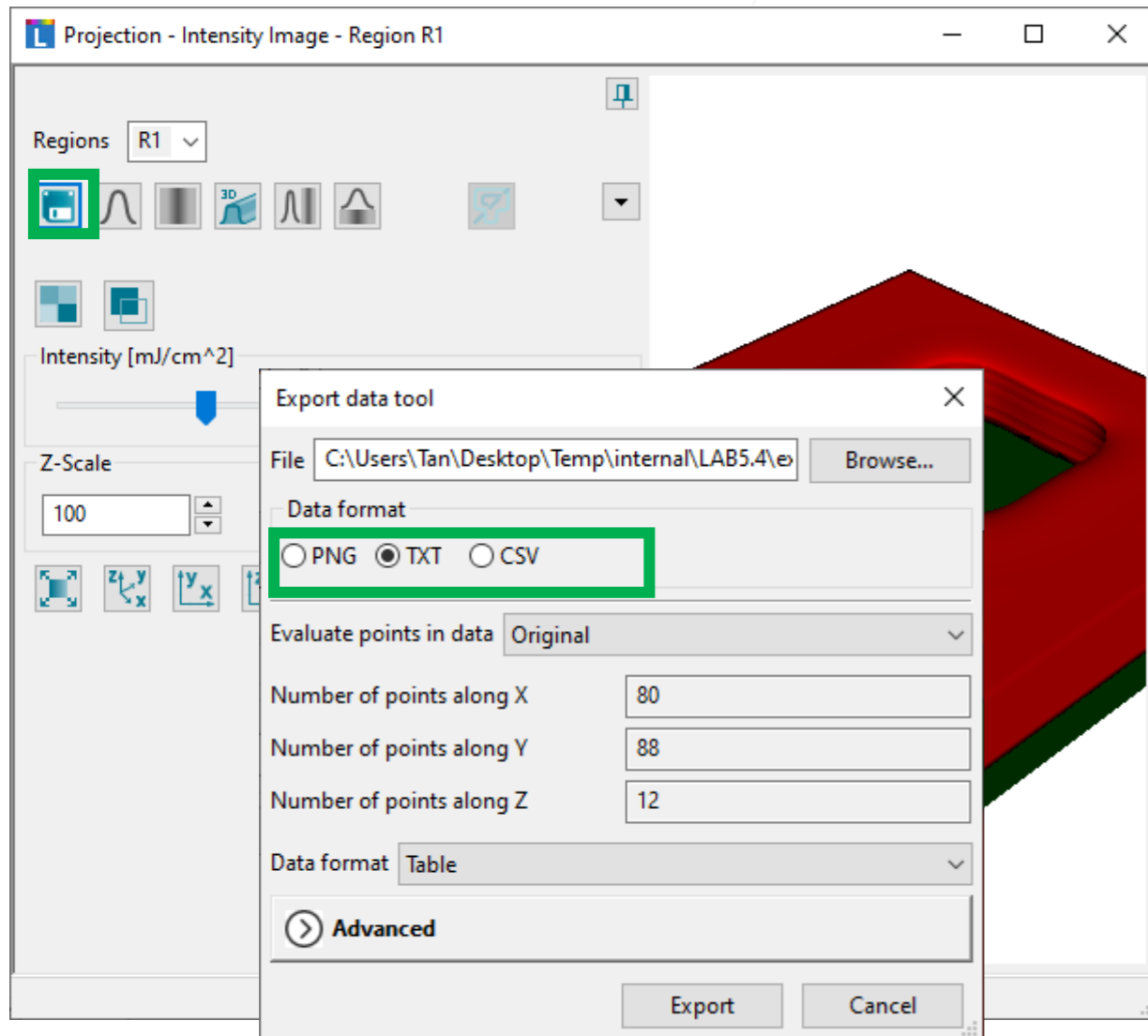
# Reflectivity Analysis – Min/Max

Reflectivity Analysis for    
Thickness Range [um] from  to



- The Reflectivity Analysis now automatically calculates the min and max reflectivity values, and highlights the positions and displays the results.

# 3D View Export



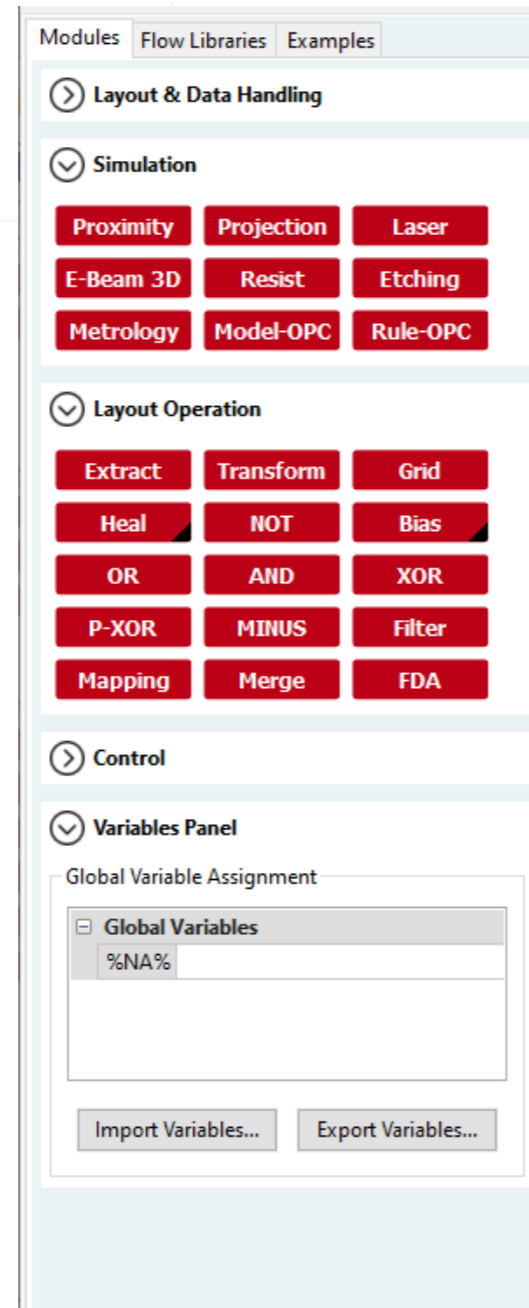
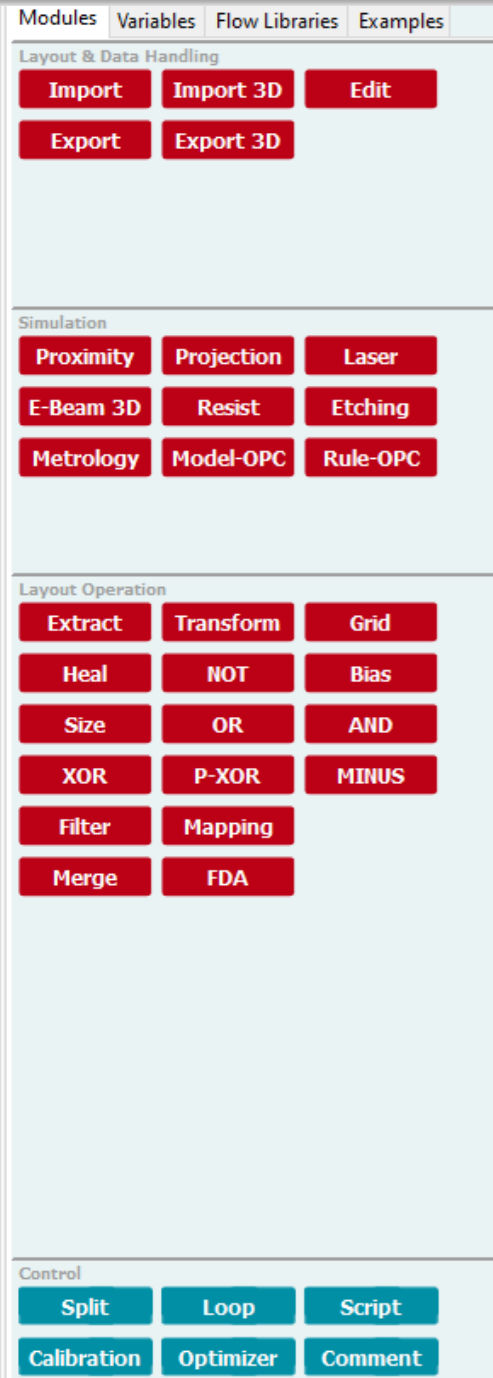
- 3D results view now allow exporting the full data set for analysis outside of LAB
- Newly available formats are .txt file and .CSV
- Adjustable output parameters and header information

# Usability

# Update Modules Tab

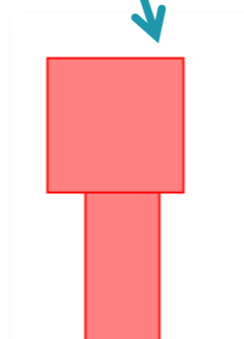
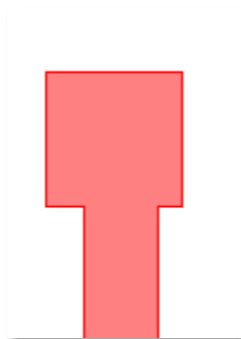
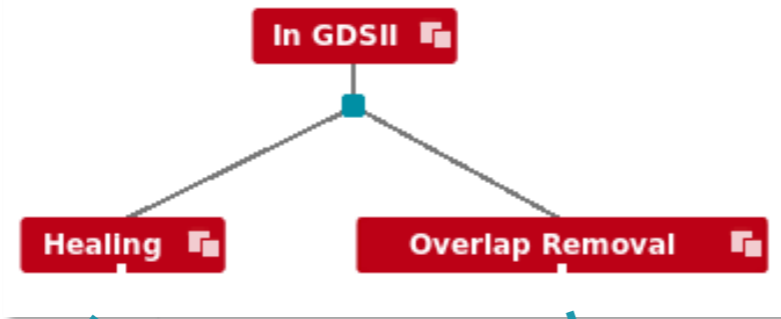
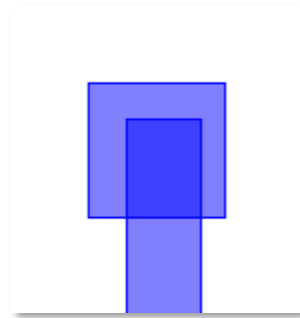
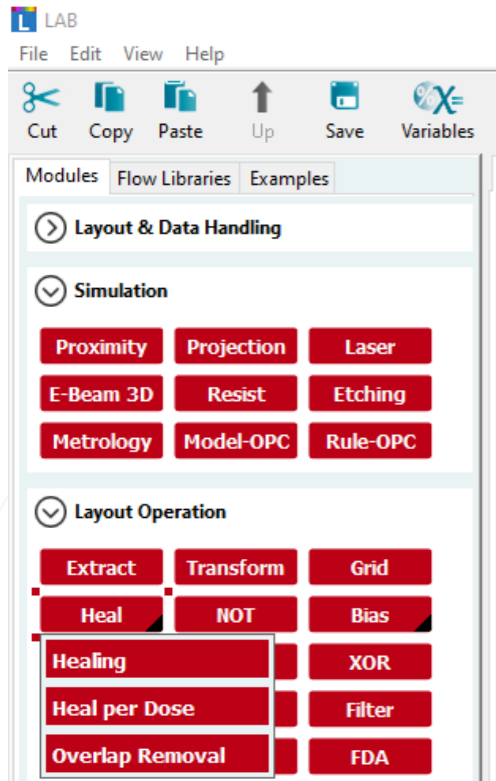
The Modules tab has been reworked offering now:

- Collapsible groups by introducing accordion panels
- Quick access to Global Variables
  - Global Variables with Import & Export functions.



# Submodules

- Modules can now have multiple custom configurations, or “submodules”
- New defaults provided for: Heal, Bias
- New custom modules can be created by right-clicking on a module and clicking “Create Custom Module...”



# Submodule Example

- Example : Submodules can be configured for user facilities, allowing default tool configuration for user.

Modules | Flow Libraries | Examples

Layout & Data Handling

Import Import 3D Edit

Export Export 3D

Simulation

Proximity Projection Laser

E-Beam 3D ASML Stepper

Metrology Model-OPC Rule-OPC

Layout Operation

Extract Transform Grid

Heal NOT Bias

OR AND XOR

P-XOR MINUS Filter

Mapping Merge FDA



Projection Exposure

Mask Stack Tool Simulation Analysis Label/Comment

Spectrum

Predefined Spectrum: 365 nm (i-line) ▼

Wavelength [nm]	Rel. Weight	Peak Width [nm]
365	1	5

Import ...

Export ...

Delete Row

Exposure Dose [mJ/cm<sup>2</sup>] 1.000000

Polarization Scalar ▼


Source

Type Annular ▼

Sigma 0.500000

Sigma 2 0.250000

Annular Fixing 0.000000



Exposure Parameters

Focus Offset [um] 0.000000 Focus Pos. Stack top ▼ Immersion Index 1.000000

Defocus direction Away from substrate ▼ NA 0.450000 Reduction 1.000000

Flare Background 0.000000

Aberrations  per Wavelength ▼ Edit Zernike Coefficients...



# PSF Filter Sorting

2D-PSF Archive

Import... Export... Delete Repair Index

LPSF Analytic Calibration

Filter	Tag	Substrate	Layers	Filters	Energy [keV]	E-Position	Electrons	Alpha [um]	Beta [um]	Gamma [um]
1		GaAs		PMMA 200	50	0.09	2000000	0	0	0
2		GaAs		PMMA 200	100	0.09	2000000	0	0	0
3		GaAs		PMMA 500	50	0.125	2000000	0	0	0
4		GaAs		PMMA 500	50	0.325	2000000	0	0	0
5		GaAs		PMMA 500	100	0.125	2000000	0	0	0
6		GaAs		PMMA 500	100	0.325	2000000	0	0	0
7		GaAs		PMMA 200	80	0.09	2000000	0	0	0
8	project2	GaAs		PMMA 200	125	0.09	2000000	0	0	0
9		GaAs		PMMA 500	80	0.125	2000000	0	0	0
10		GaAs		PMMA 500	80	0.325	2000000	0	0	0
11		GaAs		PMMA 500	125	0.125	2000000	0	0	0
12		GaAs		PMMA 500	125	0.325	2000000	0	0	0
13		GaAs		PMMA 200	100	0.095	2000000	0	0	0
14		GaAs		PMMA 300	100	0.145	2000000	0	0	0
15	web500	GaAs		PMMA 500	100	0.245	2000000	0	0	0
16	web100	GaAs		PMMA 100	100	0.045	2000000	0	0	0
17	web300nr	GaAs		PMMA 300	100	0.145	2000000	0	0	0
18	webinar	GaAs		PMMA 900	100	0.025	1000000	0	0	0

OK Cancel

- For E-Beam 3D module, the PSF can be selected from 2D/3D Archive.
- New PSF filter option to allow multiple filters.
- First row of table is now the filter-per-column. Clicking on the column label results in ascending sorting, a second click in descending sorting.



Thank You!

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