



# Advanced Software Features for the LA-950



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# What we'll talk about

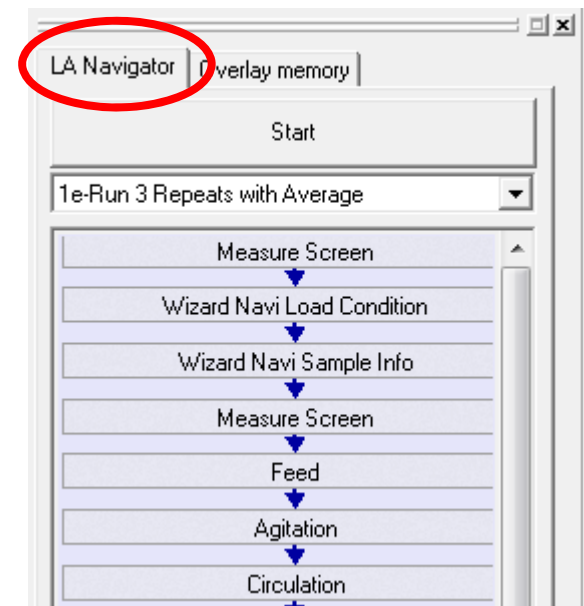
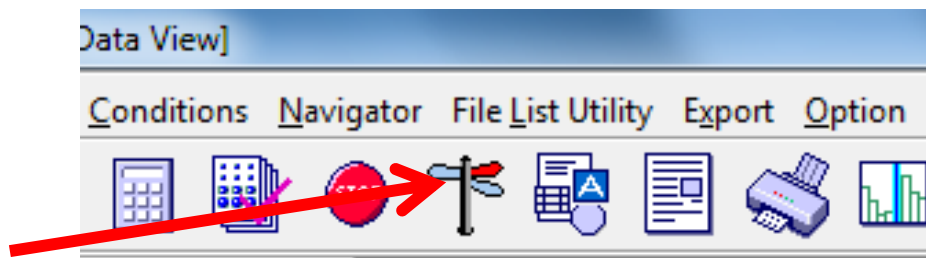
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- **Measurement tools**
- **Data analysis tools**
- **Data verification tools**
- **Q&A**



# One-button Measurement

- Use the Navigator or Method Expert to create Sequence (.seq) files
  - Manual: Navigator
  - Auto: Method Expert



# LA-950 Method Expert

- Unique guided method development
- Optimize parameters
- Choose the best refractive index
- Create “one button” SOPs
- Webinar TE004 for Method Expert



# Collecting and Calculating

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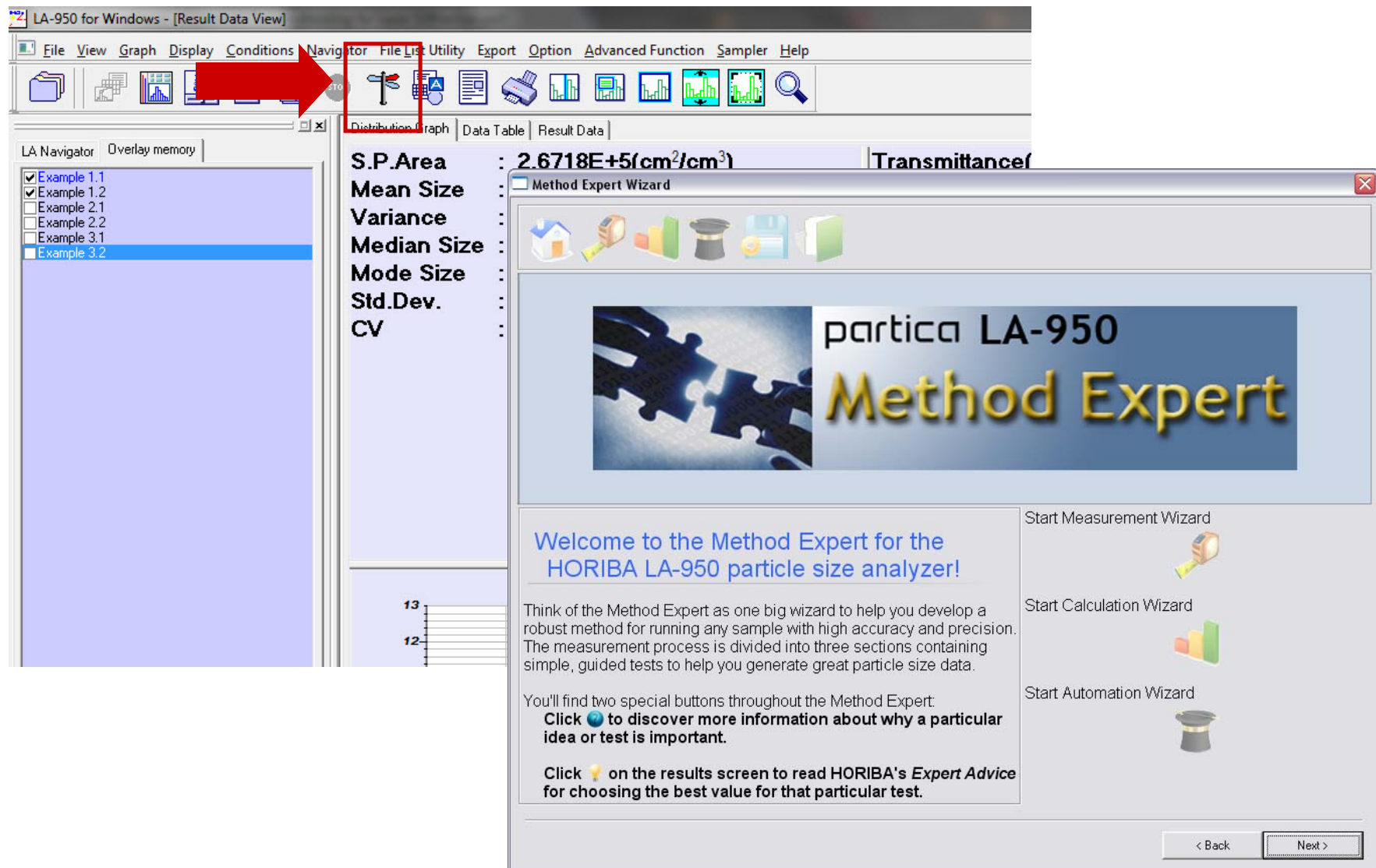
**The LA-950 *hardware* collects scattered light data**

**The LA-950 *software* calculates the particle size distribution using that scattered light data**

**Both must be optimized to maximize data quality**



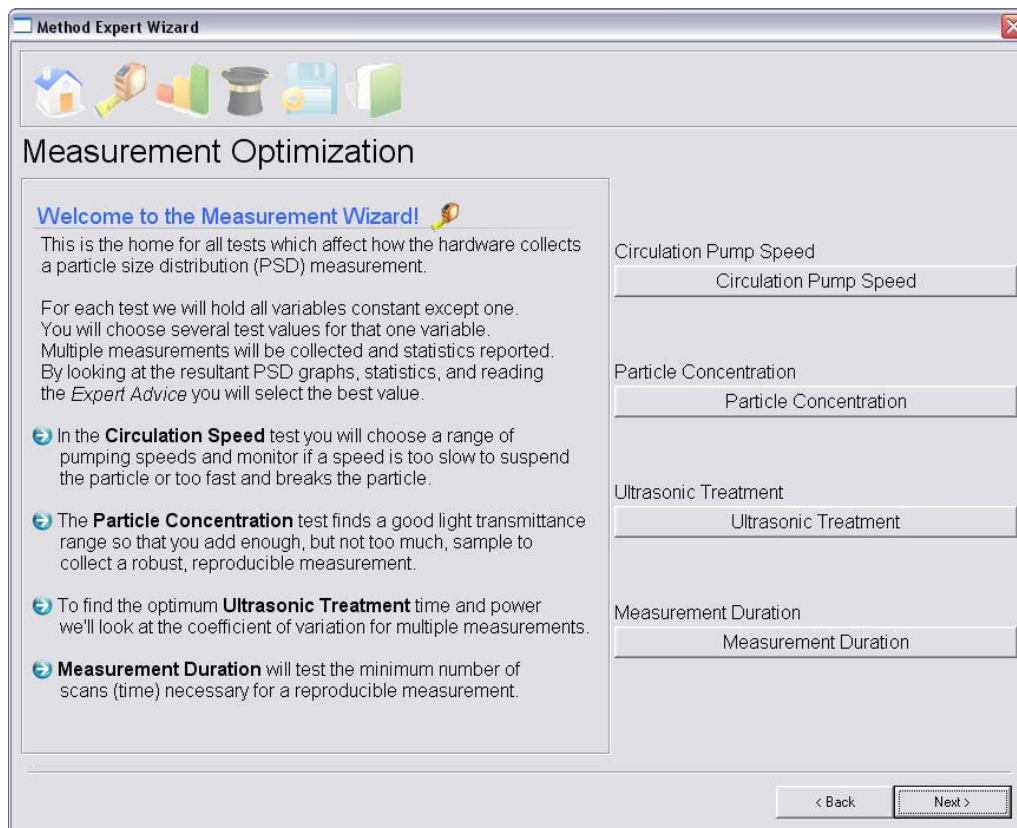
# LA-950 Method Expert





# Method Expert Hardware

## There are four important tests...

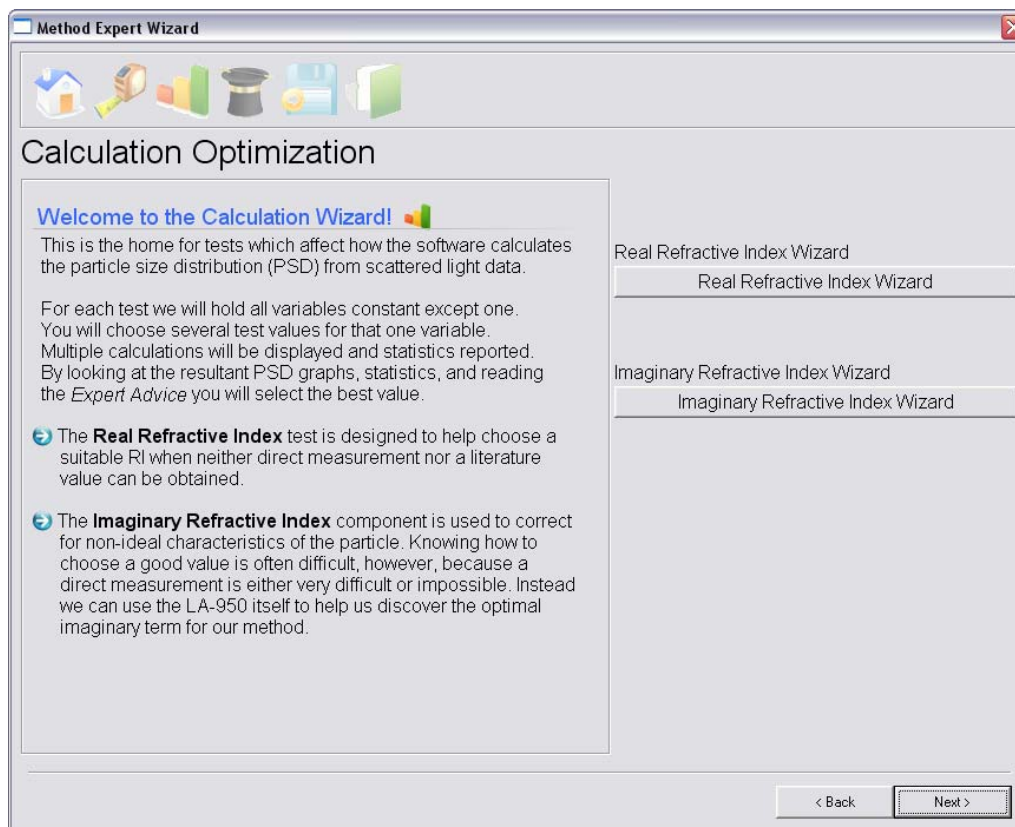


Circulation  
Concentration  
Dispersion  
Duration



# Method Expert Calculation

## There are two important tests...



Real RI  
Imaginary RI





# LA-950 Method Expert

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**Why is the test important?**

**What does the test do?**

**How will the results be displayed?**

**What is the best value?**

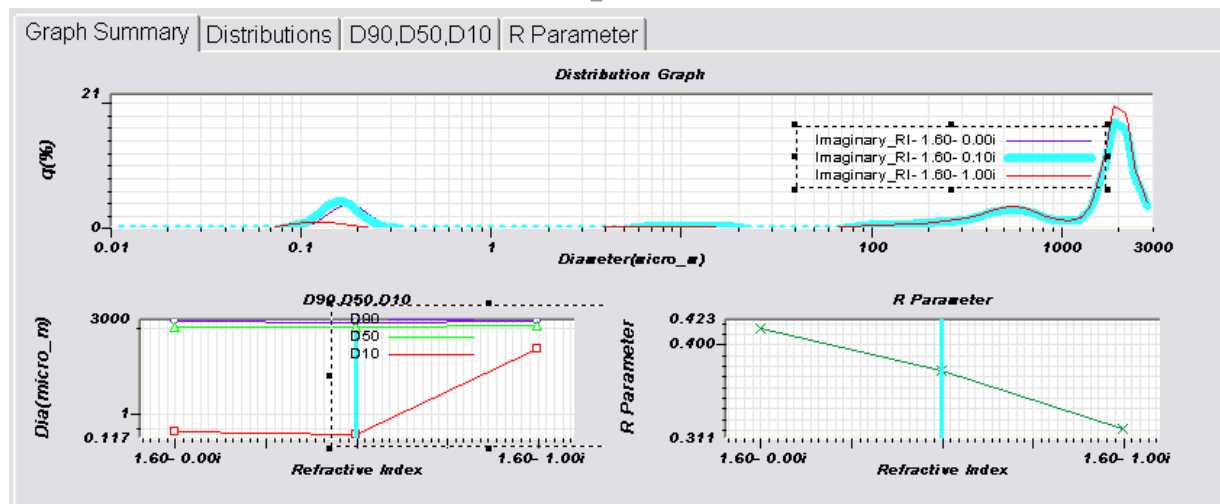
**User selects up to 5 values for testing**



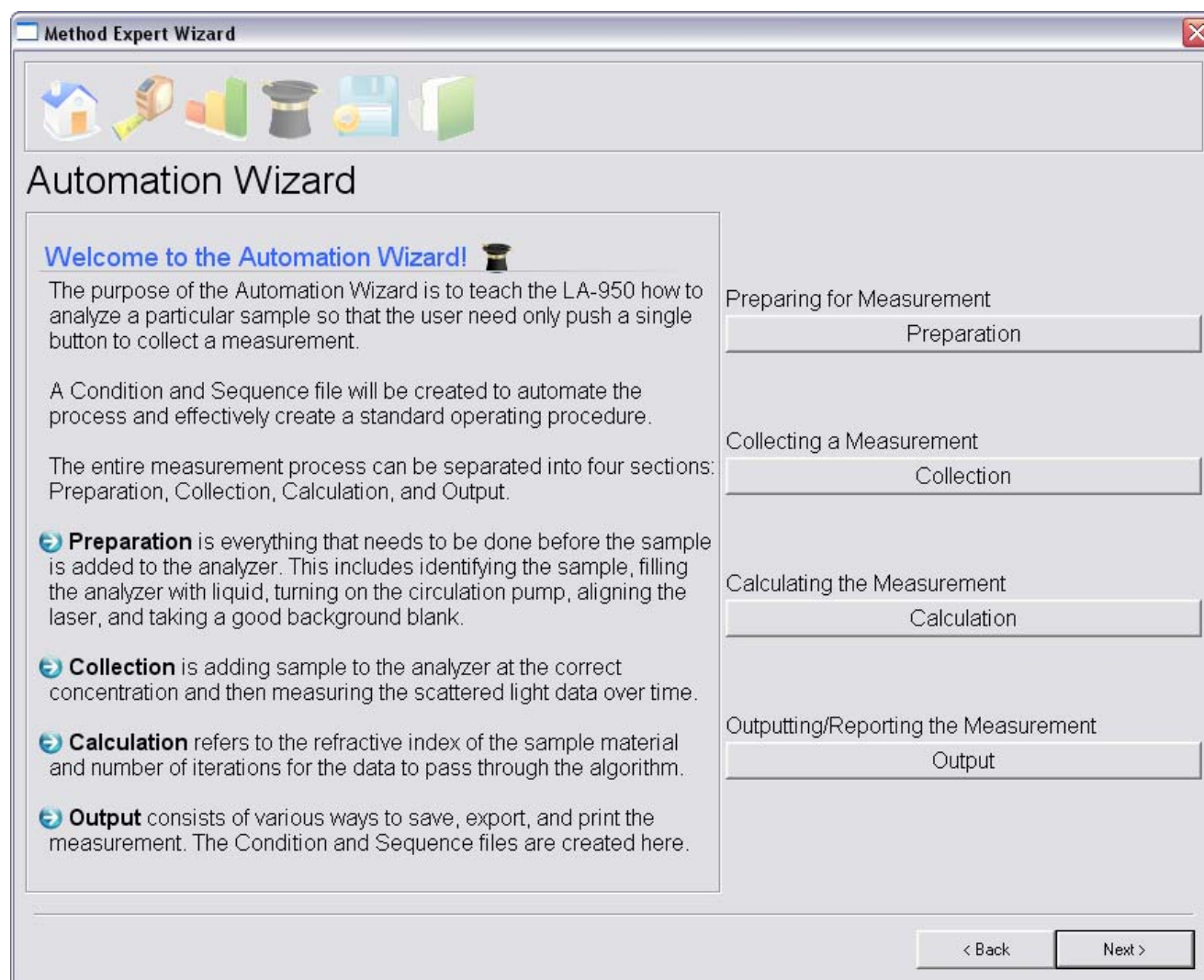
# LA-950 Method Expert

Method Expert guides user to prepare the LA-950 for each test

Results displayed in multiple formats:  
PSD, D50, R-parameter




# LA-950 Method Expert



# LA-950 Method Expert

Method Expert Wizard


Preparation
Collection
Calculation
Output

## Automation Wizard

### Outputting/Reporting the Measurement ?

**Section Purpose** Remember to click the ? button for more information

The measurement has been collected and calculated and can now be saved, exported, and printed for reporting. The LA-950 was designed to meet a variety of customer preferences, so there are many ways to perform these tasks.

Once the reporting setup is finished, simply name the Condition and Sequence files used to run this method.

---

Step 4. Give this Expert Method a unique, descriptive name. (This name is used as the output sequence file name)

?

☒ Use same name for saving the condition file.

---

Step 5. Input condition file name.

?



---

Step 6. Push save button.

This wizard is temporarily closed, and the sequence file and condition file are saved.

Save Sequence and Condition

< Back
Next >



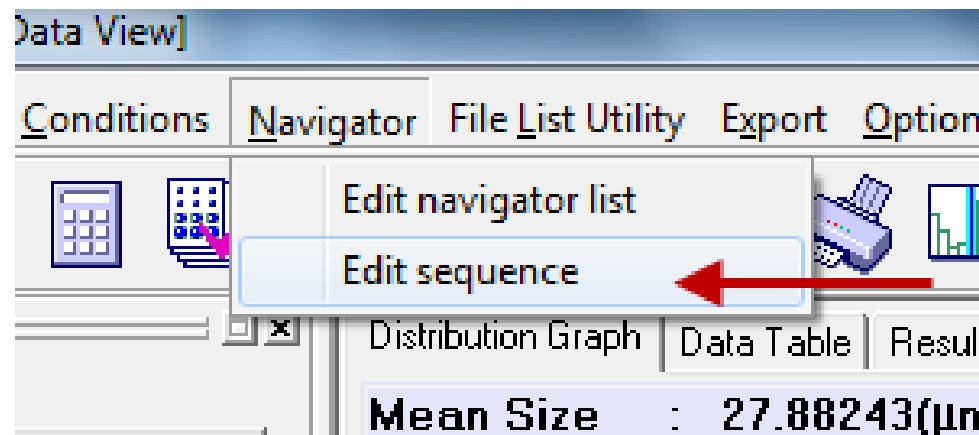
# Dry Measurement

- Method Expert currently wet only
- Use “Auto Measurement” for dry
- Webinar TE016: Optimizing Dry Powder Measurements



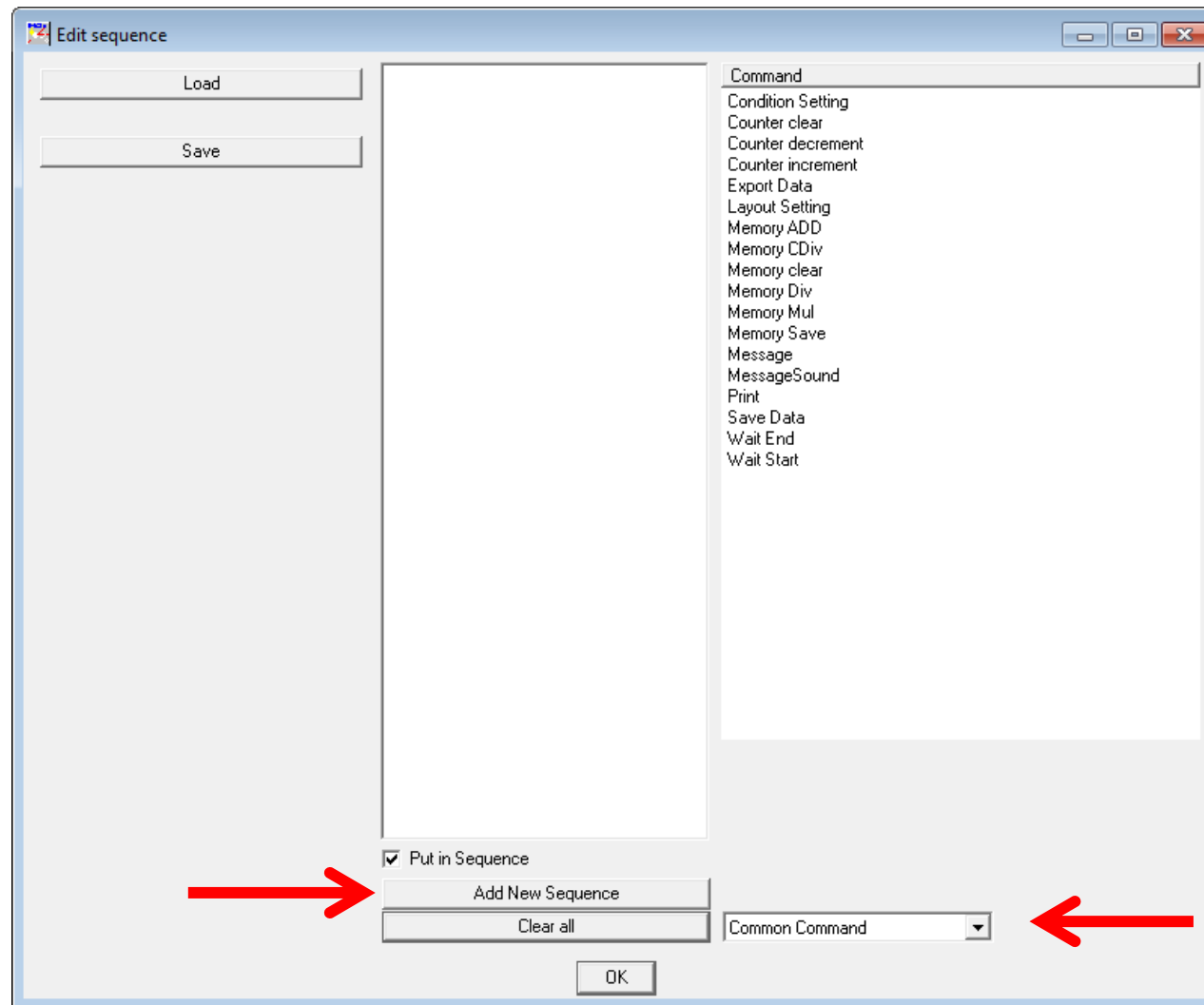
# Navigator

- LA Navigator function creates Sequence programs to operate the LA-950
- Maximum flexibility

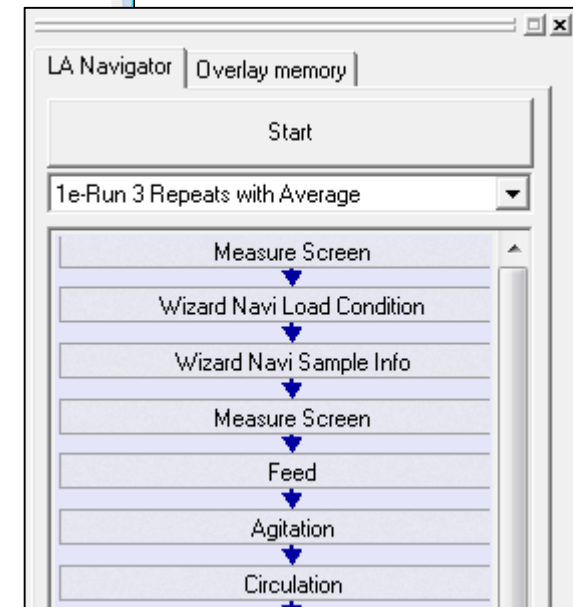
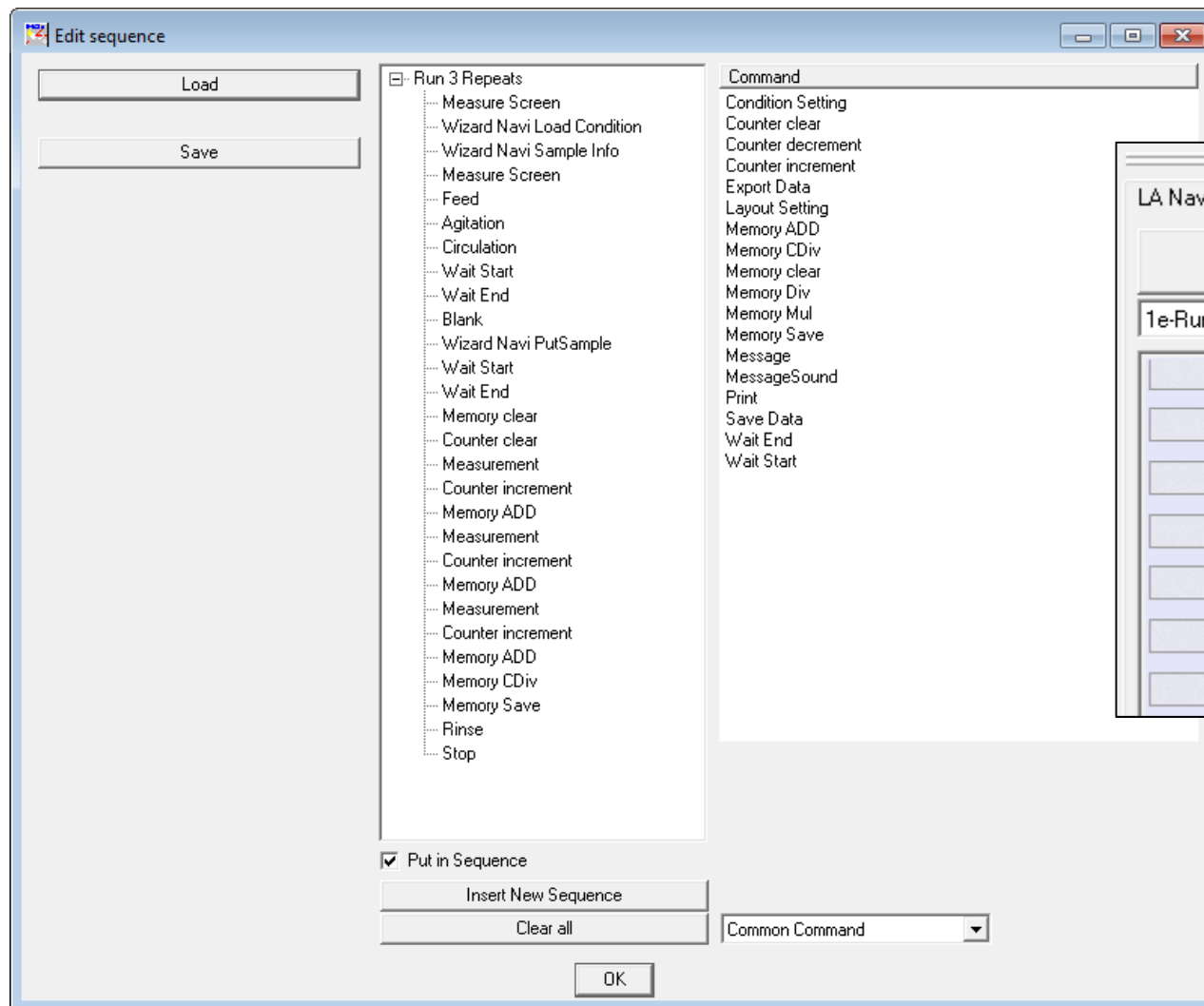




# Navigator

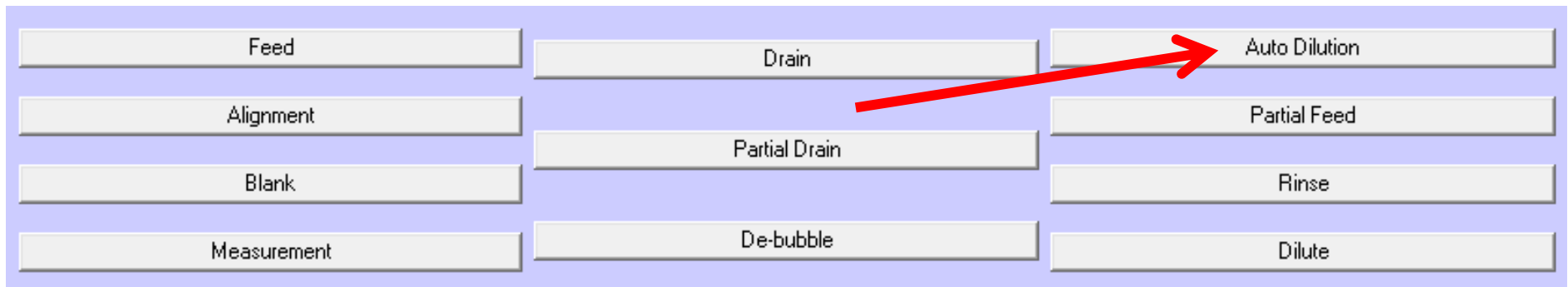


# Navigator



# Automatic Dilution

- Concentration control
- Adds dispersant, drains, repeat
- Is not possible without fill pump



# Automatic Dilution

**Advanced**

Sample Information   Calculation   Measurement   System   System : Preparation

Transmittance(R) Upper: 90 % Lower: 80  
 Transmittance(B) Upper: 90 % Lower: 70

Feed Liquid level: Low  
 Number of Times to Rinse: 1

Automatic dilution Light ☒ Red ☐ Blue

Data acquisition times(Sample)  
 LD: 5000  
 LED: 5000

Data acquisition times(Blank)  
 LD: 5000  
 LED: 5000

Alignment before measurement ☐ No ☒ Yes

OK Cancel

Transmittance  
 90.28(%)  
 77.26(%)



# What we'll talk about

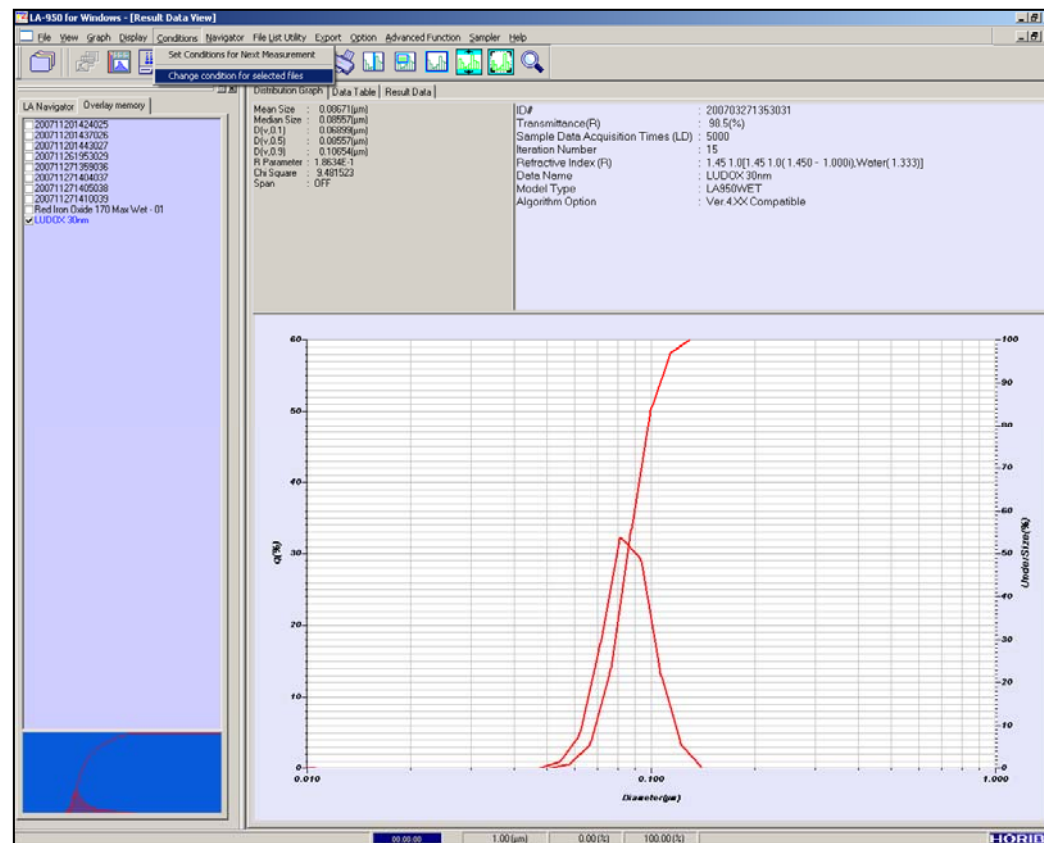
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- **Measurement tools**
- **Data analysis tools**
- **Data verification tools**
- **Q&A**



# Refractive Index

- Many, many resources on website
- Webinar TR009: Optimization of RI





# Manually Changing RI

**Measurement Dialog**

Load

Sample information

Sample Name: LUDOX

Material: Colloidal silica

Source: LUDOX

Lot Number: 01-01183

Test or Assay. Number: F0706U09-IT

Calculation Data Setting

☐ ActiveData

☒ Select Data in Memory

Select Data

- ☐ 200711201424025
- ☐ 200711201437026
- ☐ 200711201443027
- ☐ 200711261953029
- ☐ 200711271359036
- ☐ 200711271404037
- ☐ 200711271405038
- ☐ 200711271410039
- ☐ Red Iron Oxide 170 Max Wet - 01

Refractive Index

File Name: 1.45 1.0

Comment:

Form of Distribution

☐ Manual ☒ Auto

Condition Iteration Number 15

Distribution base

☒ Volume ☐ Area

☐ Length ☐ Numbers

Advanced

ReCalc

Cancel

**Select Kernel**

Folder: C:\Program Files\HORIBA\LA-950E\LAACQUISITION\Kernel

Select Folder

File Name	File Comment	Sample Name	Sample Comment	Sam...	Sam...	Sam...	Sam...	Dispersion Name	Dispersio...	Disp...	Disp
1.33 1.0 in 1.385		1.33 1.0 in 1.385		1.3300	1.0000	1.3300	1.0000	Heptane	Heptane	1.3850	1.38
1.45 1.0 in 1.33		1.45 1.0		1.4500	1.0000	1.4500	1.0000	Water	Water	1.3330	1.33
1.45 1.0		1.45 1.0		1.4500	1.0000	1.4500	1.0000	Water	Water	1.3330	1.33
1.51 1.0 in 1.33		1.51 1.0		1.5100	1.0000	1.5100	1.0000	Water	Water	1.3330	1.33
1.55 1.0 in 1.33		1.55 1.0 in 1.33		1.5500	1.0000	1.5500	1.0000	Water	Water	1.3330	1.33
1.57 0		1.57 0		1.5700	0.0000	1.5700	0.0000	Water	Water	1.3330	1.33
1.59 0.1 in 1.379		1.59 0.1 in 1.379		1.5900	0.1000	1.5900	0.1000	Isopropanol	Isopropanol	1.3780	1.37
1.6 0.1 in 1.33		1.6 0.1 in 1.33		1.6000	0.1000	1.6000	0.1000	Water	Water	1.3330	1.33
1.60-0 in water		RI=1.60		1.6000	0.0000	1.6000	0.0000	Water	Water	1.3330	1.33
1.70-0.1 IPA		1.70-0.1i		1.7000	0.1000	1.7000	0.1000	Isopropanol	Isopropanol	1.3780	1.37
Alumina	water	Alumina	Alumina	1.6600	0.0000	1.6600	0.0000	Water	Water	1.3330	1.33
Aluminum	water	Aluminum	Aluminum	1.6000	5.4000	1.6000	5.4000	Water	Water	1.3330	1.33
Amber	water	Amber	Amber	1.5400	0.0000	1.5400	0.0000	Water	Water	1.3330	1.33
Antimony	water	Antimony	Antimony	3.2000	5.0000	3.2000	5.0000	Water	Water	1.3330	1.33
Asphalt	water	Asphalt	Asphalt	1.6300	0.0000	1.6300	0.0000	Water	Water	1.3330	1.33
Barium carbonate	water	Barium carbonate	Barium carbonate	1.6000	0.0000	1.6000	0.0000	Water	Water	1.3330	1.33
Barium fluochloride	water	Barium fluochloride	Barium fluochloride	1.6400	0.0000	1.6400	0.0000	Water	Water	1.3330	1.33
Barium fluoride	water	Barium fluoride	Barium fluoride	1.4700	0.0000	1.4700	0.0000	Water	Water	1.3330	1.33
Barium phosphate	water	Barium phosphate	Barium phosphate	1.6200	0.0000	1.6200	0.0000	Water	Water	1.3330	1.33
Barium sulfate	water	Barium sulfate	Barium sulfate	1.6200	0.0000	1.6200	0.0000	Water	Water	1.3330	1.33
Barium sulfide	water	Barium sulfide	Barium sulfide	2.1600	0.0000	2.1600	0.0000	Water	Water	1.3330	1.33
Barium yellow	water	Barium yellow	Barium yellow	1.6300	0.0000	1.6300	0.0000	Water	Water	1.3330	1.33
Cadmium sulfide	water	Cadmium sulfide	Cadmium sulfide	2.4200	0.0000	2.4200	0.0000	Water	Water	1.3330	1.33
Calcium alminate	water	Calcium alminate	Calcium alminate	1.7100	0.0000	1.7100	0.0000	Water	Water	1.3330	1.33
Calcium borate	water	Calcium borate	Calcium borate	1.6000	0.0000	1.6000	0.0000	Water	Water	1.3330	1.33
Calcium carbonate	water	Calcium carbonate	Calcium carbonate	1.5800	0.0000	1.5800	0.0000	Water	Water	1.3330	1.33
Canadian balsam	water	Canadian balsam	Canadian balsam	1.5200	0.0000	1.5200	0.0000	Water	Water	1.3330	1.33
Carbon	water	Carbon	Carbon	1.3200	0.0000	1.3200	0.0000	Water	Water	1.3330	1.33
Celunene	water	Celunene	Celunene	1.8400	0.0000	1.8400	0.0000	Water	Water	1.3330	1.33
Chrome green	water	Chrome green	Chrome green	2.4000	0.0000	2.4000	0.0000	Water	Water	1.3330	1.33
Chromium oxide	water	Chromium oxide	Chromium oxide	2.5000	0.0000	2.5000	0.0000	Water	Water	1.3330	1.33
Cobalt blue	water	Cobalt blue	Cobalt blue	1.7400	0.0000	1.7400	0.0000	Water	Water	1.3330	1.33
Cobalt green	water	Cobalt green	Cobalt green	1.9700	0.0000	1.9700	0.0000	Water	Water	1.3330	1.33

OK

Cancel



# Manually Changing RI

**Measurement Dialog**

Load

Sample information

Sample Name: LUDOX

Material: Colloidal silica

Source: LUDOX

Lot Number: 01-01183

Test or Assay. Number: F0706U09-IT

Calculation Data Setting

☐ ActiveData

☒ Select Data in Memory

Select Data

- ☐ 200711201424025
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- ☐ 200711201443027
- ☐ 200711261953029
- ☐ 200711271359036
- ☐ 200711271404037
- ☐ 200711271405038
- ☐ 200711271410039
- ☐ Red Iron Oxide 170 Max Wet - 01

Refractive Index

File Name: 1.45 1.0

Comment:

Form of Distribution

☐ Manual ☒ Auto

Condition: Iteration Number 15

Distribution base

☒ Volume ☐ Area

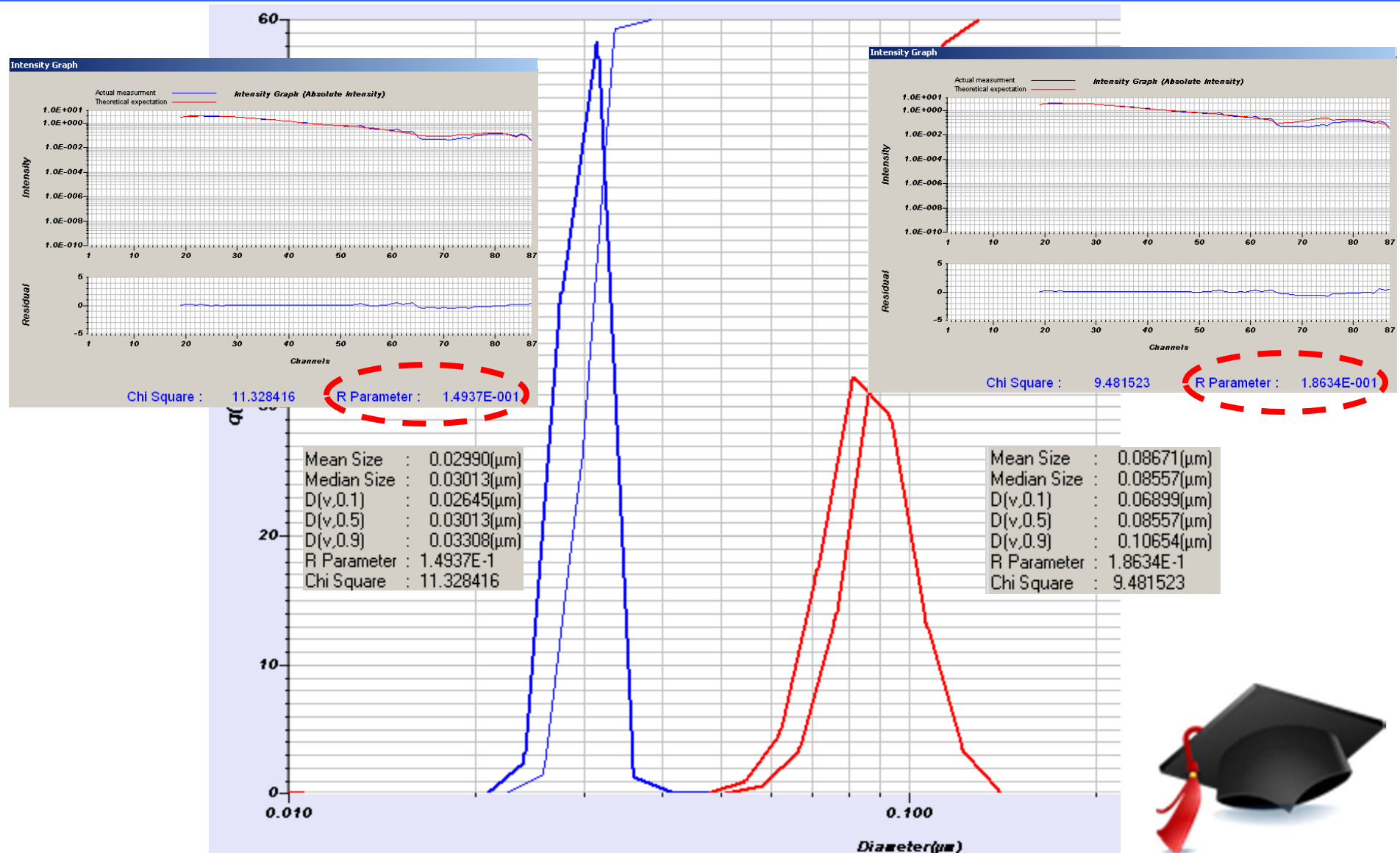
☐ Length ☐ Numbers

Advanced

ReCalc



# Manual Optimization



# Automated RI Computation

## ■ Real part study

- Need to fix imaginary part
- Set up to 5 real parts
- Software will compute all RI and display R parameter variation with RI selection

Step 1: Select measurement data for test

☒ Select Active Memory Data    ☐ Select DataFile

Step 2: Choose RI for liquid dispersant

Step 3: Input RI imaginary component for test

Step 4: Input RI real component for test

Test Value 1:	<input type="text" value="1.5"/>	Test Value 4:	<input type="text" value="1.8"/>
Test Value 2:	<input type="text" value="1.6"/>	Test Value 5:	<input type="text" value="1.9"/>
Test Value 3:	<input type="text" value="1.7"/>		

Step 5: Push "Execute ..." button.  
This wizard is temporarily closed,  
and the test sequence is executed.



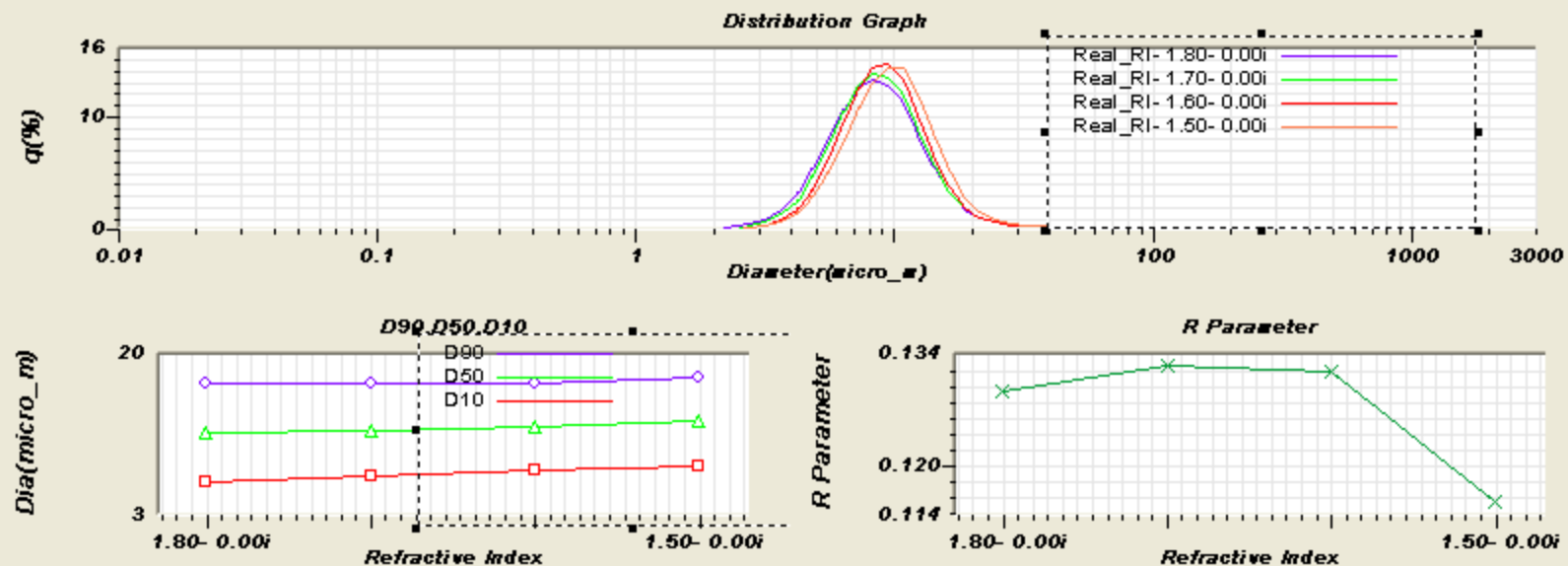
# Automated RI Computation

## Calculation Optimization

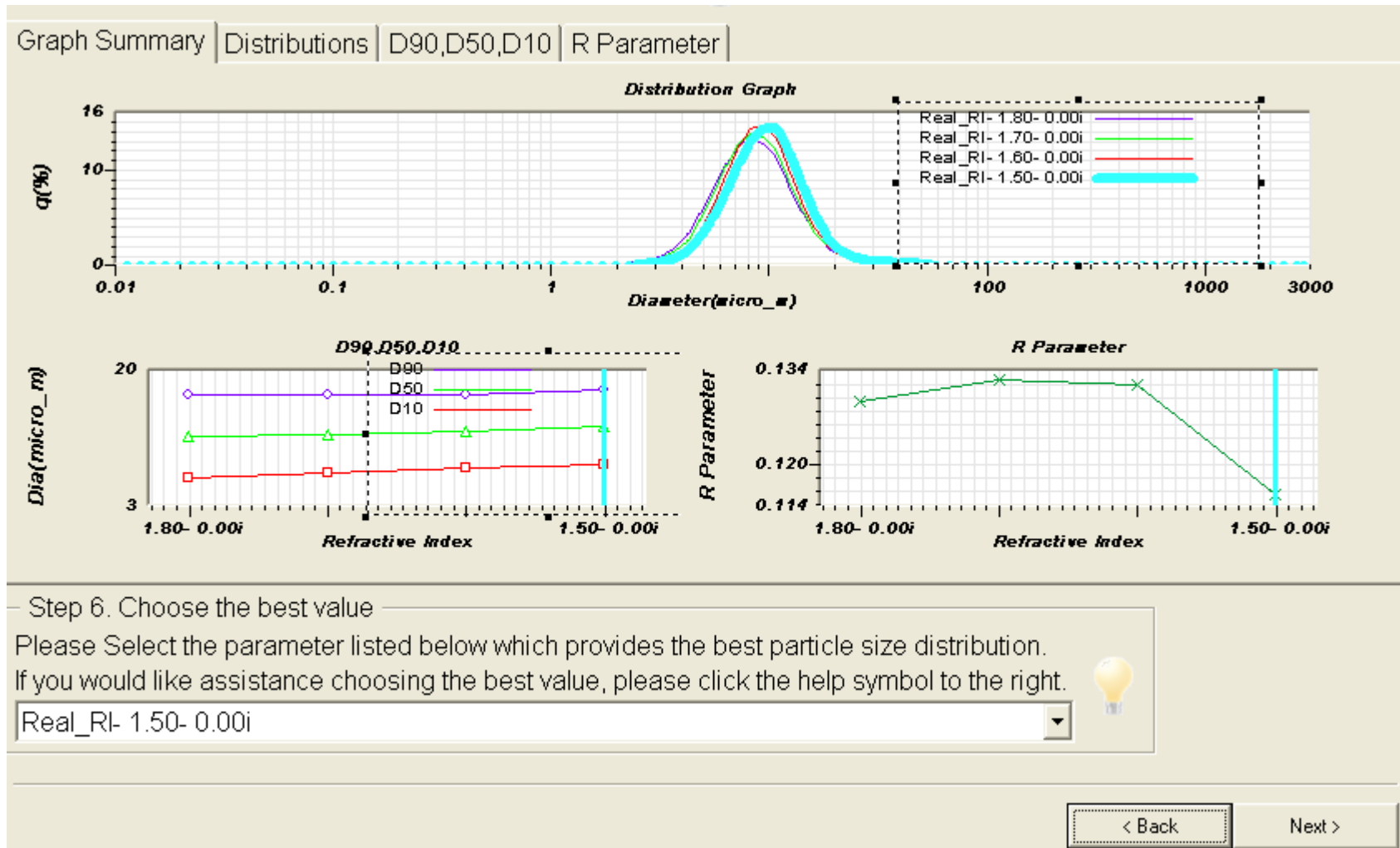
### Real Refractive Index Wizard -Result-



Graph Summary | Distributions | D90,D50,D10 | R Parameter



# Automated RI Computation





# Automated RI Computation

## ■ Imaginary part study

- Need to fix real part
- Set up to 5 imaginary parts
- Software will compute all RI and display R parameter variation with RI selection

Step 1: Select measurement data for test

☒ Select Active Memory Data    ☐ Select DataFile

---

Step 2: Choose RI for liquid dispersant    Step 3: Input RI real component for test

---

Step 4: Input RI imaginary component for test

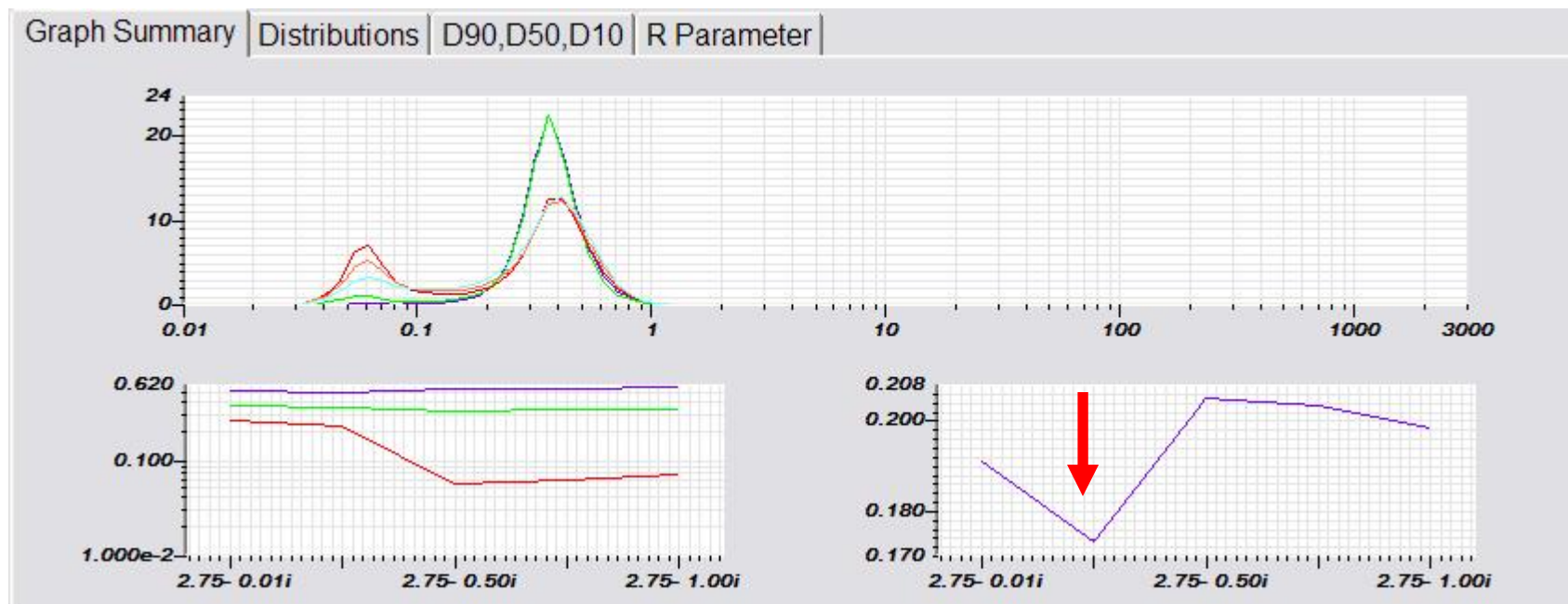
Test Value 1:	<input type="text" value="0.01"/>	Test Value 4:	<input type="text" value="0.7"/>
Test Value 2:	<input type="text" value="0.1"/>	Test Value 5:	<input type="text" value="1"/>
Test Value 3:	<input type="text" value="0.5"/>		

Step 5: Push "Execute ..." button.  
This wizard is temporarily closed,  
and the test sequence is executed.

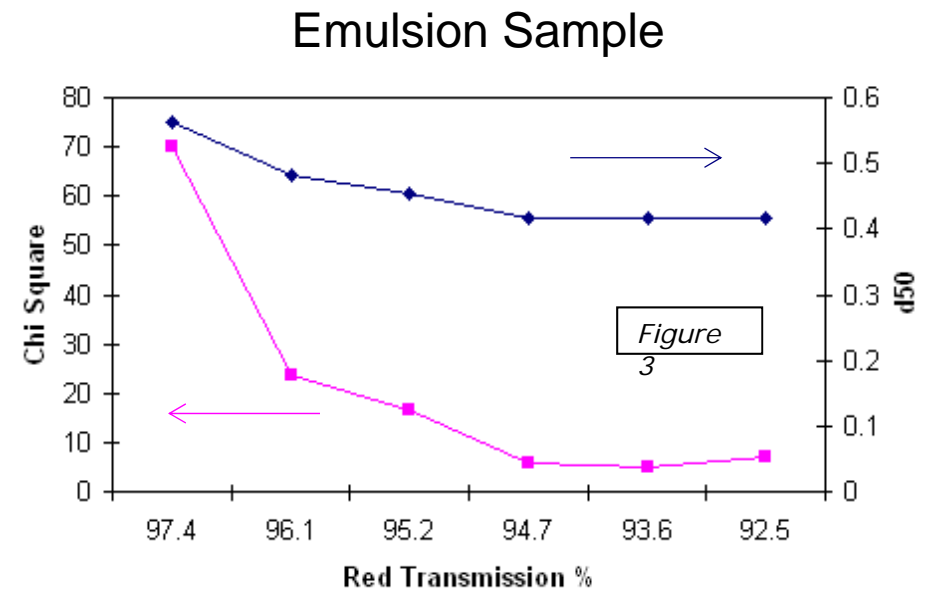
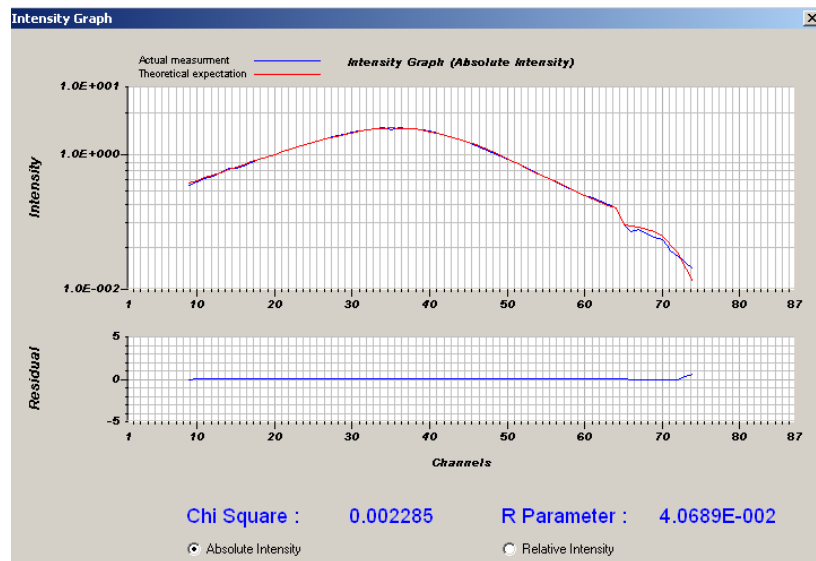


# Automated RI Computation

## ■ Imaginary study



# Error Calculations



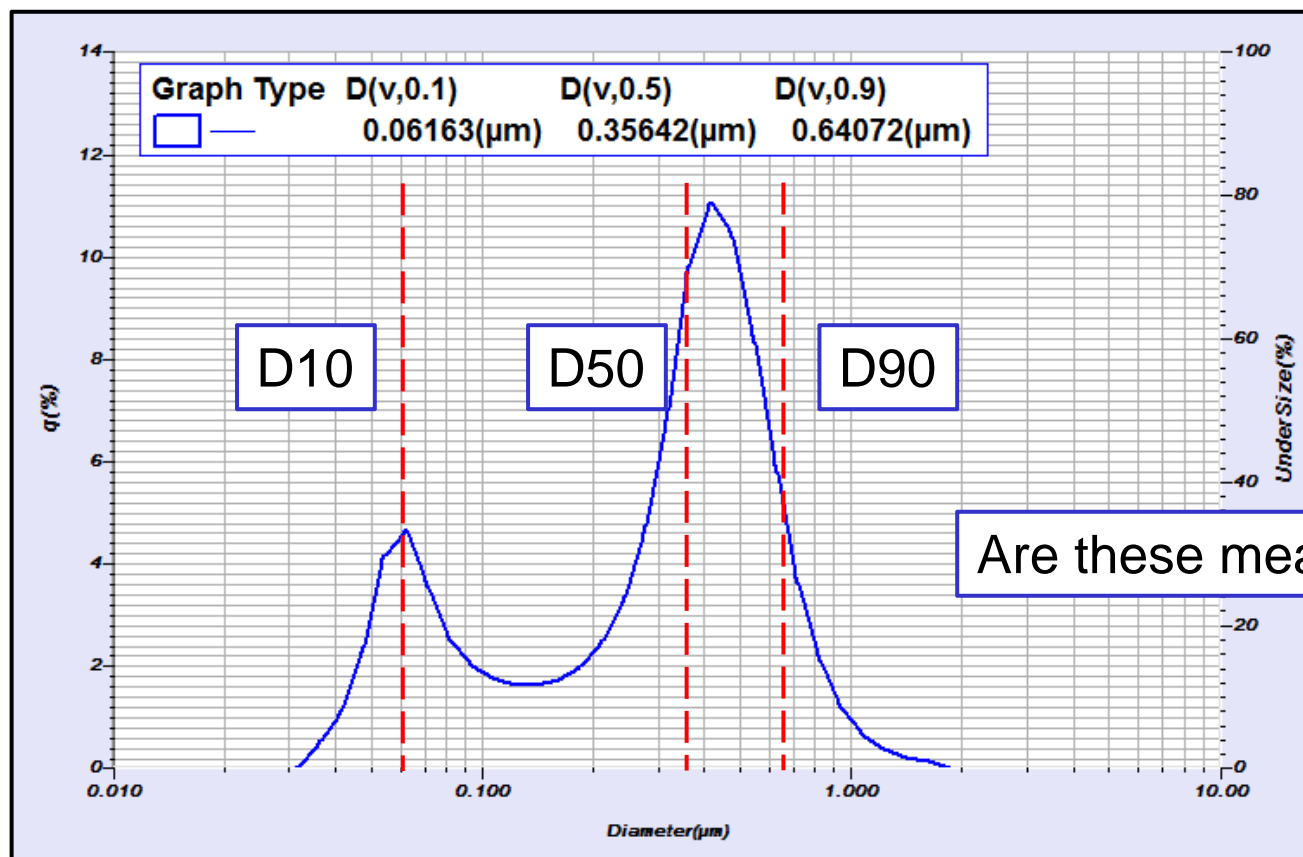
$$\chi^2 = \sum \left\{ \frac{1}{\sigma_i^2} [y_i - y(x_i)]^2 \right\} \quad R = \frac{1}{N} \sum_{i=1}^N \left\{ \frac{1}{y(x_i)} |y_i - y(x_i)| \right\}$$

- $y_i$  The measured scattered light at each channel (i) of the detector.
- $y(x_i)$  The calculated scattered light at each channel (i) of the detector based on the chosen refractive index kernel and reported particle size distribution.
- $\sigma_i$  The standard deviation of the scattered light intensity at each channel (i) of the detector. A larger  $\sigma_i$  indicates lower reliability of the signal on a given detector.
- $N$  The number of detectors used for the calculation

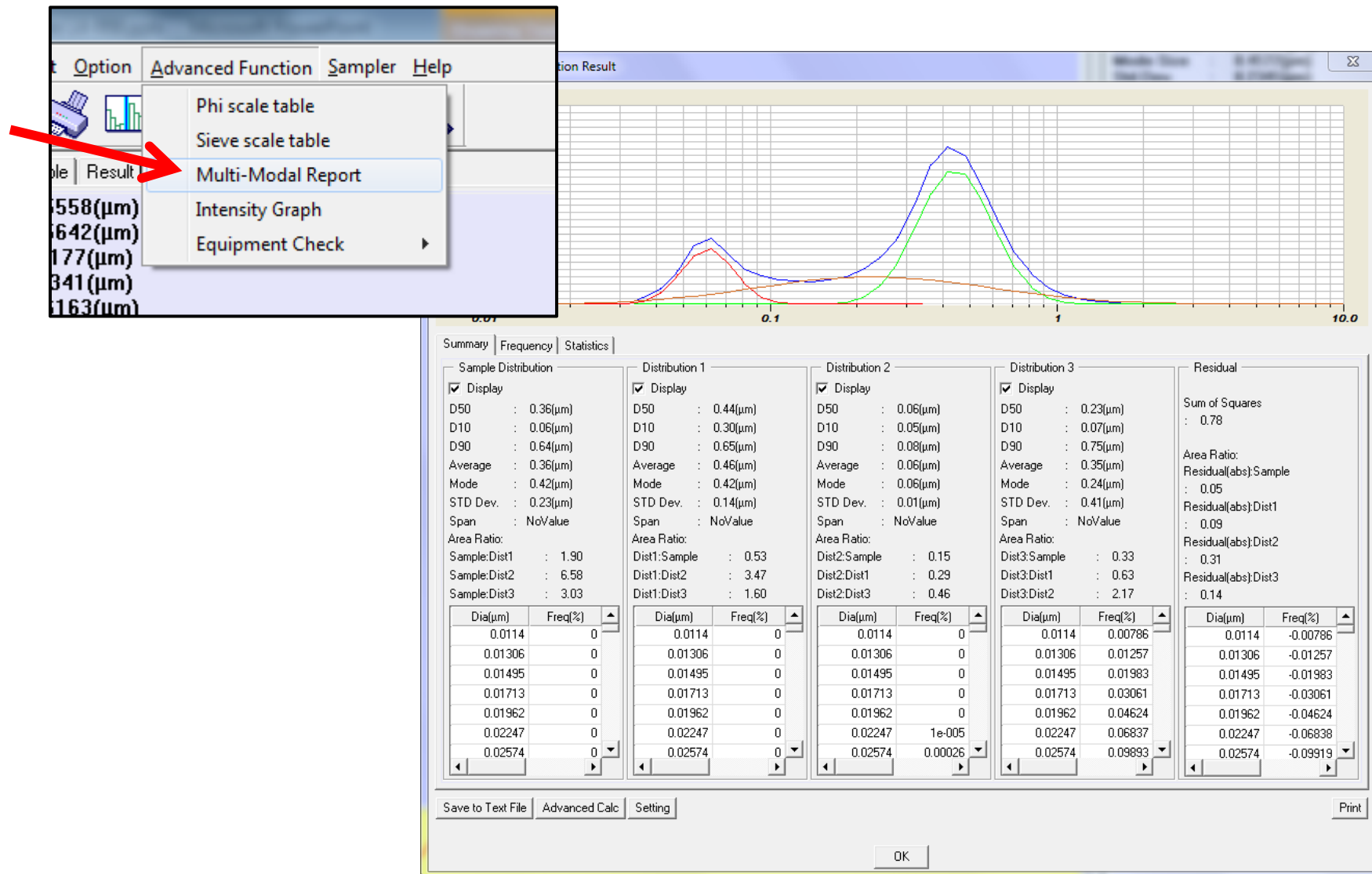


# Multimodal Report

- Hard to use full-distribution metrics to describe multimodal results

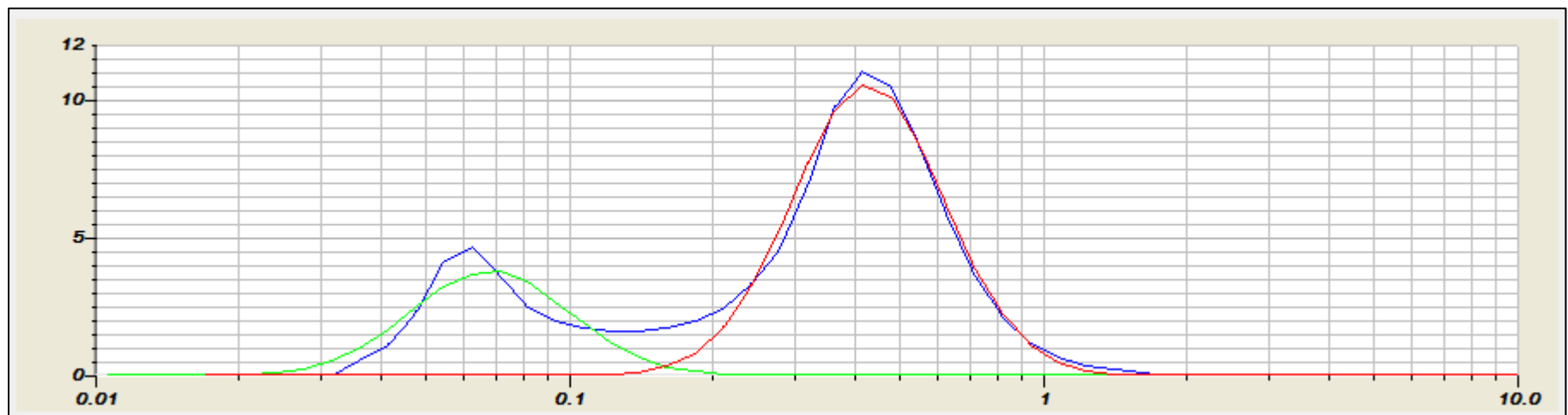


# Multimodal Report



# Multimodal Report

- Deconvolute distribution into components





# Multimodal Report

## ■ Statistics for each distribution mode

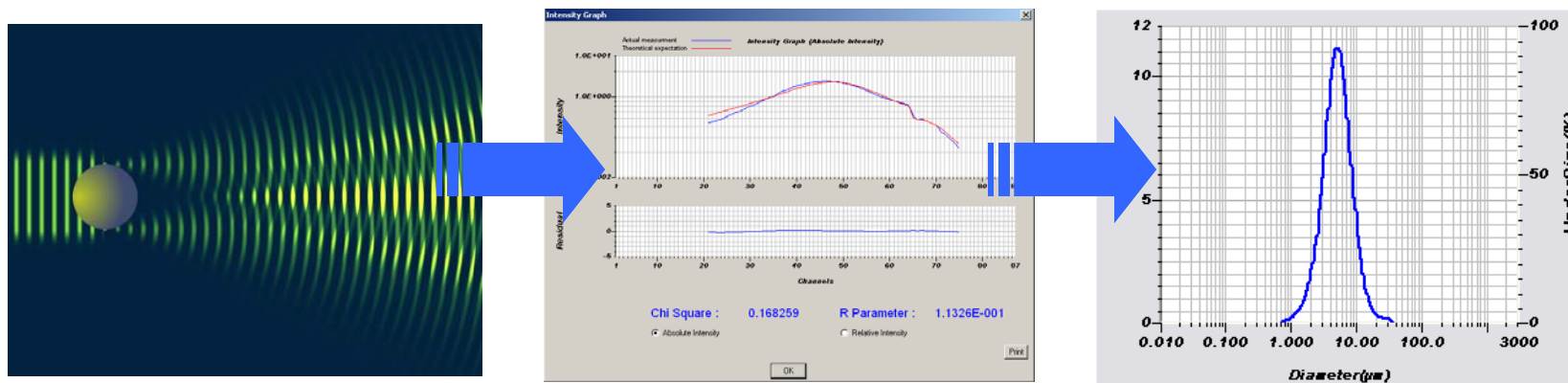
Summary	Frequency	Statistics		
Sample Distribution	Distribution 1	Distribution 2	Distribution 3	Residual
<input checked="" type="checkbox"/> Display	<input checked="" type="checkbox"/> Display	<input checked="" type="checkbox"/> Display	<input checked="" type="checkbox"/> Display	
D50 : 0.36(μm)	D50 : 0.07(μm)	D50 : 0.43(μm)	D50 : ---(μm)	Sum of Squares : 9.49
D10 : 0.06(μm)	D10 : 0.04(μm)	D10 : 0.27(μm)	D10 : ---(μm)	
D90 : 0.64(μm)	D90 : 0.11(μm)	D90 : 0.69(μm)	D90 : ---(μm)	Area Ratio:
Average : 0.36(μm)	Average : 0.07(μm)	Average : 0.46(μm)	Average : ---(μm)	Residual(abs):Sample : 0.14
Mode : 0.42(μm)	Mode : 0.07(μm)	Mode : 0.42(μm)	Mode : ---(μm)	Residual(abs):Dist1 : 0.52
STD Dev. : 0.23(μm)	STD Dev. : 0.03(μm)	STD Dev. : 0.17(μm)	STD Dev. : ---(μm)	Residual(abs):Dist2 : 0.19
Span : NoValue	Span : NoValue	Span : NoValue	Span : ---(μm)	Residual(abs):Dist3 : ---
Area Ratio:	Area Ratio:	Area Ratio:	Area Ratio:	
Sample:Dist1 : 3.72	Dist1:Sample : 0.27	Dist2:Sample : 0.72	Dist3:Sample : ---	
Sample:Dist2 : 1.39	Dist1:Dist2 : 0.37	Dist2:Dist1 : 2.67	Dist3:Dist1 : ---	
Sample:Dist3 : ---	Dist1:Dist3 : ---	Dist2:Dist3 : ---	Dist3:Dist2 : ---	

Better understanding of entire distribution



# Intensity Graph

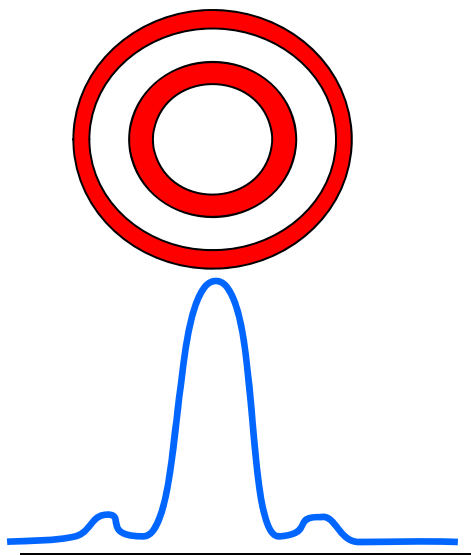
- Diffraction analyzer measures light scattering pattern, algorithm transforms this into a particle size distribution



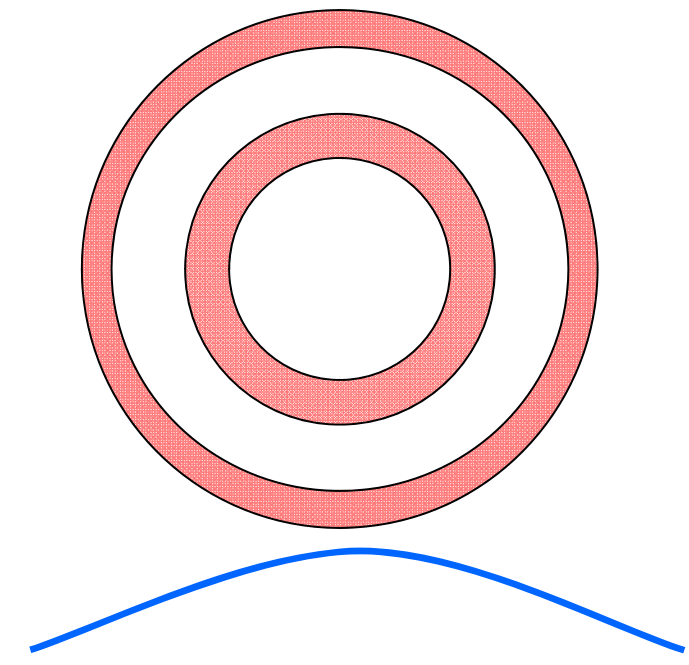
# Size affects intensity

## ■ LARGE PARTICLE:

- Low angle scatter
- Large signal



**Narrow Pattern - High intensity**

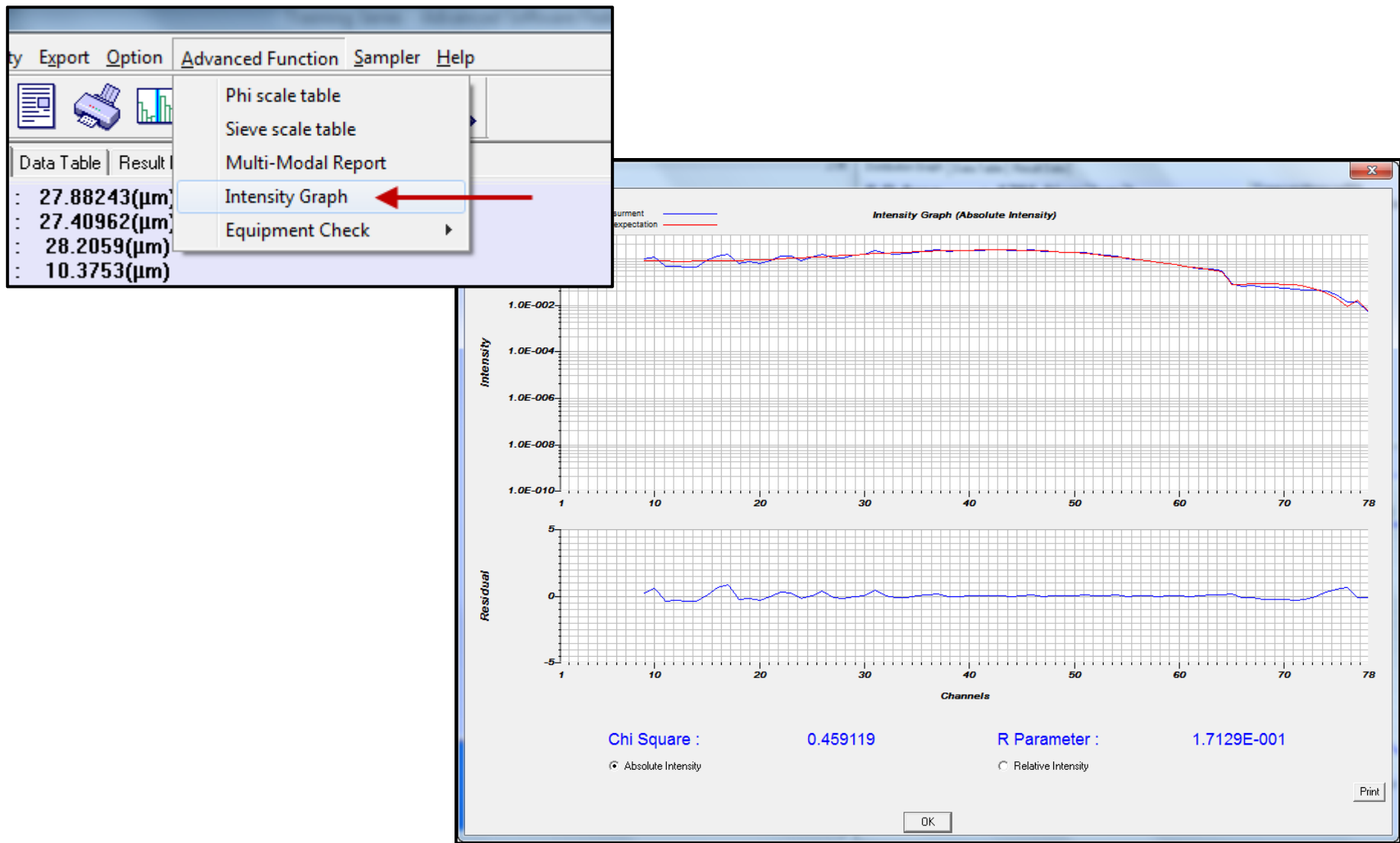


**Wide Pattern - Low intensity**

## ■ SMALL PARTICLE:

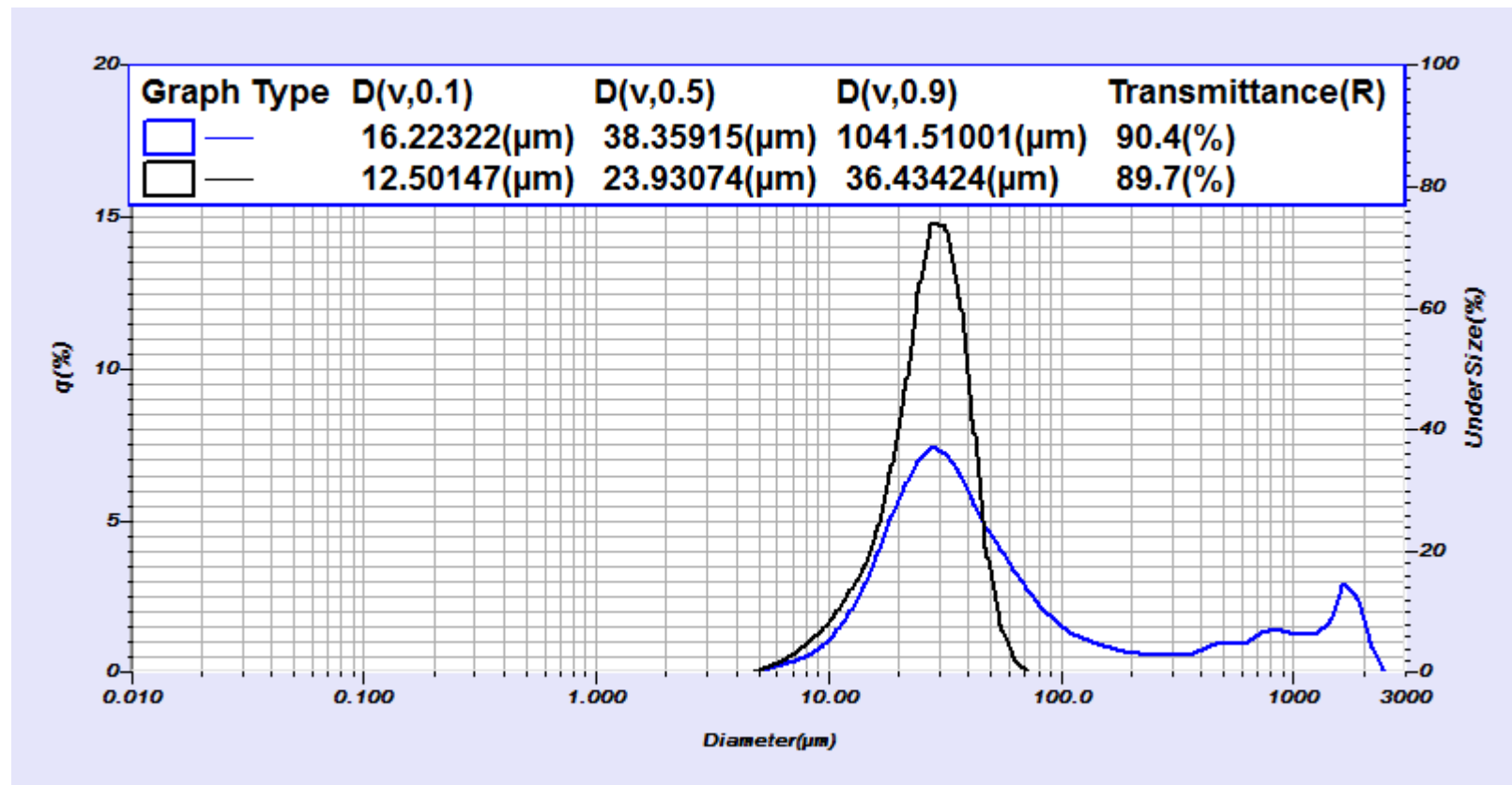
- High Angle Scatter
- Small Signal

# Intensity Graph

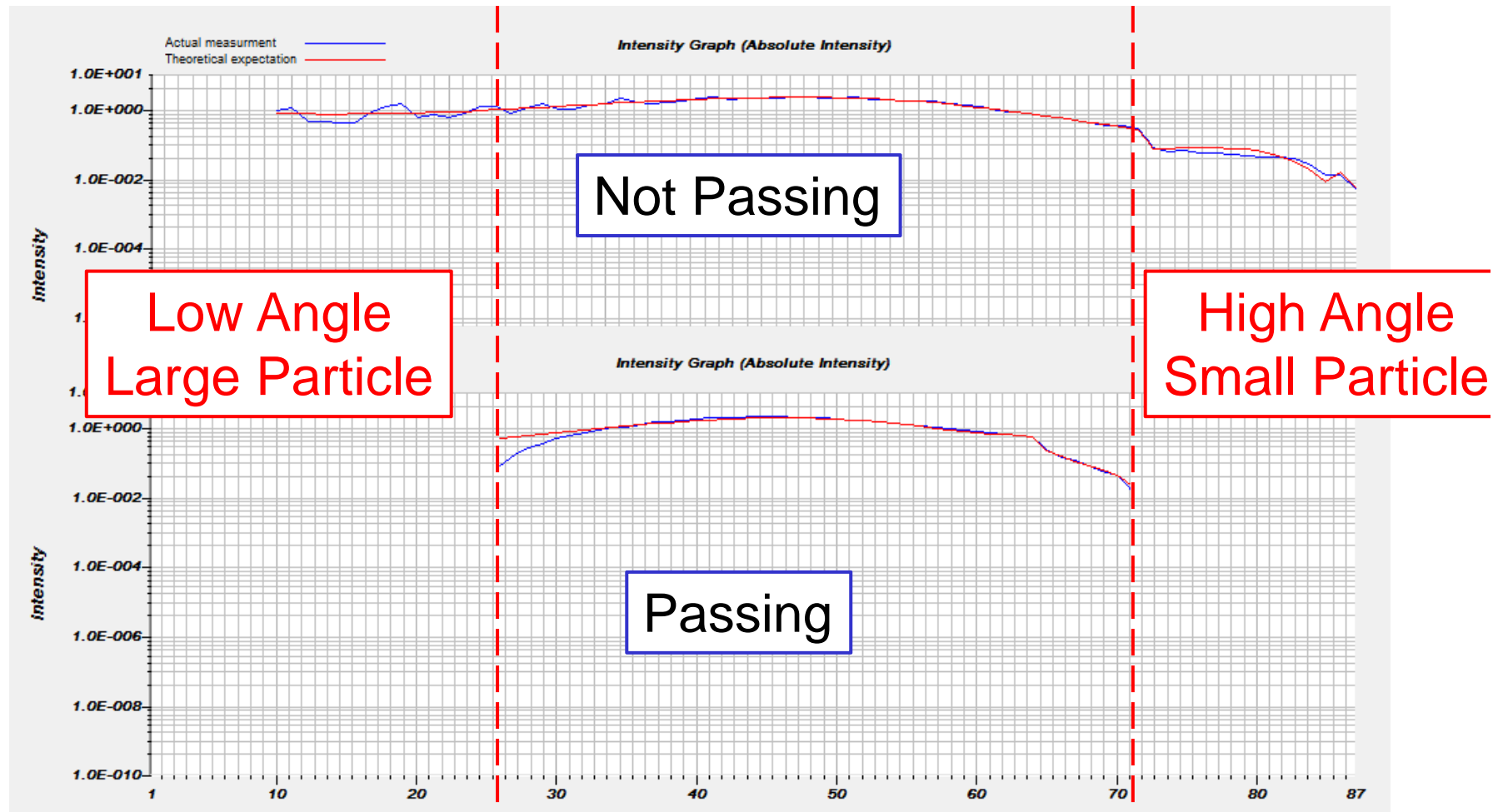


# Intensity Graph

- One way to use the Intensity Graph
  - Two results, one good and one bad

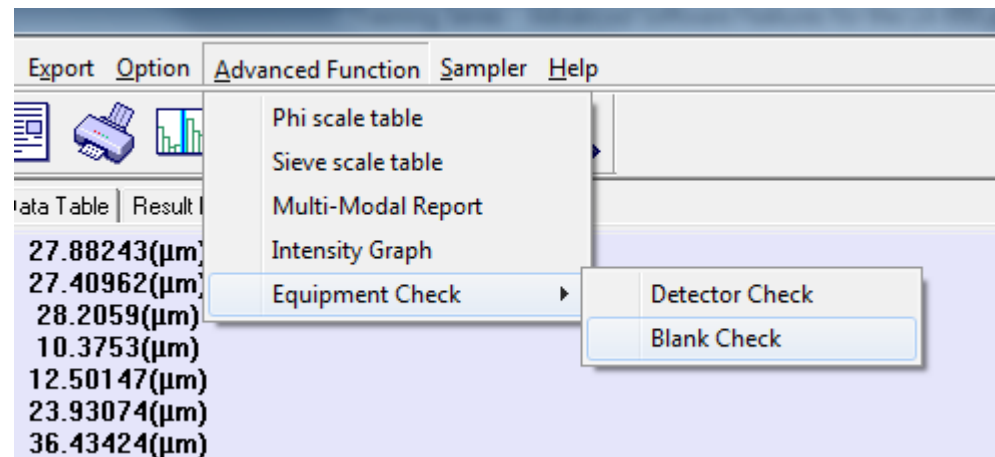


# Intensity Graph



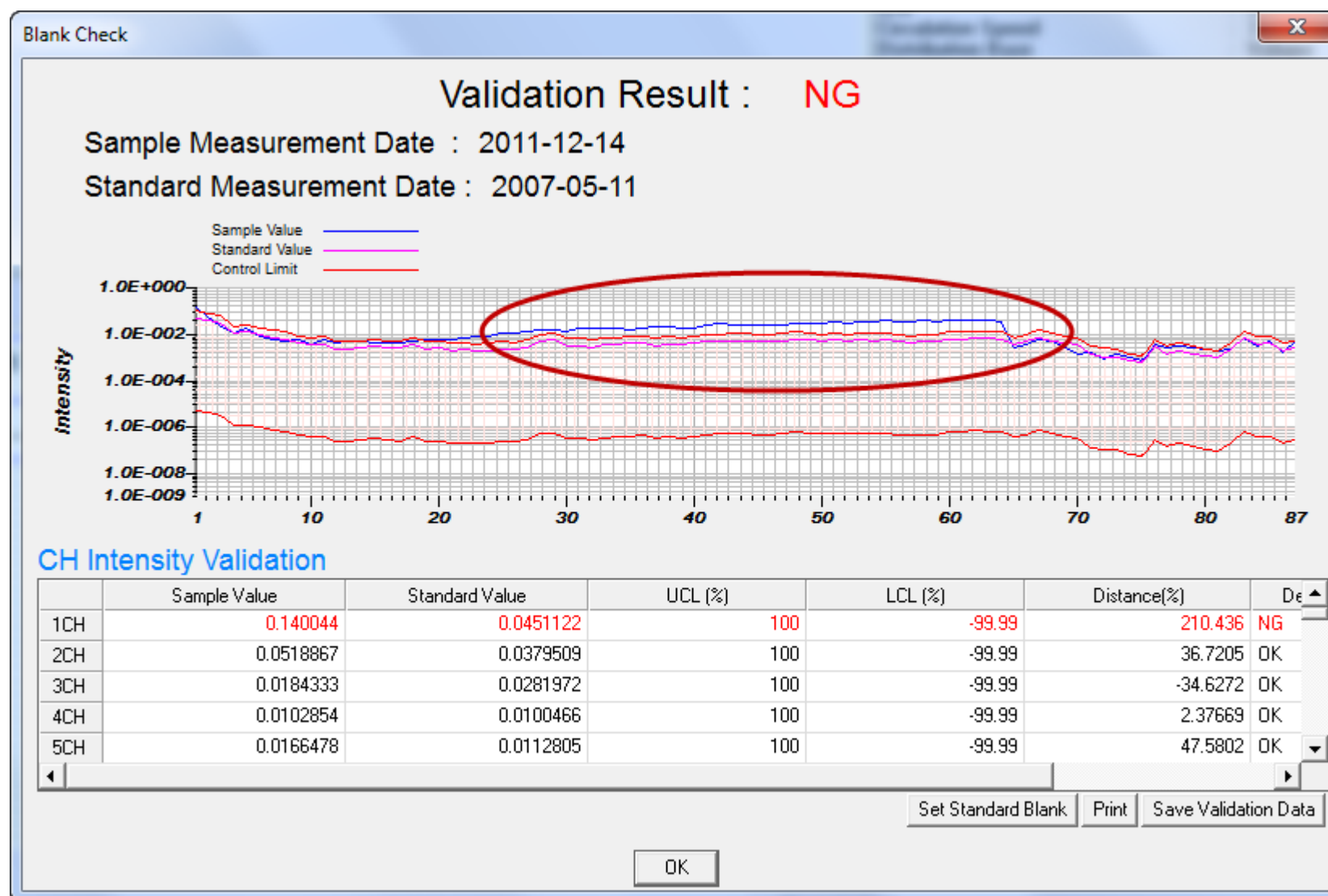
# Blank Check

- Need to explain difference in scattering
- Try other tools, i.e. Blank Check





# Blank Check



# Custom Calculations

**Advanced**

Sample Information

Calculation

Refractive Index

Sample

Name: Silicon oil

Comment: Silicon oil

Index LD: 1.41

Index LED: 1.41

Dispersion Medium

Name: Water

Comment: Water

Index LD: 1.333

Index LED: 1.333

Fixed Value

Cumulative % on Particle Size:

(1)	<input type="checkbox"/>	850	μm	(6)	<input checked="" type="checkbox"/>	150	μm
(2)	<input type="checkbox"/>	600	μm	(7)	<input checked="" type="checkbox"/>	106	μm
(3)	<input type="checkbox"/>	425	μm	(8)	<input checked="" type="checkbox"/>	75	μm
(4)	<input type="checkbox"/>	300	μm	(9)	<input checked="" type="checkbox"/>	53	μm
(5)	<input type="checkbox"/>	212	μm	(10)	<input checked="" type="checkbox"/>	38	μm

Particle Size on Cumulative %:

(1)	<input type="checkbox"/>	5	%	(6)	<input type="checkbox"/>	6	%
(2)	<input checked="" type="checkbox"/>	10	%	(7)	<input type="checkbox"/>	7	%
(3)	<input type="checkbox"/>	20	%	(8)	<input type="checkbox"/>	8	%
(4)	<input type="checkbox"/>	30	%	(9)	<input checked="" type="checkbox"/>	9	%
(5)	<input type="checkbox"/>	40	%	(10)	<input type="checkbox"/>	9	%

Density Distribution Graph

☒ Standard ☐ Custom Setting % (undersize)

☐ Custom Setting

Formula Manipulation

(1) ☒ Setting (3) ☐ Setting

(2) ☐ Setting (4) ☐ Setting

Verification

No Define

No Define

No Define

Setting

OK

**Formula Manipulation Setting**

Variables' Setting

x: Median Size

y: D10

z: D90

Formula: (z-y)/x

Title: Span

OK

**Formula Manipulation Setting**

Variables' Setting

x: Median Size

y: Chi Square

z: R Parameter

Skewness

Kurtosis

Diameter on Cumulative %(1)

Formula: (z-y)/x

Title: Span

OK

Cancel

Formula: (z-y)/x

Title: Span

# What we'll talk about

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- **Measurement tools**
- **Data analysis tools**
- **Data verification tools**
- **Q&A**



# Automate COV Calculation

- Coefficient of Variation indicates precision of multiple measurements
- ISO 13320 and USP <429> make recommendations using COV

Summary Report				
Export Summary	Print Summary	Edit Layout	Best Fit Columns	Hide Selected
File Name	Sample Name	D(v,0.1)	D(v,0.5)	D(v,0.9)
200811061138068.NGB	Zircoa Slurry	0.065	0.107	0.185
200811061140069.NGB	Zircoa Slurry	0.071	0.145	11.896
200811061144070.NGB	Zircoa Slurry	0.069	0.129	3.838
Average		0.068	0.127	5.306
Std. Dev.		0.003	0.019	5.992
CV (%)		4.471	15.023	112.921
ISO 13320-1 (20.0, 15.0, 20.0)		PASSED	FAILED	FAILED



# Automate COV Calculation

The screenshot illustrates the steps to automate COV calculation in the HORIBA software:

- File List View:** A window showing a list of data files. The 'Summary' button is highlighted with a red arrow.
- Summary Report:** A window displaying a list of files. The 'Print Summary' button is highlighted with a red arrow.
- Select Summary Items:** A dialog box for selecting summary items. The 'Add >>' button is highlighted with a red arrow. The 'Summary Items' list includes:
  - Source
  - Instrument ID
  - Test or Assay. Number
  - Median Size
  - Diameter on Cumulative % [02]
  - Diameter on Cumulative % [09]
  - Mean Size
  - Mode Size
  - D(v,0.1)
  - D(v,0.5)
  - D(v,0.9)
- Validation:** A section in the dialog box for specifying validation parameters. The 'Specification' dropdown is set to 'ISO 13320-1'. The 'OK' button is highlighted with a red arrow.

# Automate COV Calculation

Summary Report				
Export Summary	Print Summary	Edit Layout	Best Fit Columns	Hide Selected
File Name	Sample Name	D(v,0.1)	D(v,0.5)	D(v,0.9)
200811061138068.NGB	Zircoa Slurry	0.065	0.107	0.185
200811061140069.NGB	Zircoa Slurry	0.071	0.145	11.896
200811061144070.NGB	Zircoa Slurry	0.069	0.129	3.838
Average		0.068	0.127	5.306
Std. Dev.		0.003	0.019	5.992
CV (%)		4.471	15.023	112.921
ISO 13320-1 (20.0, 15.0, 20.0)		PASSED	FAILED	FAILED



# Result Verification

Verification Setting

Parameter

Median Size

Specification

ISO 13320-1

Standard Value

50

( $\mu\text{m}$ )

Tolerance

$\pm$  5

( $\mu\text{m}$ )

Certified range of values

D(v,0.5)  $\geq$  10 $\mu\text{m}$

$\pm$  0 %

D(v,0.5)  $<$  10 $\mu\text{m}$

$\pm$  0 %

Result Display Setting

Pass:

Color:

Text:

OK

Fail:




Color:

Text:

NG

OK

Cancel

Distribution Graph	Data Table	Result Data		
<b>Mean Size</b> : 0.18408( $\mu\text{m}$ ) <b>Variance</b> : 1.8988E-3( $\mu\text{m}^2$ ) <b>Median Size</b> : 0.17730( $\mu\text{m}$ ) <b>Mode Size</b> : 0.1649( $\mu\text{m}$ ) <b>Std.Dev.</b> : 0.0436( $\mu\text{m}$ ) <b>Chi Square</b> : 4.162519 <b>R Parameter</b> : 3.7379E-1 <b>Diameter on Cumulative %</b> : (2)10.00 (%)~ 0.1345( $\mu\text{m}$ ) : (9)90.00 (%)~ 0.2450( $\mu\text{m}$ ) <b>Cumulative % on Diameter</b> : (1)850.0 ( $\mu\text{m}$ )~ 100.000(%) : (2)600.0 ( $\mu\text{m}$ )~ 100.000(%) : (3)425.0 ( $\mu\text{m}$ )~ 100.000(%) : (4)300.0 ( $\mu\text{m}$ )~ 100.000(%) : (5)212.0 ( $\mu\text{m}$ )~ 100.000(%) : (6)150.0 ( $\mu\text{m}$ )~ 100.000(%) : (7)106.0 ( $\mu\text{m}$ )~ 100.000(%) : (8)75.00 ( $\mu\text{m}$ )~ 100.000(%) : (9)53.00 ( $\mu\text{m}$ )~ 100.000(%) : (10)38.00 ( $\mu\text{m}$ )~ 100.000(%) <b>Verification</b> : 1.OK 4.3% [D(v,0.5) 0.170 ( $\mu\text{m}$ )( $\pm$ 6.000%)] : 2.OK 3.5% [D(v,0.1) 0.130 ( $\mu\text{m}$ )( $\pm$ 10.00%)] : 3.OK 6.5% [D(v,0.9) 0.230 ( $\mu\text{m}$ )( $\pm$ 10.00%)]				
Data Name	Graph Type	Transmittance(R)	Median Size	R Parameter
andy1		88.3(%)	0.17730( $\mu\text{m}$ )	0.373795
200801181026014		81.1(%)	9.35329( $\mu\text{m}$ )	0.069234
andy1		88.3(%)	0.17730( $\mu\text{m}$ )	0.373795





# What we'll talk about

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- **Measurement tools**
- **Data analysis tools**
- **Data verification tools**
- **Q&A**



**Thank you**

ありがとうございました

ขอบคุณครับ

谢谢

اشكر

Gracias

Grazie

Σας ευχαριστούμε

धन्यवाद

நன்றி

Tacka dig

Danke

Merci

Obrigado

감사합니다

Большое спасибо

おかしき

*Omoshiro Okashiku*

# To Learn More: [www.horiba.com/particle](http://www.horiba.com/particle)

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## Particle Characterization

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### Particle Characterization

HORIBA designs, manufactures, and supplies state of the art particle characterization instruments.

Every instrument across the five business segments must meet stringent requirements before the HORIBA name is attached. The Particle Characterization group of analyzers has incorporated this principle into each new design since entering the business in 1979. Relentless innovation united with high performance to attain the ultimate goal: a new standard in usability.

### Particle Characterization Products

HORIBA offers instruments for particle size, particle shape, zeta potential, and surface area analysis. Measurable particle size range is from 1 nanometer to 30 millimeters, at concentrations ranging from 1 ppm to 50 vol% with shape determination available starting at 1 micrometer. A range of analytical techniques are employed including laser diffraction (Mie Theory), dynamic light scattering, acoustic and electroacoustic spectroscopy, and dynamic and static image analysis. (measuring both particle size and shape information).

HORIBA's advanced designs and powerful software, combined with flexible sample handling systems are available to meet every analysis need. These instruments can incorporate small volume pumping systems for precious materials, high throughput automation, dry powder dispersers and temperature controlled flow systems in order to provide the user with the best possible solution with none of the trade-offs that might otherwise be necessary.

### Particle Size

- Laser diffraction
  - LA-950V2
  - LA-300
- Dynamic light scattering
  - SZ-100

### Request Information

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