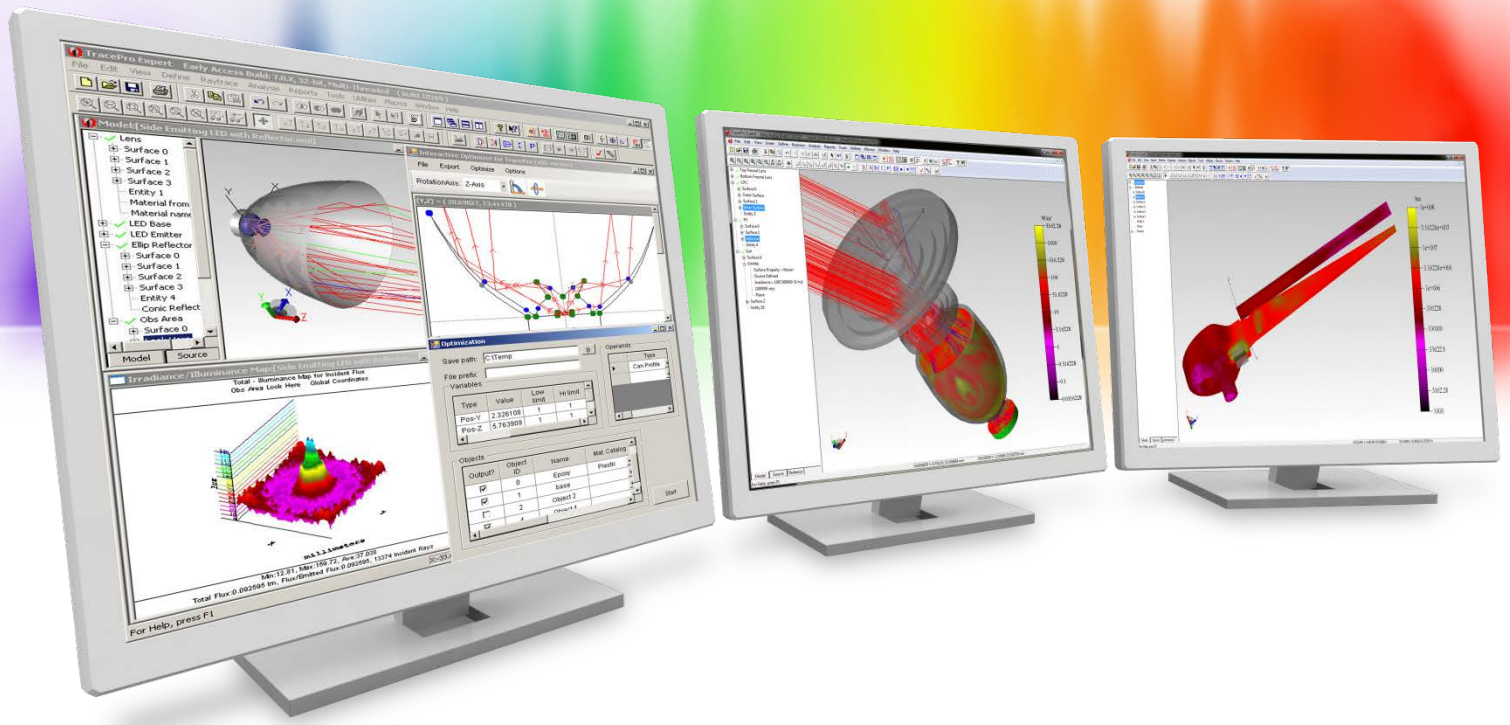
TracePro



Ray and Path Sorting in TracePro

A Lambda Research Corporation Webinar

December 15, 2016

LAMBDA RESEARCH CORPORATION

Presenter

- **Presenter**

  Dave Jacobsen
  Sr. Application Engineer
  Lambda Research Corporation

- **Moderator**

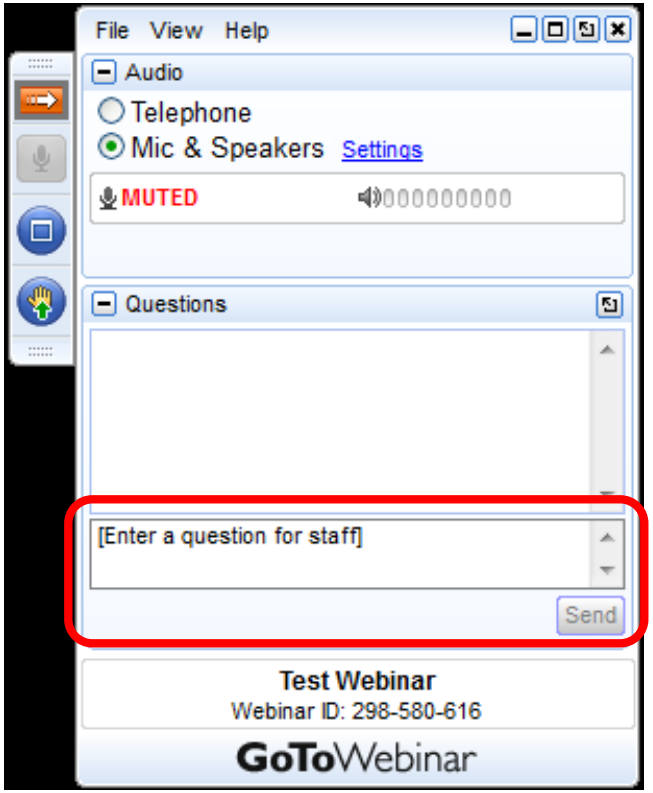
  Mike Gauvin
  Vice President of Sales and Marketing
  Lambda Research Corporation

TracePro

Format

- A 25-30 minute presentation followed by a question and answer session

- Please submit your questions anytime using Question box in the GoToWebinar control panel



TracePro

Additional Resources

- Past TracePro Webinars
  - http://www.lambdares.com/webinars
- TracePro Tutorial Videos
  - http://www.lambdares.com/videos
- TracePro Tutorials
  - http://www.lambdares.com/features/tracepro-tutorials
- Information on upcoming TracePro Training Classes
  - http://www.lambdares.com/training/software-training

TracePro

Upcoming TracePro Training

- **Jena, Germany**
  - Introduction to TracePro – March 6-7, 2017
  - Optimization with TracePro – March 8-9, 2017
  - Stray Light Analysis using TracePro – March 10, 2017

- **Littleton, MA USA**
  - Introduction to TracePro – April 11-12, 2017
  - Optimization with TracePro– April 13-14, 2017

- **Please ask us about custom onsite training**

TracePro

Latest TracePro and RayViz Release

TracePro 7.8.0 - Released October 1, 2016

RayViz 7.8.0 - Released October 1, 2016

Customers with current maintenance and support agreements can download this new release at:

http://www.lambdares.com/CustomerSupportCenter/index.php/trace-pro/current-release

TracePro

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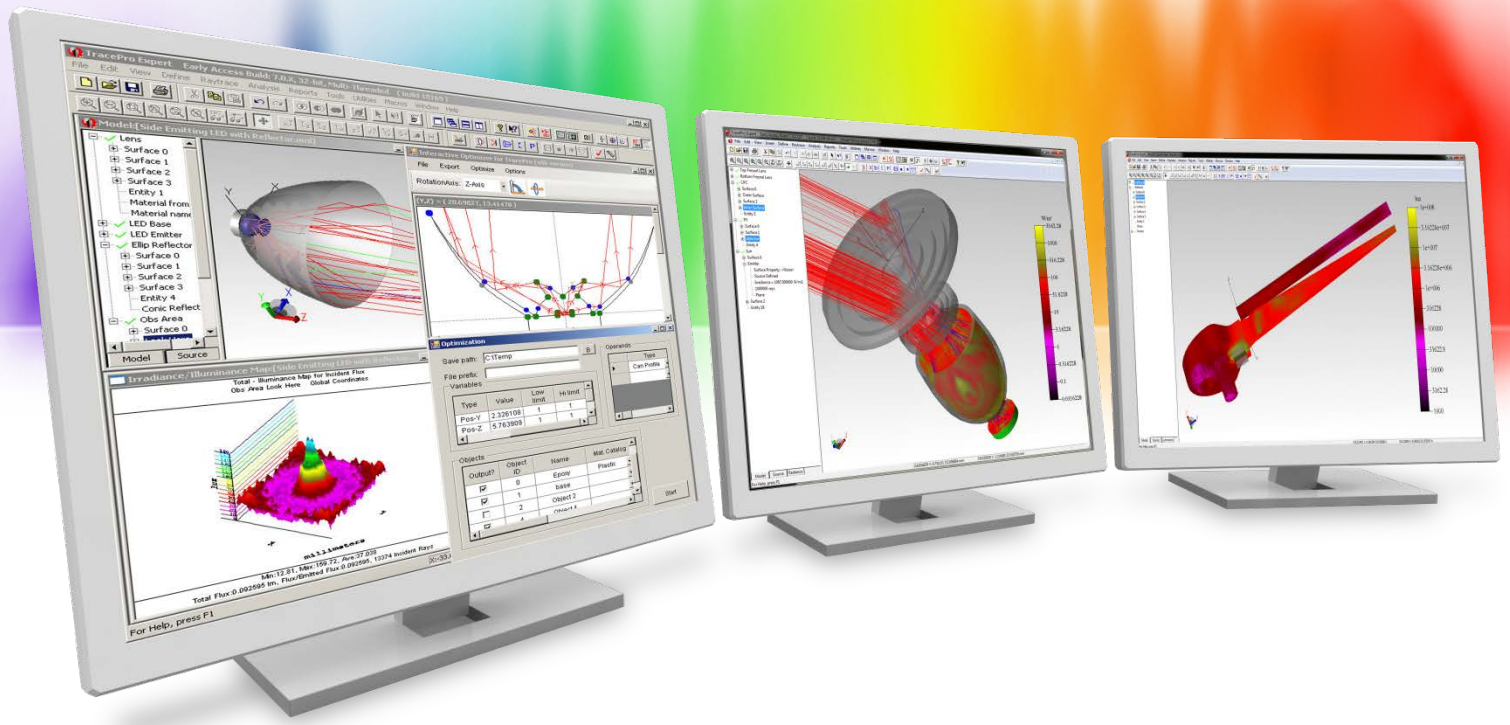


Ray and Path Sorting in TracePro

A Lambda Research Corporation Webinar

December 15, 2016

LAMBDA RESEARCH CORPORATION

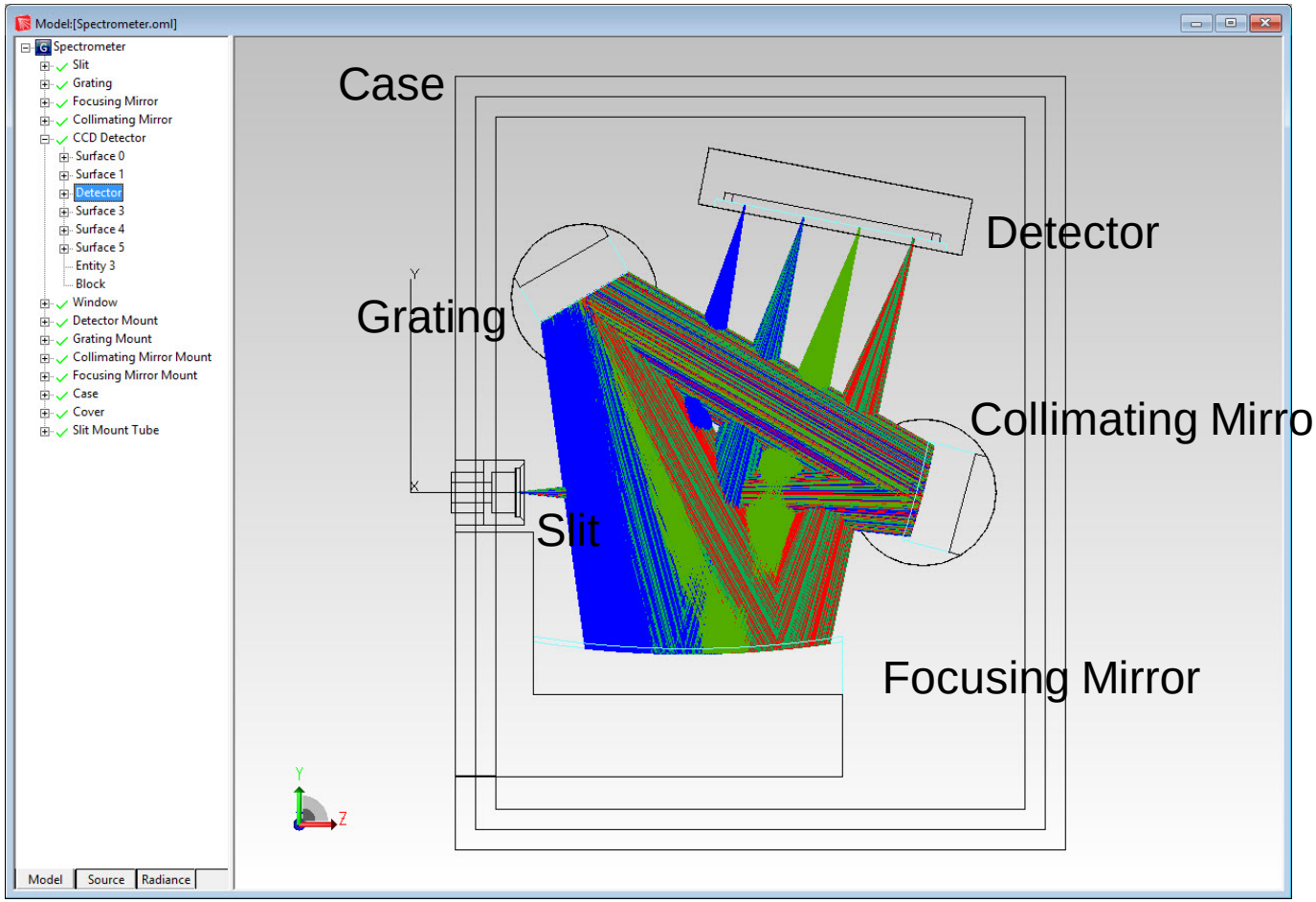
Agenda

- What is Ray Sorting and Path Sorting and how are they different
- Ray Sorting options in TracePro
- The Path Sort Table
- Defining Path Sort Filters
- Ray and Path Sorting uses, including stray light analysis
- Questions and Answers

TracePro

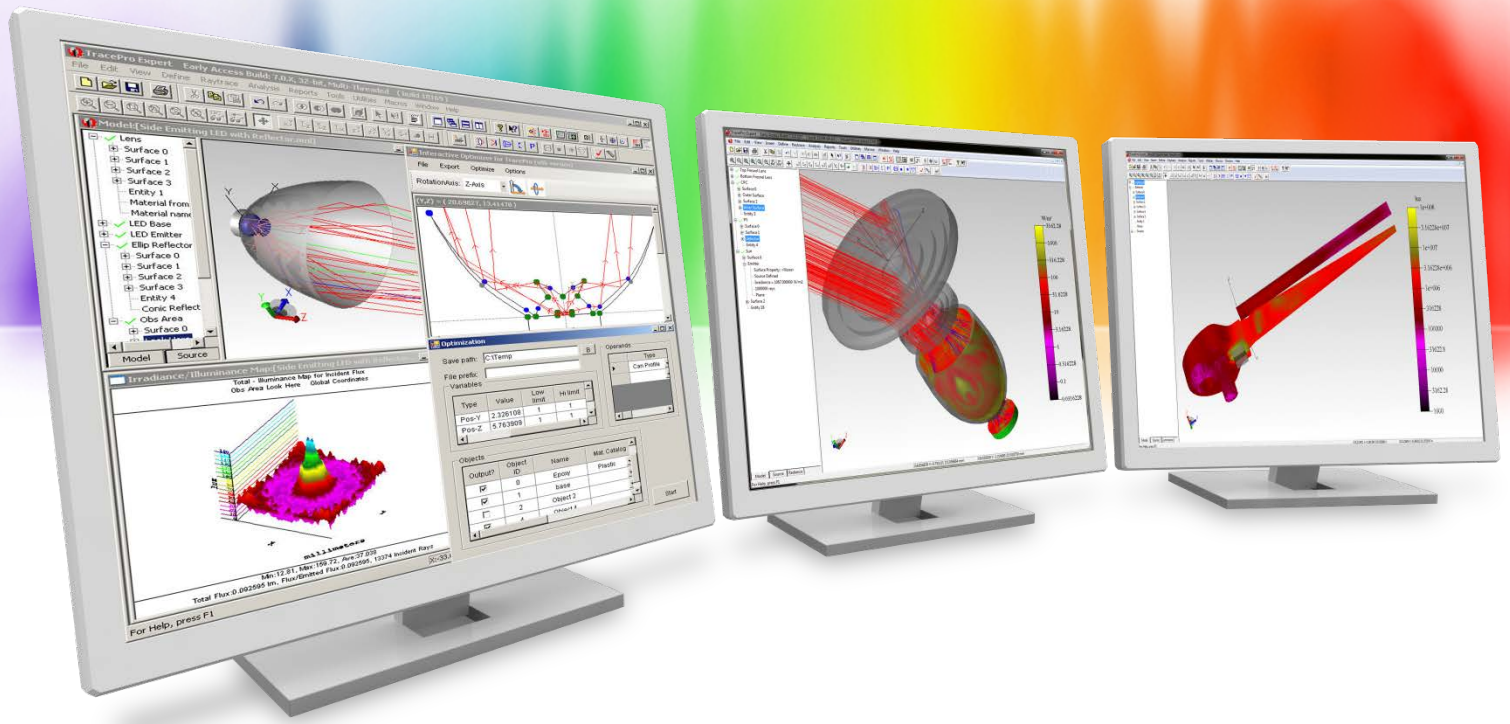
Example TracePro Model

Crossed Czerny-Turner spectrometer



TracePro

TracePro



What is Ray and Path Sorting?

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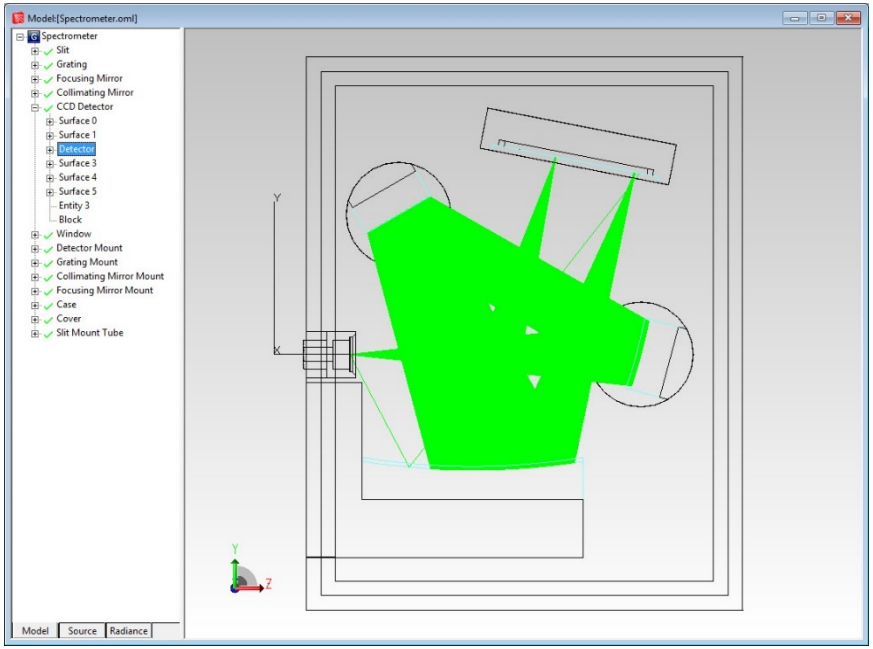
Ray and Path Sorting - Differences

- The Ray and Path Sorting tools are located in the Analysis menu in TracePro
- Can be used to display a subset of the complete raytrace results
- Ray Sorting shows all rays that meet a specified criteria
- Path Sorting shows rays that follow a discrete path to a selected surface
- The Ray and Path Sorting tools are available in all versions of TracePro
- Ray Sorting for Single and Multiple Bulk Scatter and Diffraction requires TracePro Standard or Expert
- Ray and Path Sorting can also be applied to the Irradiance/Illuminance Map

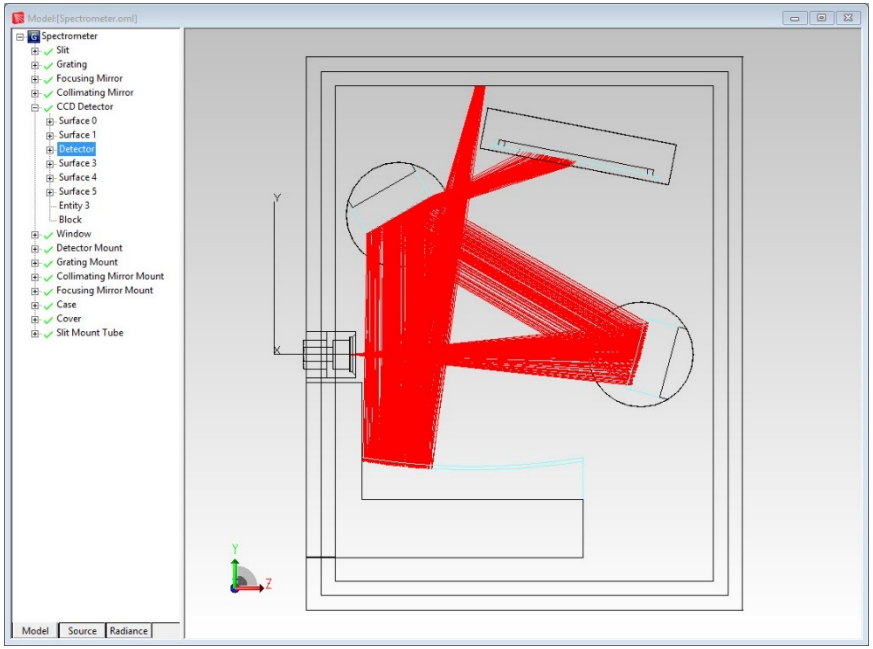
Ray and Path Sorting - Differences

Ray Sorting



Ray Sorting shows all rays that meet a specified criteria, such as hitting a selected surface, wavelength, or surface interaction type

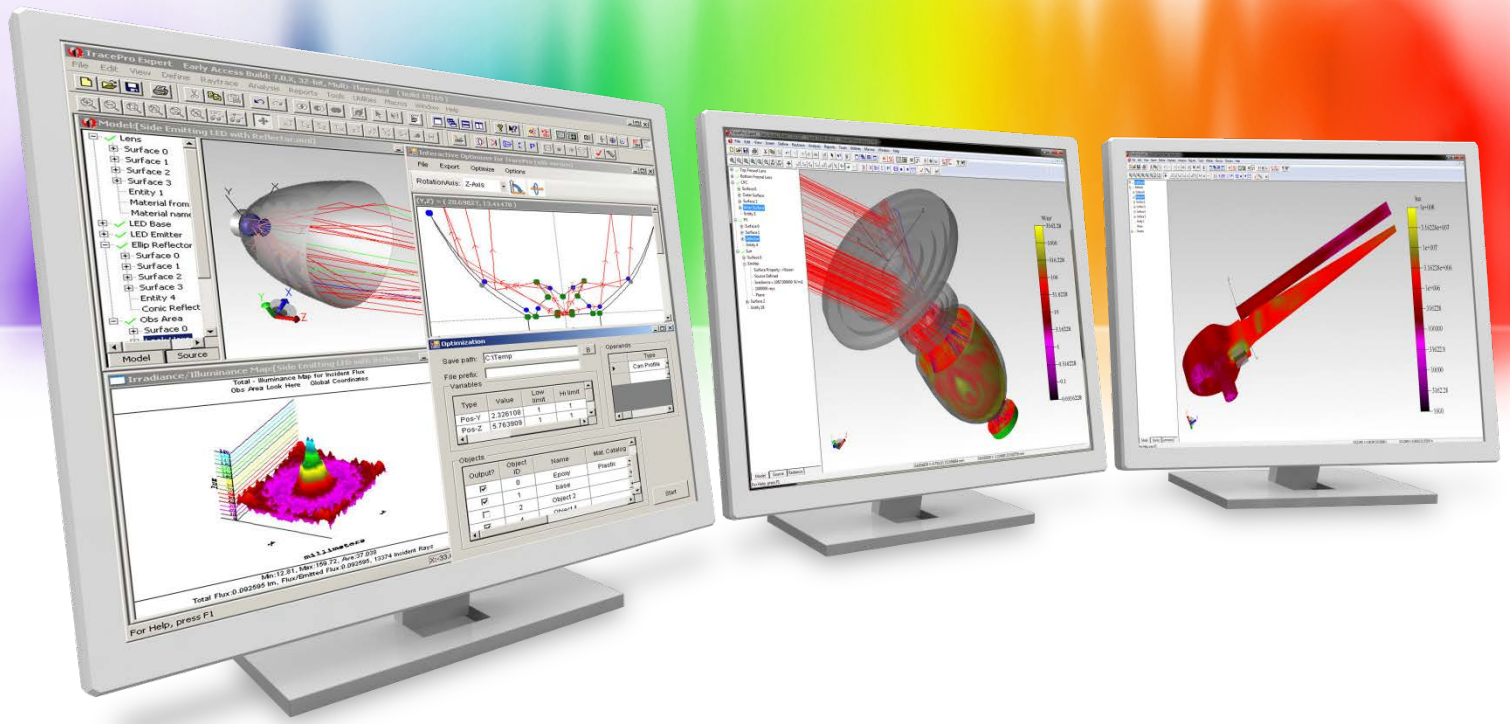
Path Sorting



Path Sorting shows all rays that follow a discrete path to reach a selected surface

TracePro

TracePro



Ray Sorting Options

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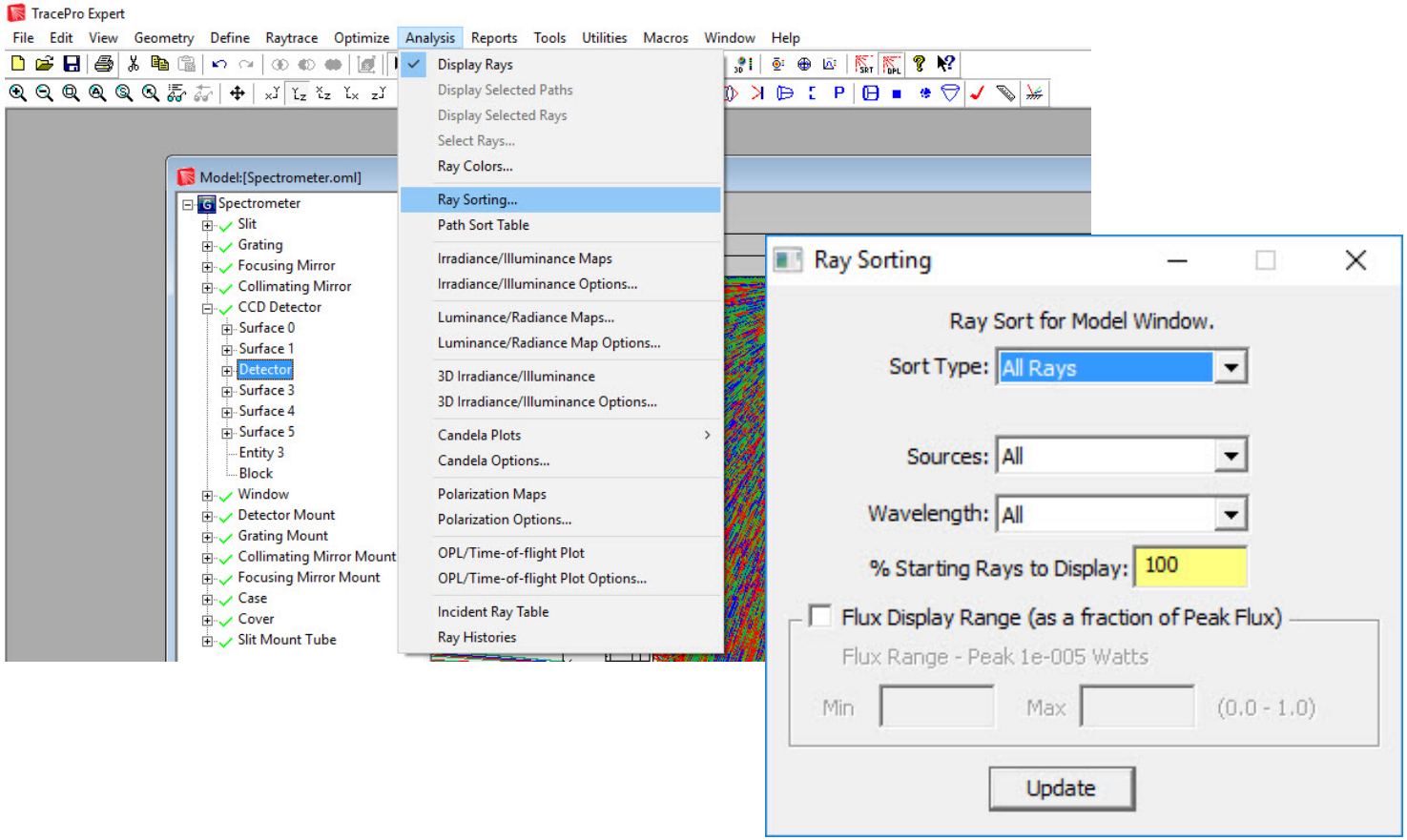
Ray Sorting Options

Ray Sorting allows for sorting rays based on a specified criteria

- Analysis->Ray Sorting



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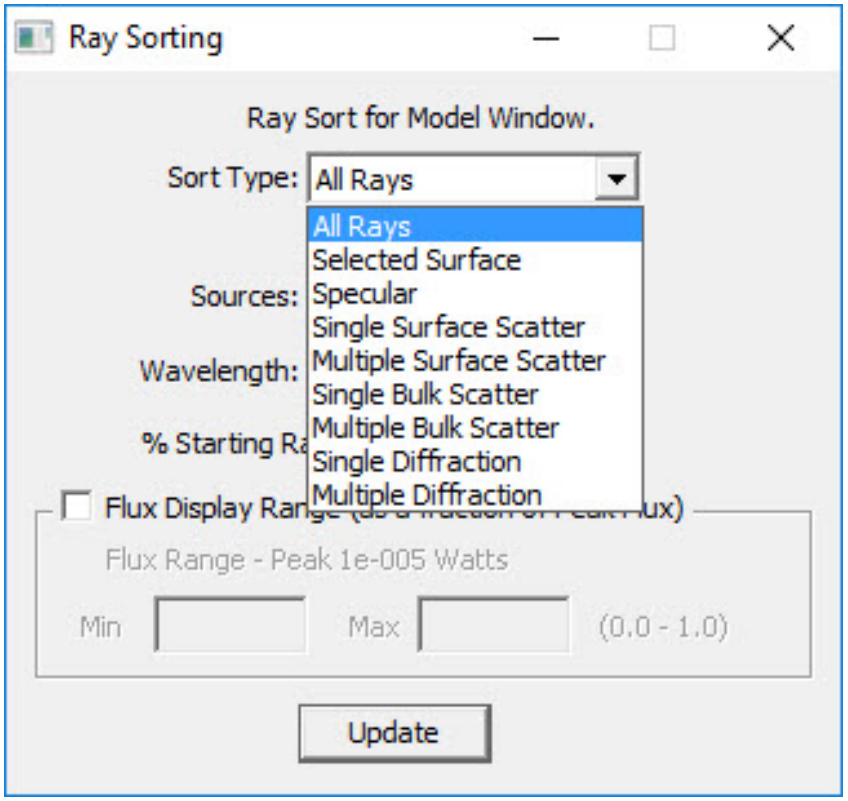
Ray Sorting Options

Sort Type Options

- Selected Surface
- Specular
- Single Surface Scatter
- Multiple Surface Scatter
- Single Bulk Scatter
- Multiple Bulk Scatter
- Single Diffraction
- Multiple Diffraction

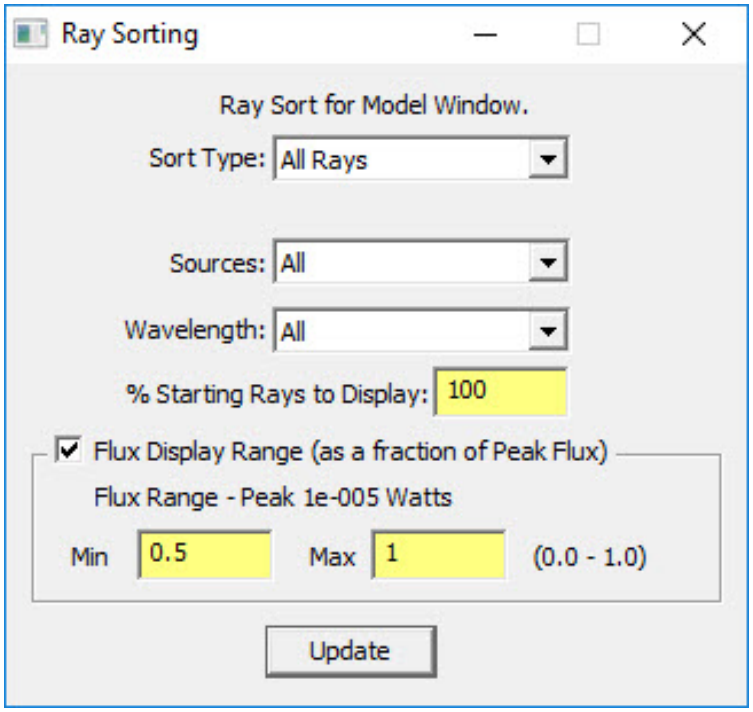


TracePro

Ray Sorting Options

Additional Sort Options

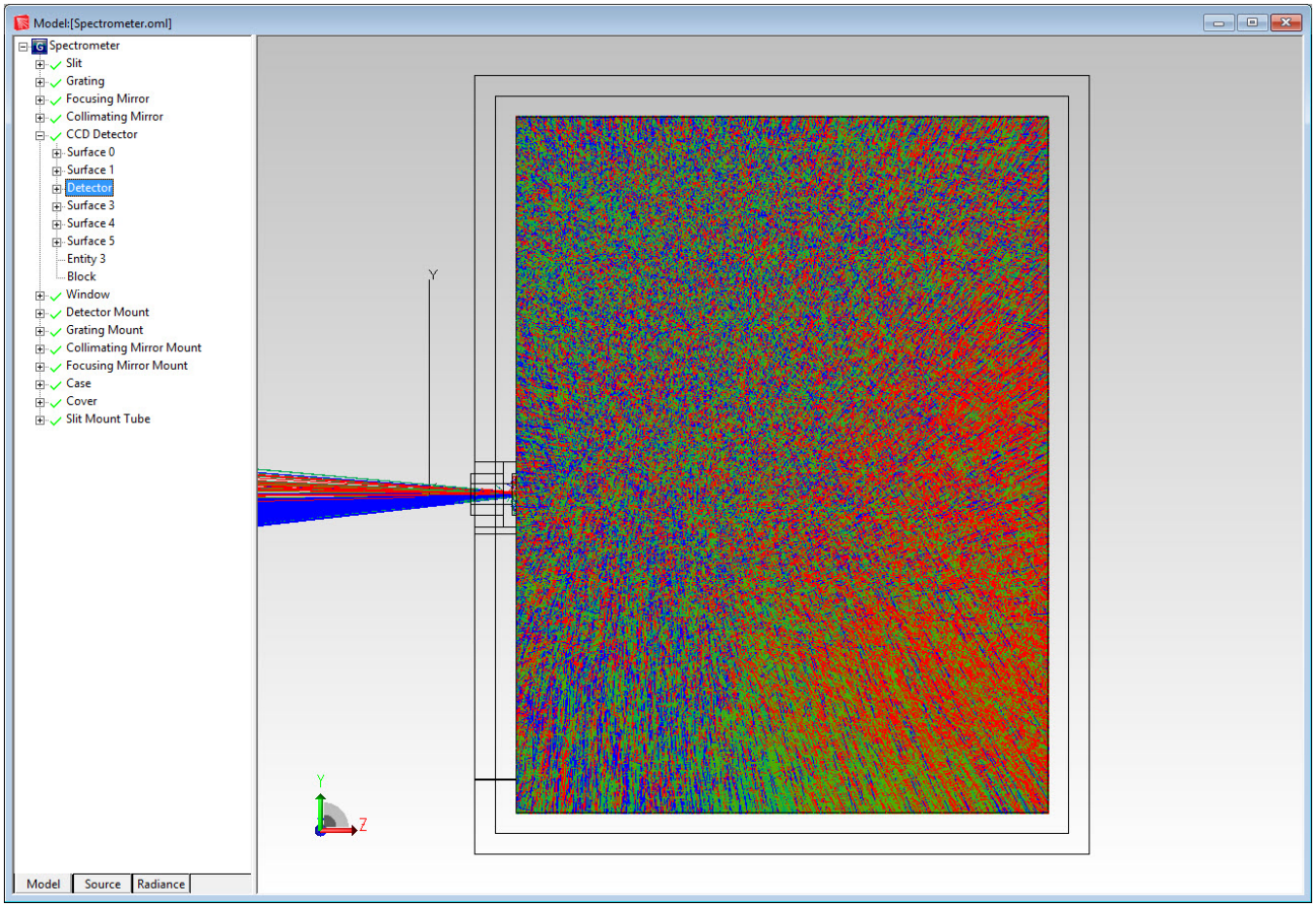
- Sort by Source
- Sort by Wavelength
- Display a percentage of the starting rays
- Sort by a range of flux values, as a fraction of the peak value



TracePro

Ray Sorting Examples

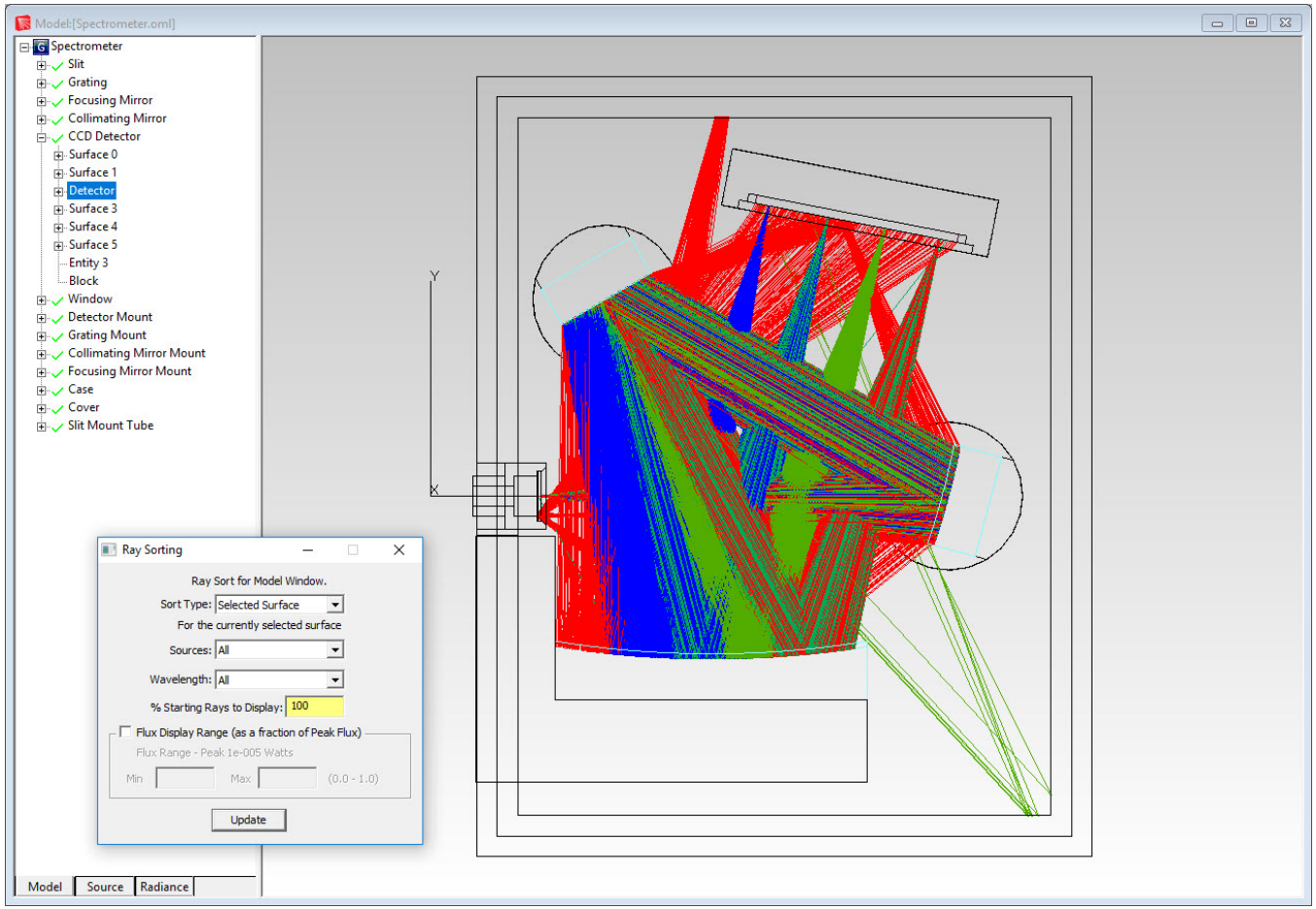
Initial raytrace results – not useable for analysis



TracePro

Ray Sorting Examples

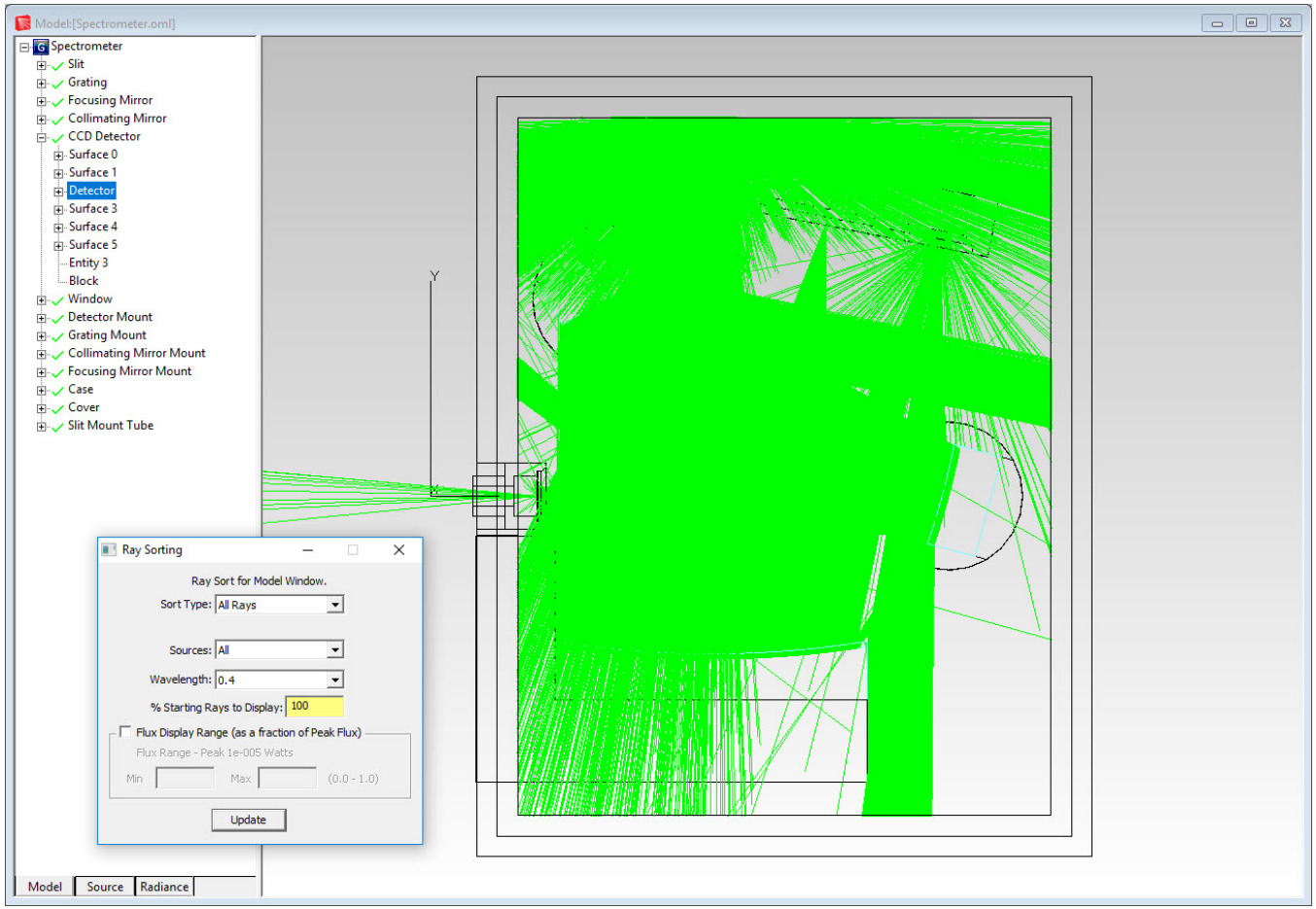
Sort Type – Selected Surface



TracePro

Ray Sorting Examples

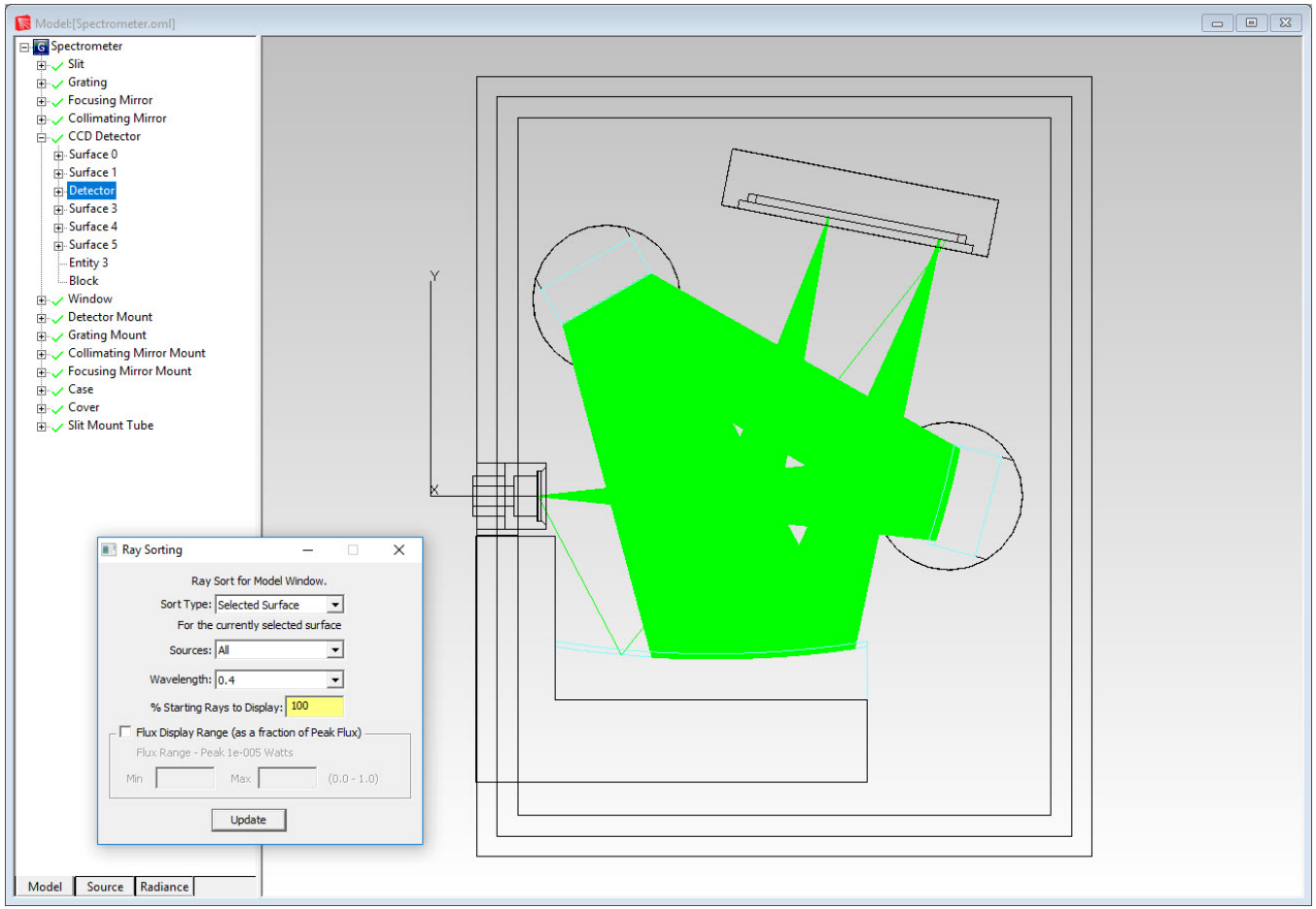
Sort Type – Wavelength



TracePro

Ray Sorting Examples

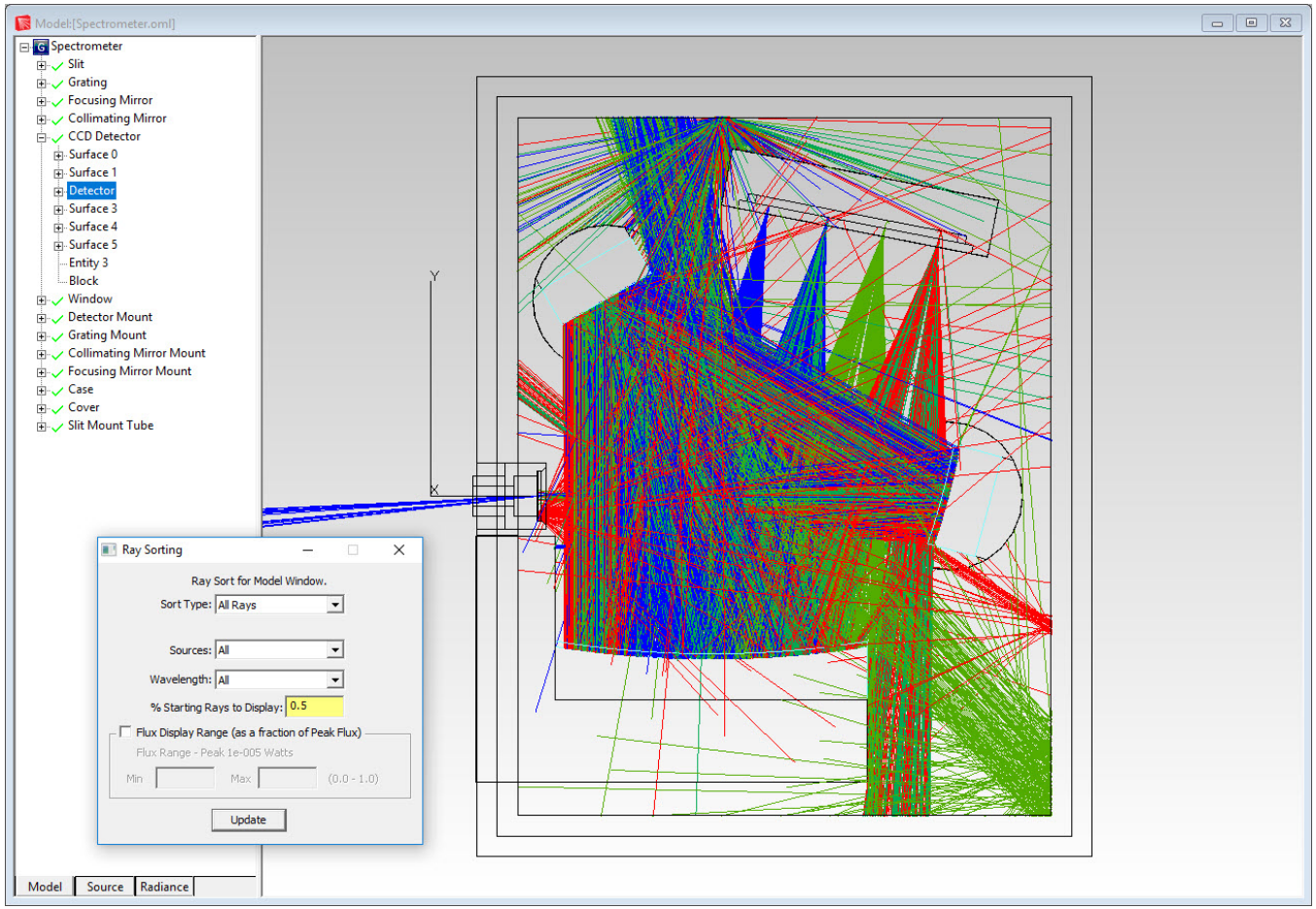
Sort Type – Selected Surface and Wavelength – note second order rays



TracePro

Ray Sorting Examples

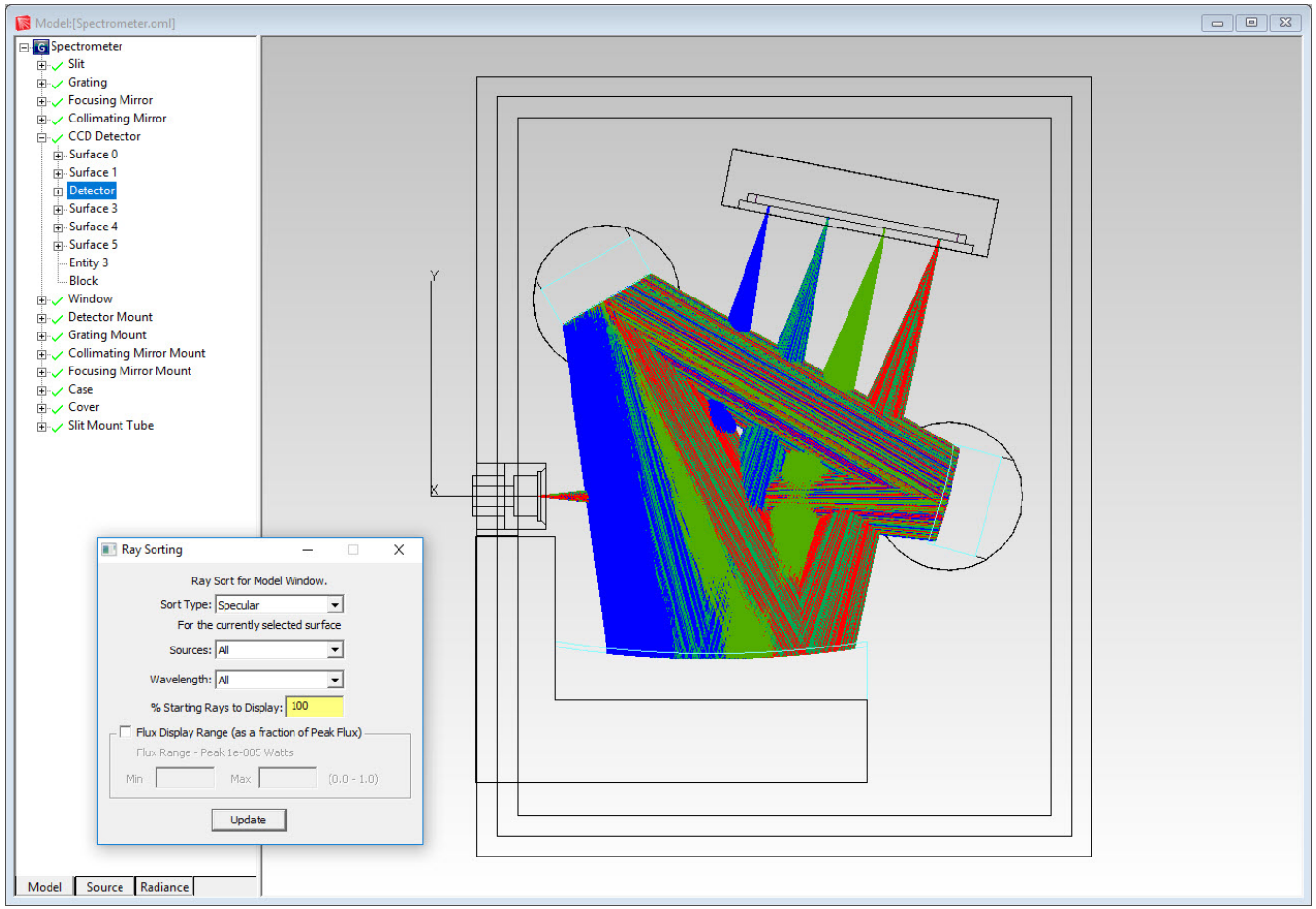
Sort Type – Percentage of Starting Rays



TracePro

Ray Sorting Examples

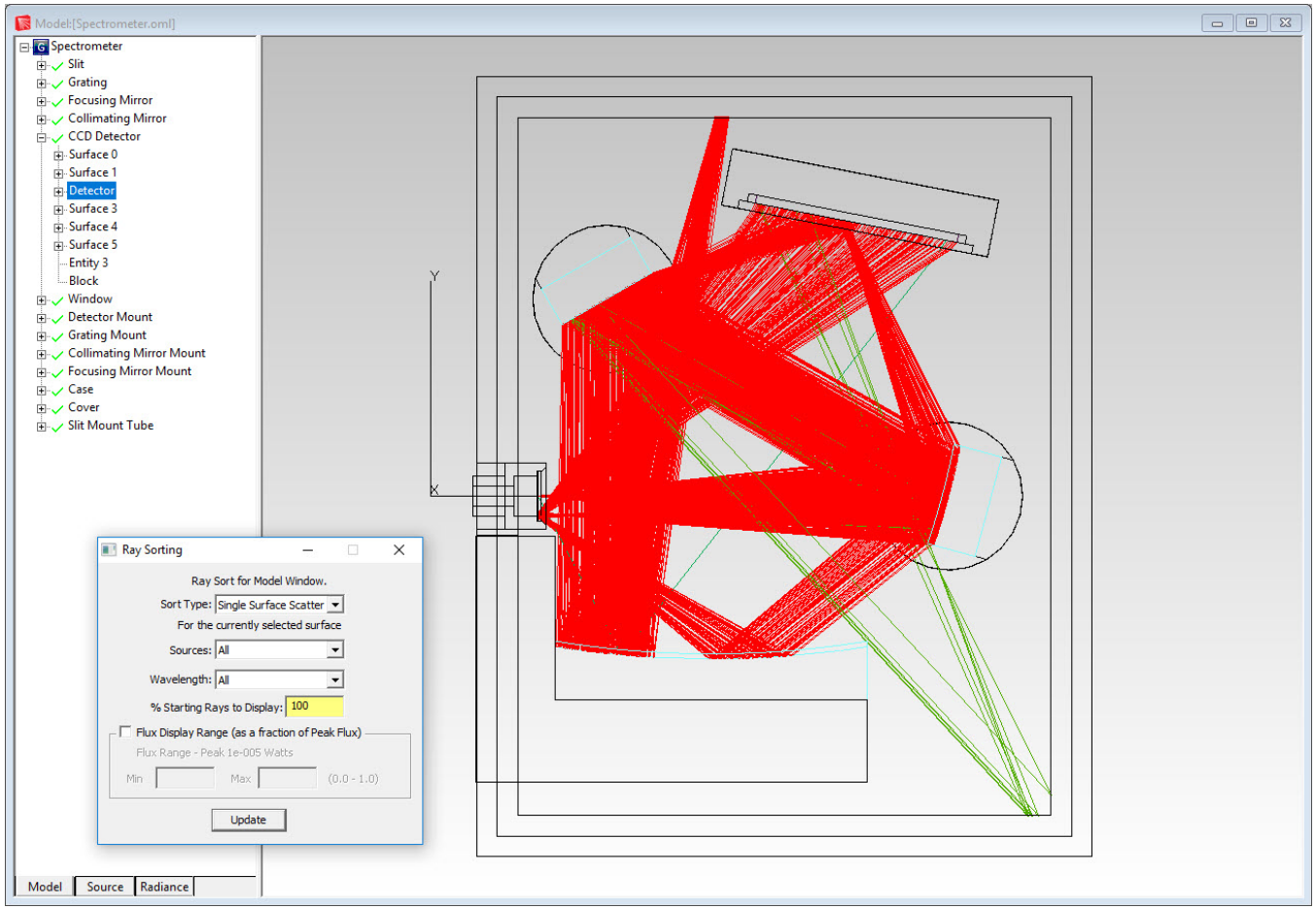
Sort Type – Specular Rays



TracePro

Ray Sorting Examples

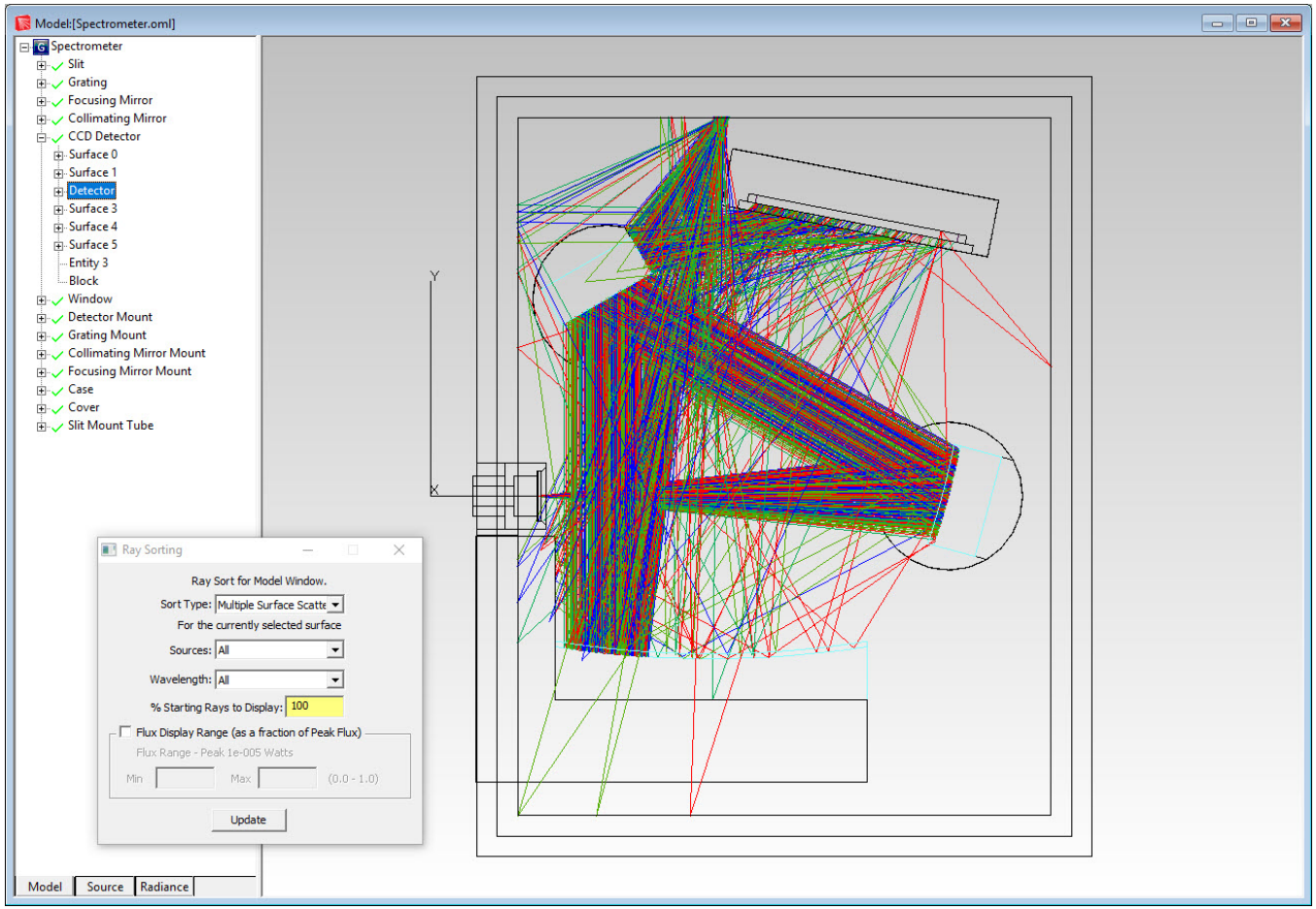
Sort Type – Single Surface Scatter Rays



TracePro

Ray Sorting Examples

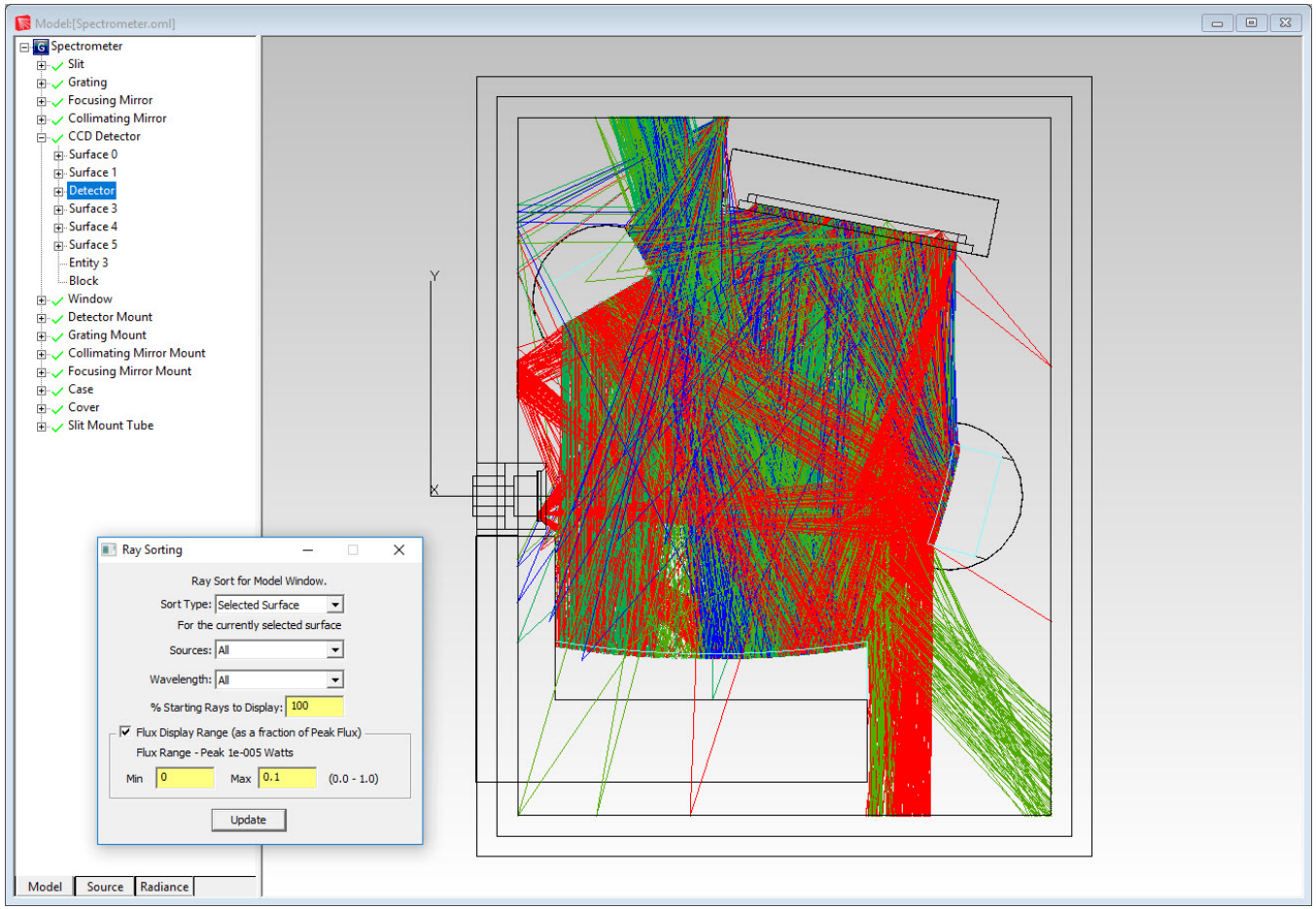
Sort Type – Multiple Surface Scatter Rays – may require lower flux threshold



TracePro

Ray Sorting Examples

Sort Type – Range of Flux Values



TracePro

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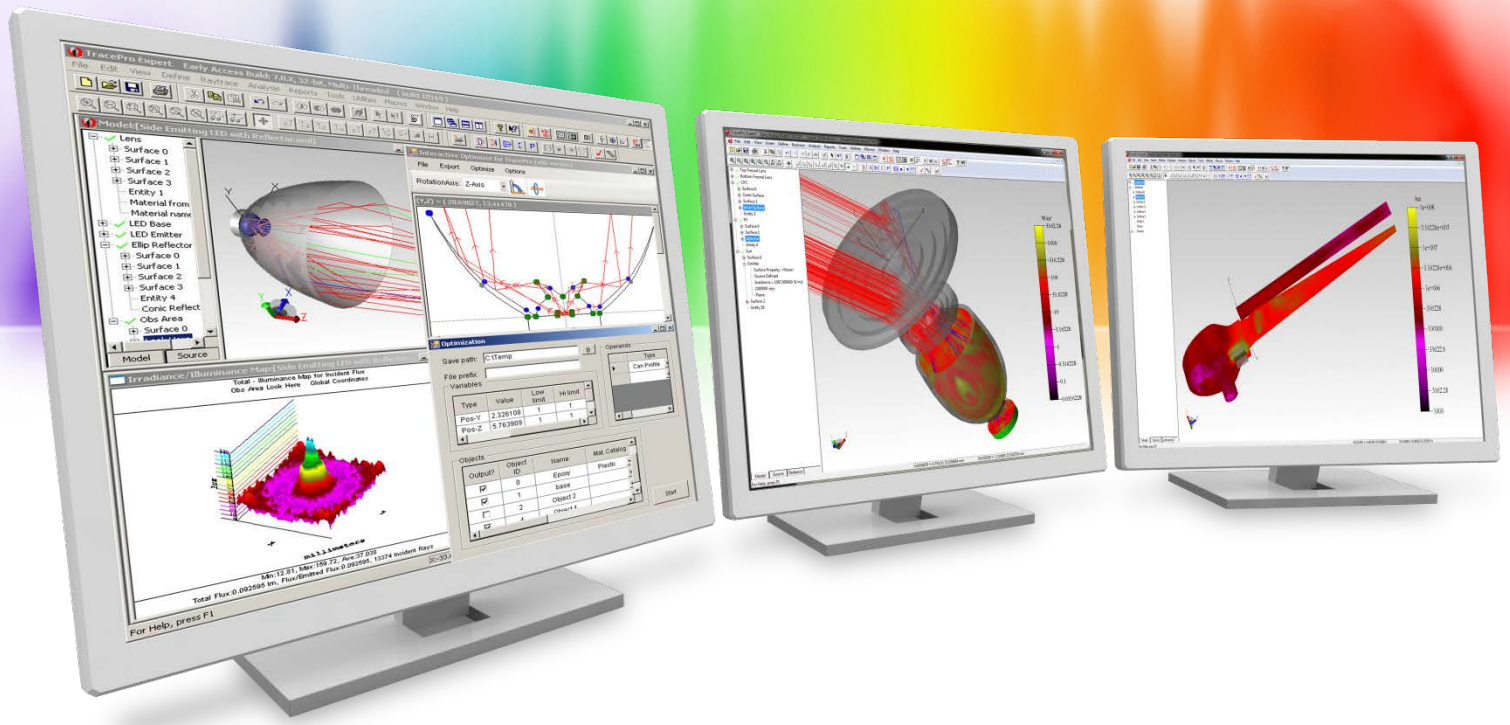

The Path Sort Table

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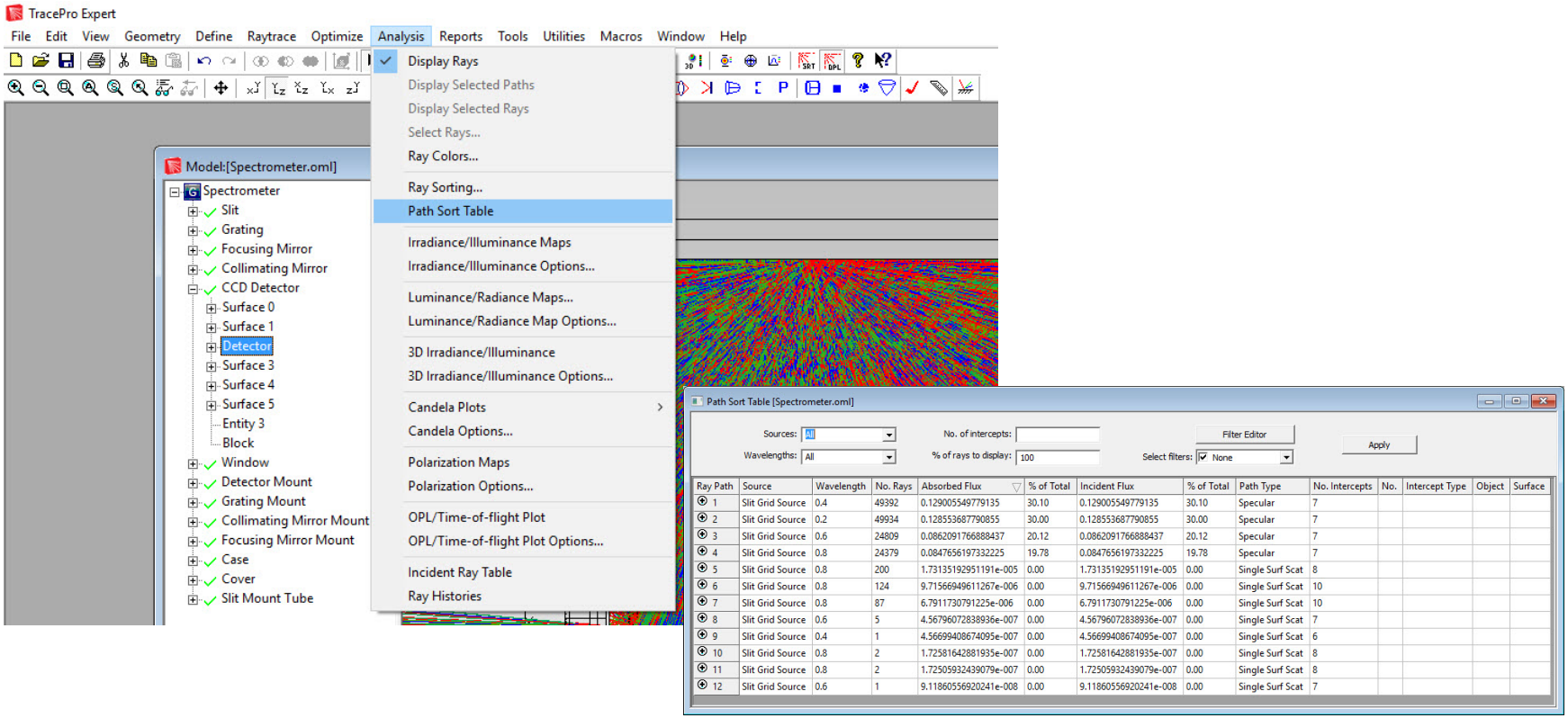
Path Sort Table

Path Sorting allows for sorting rays by the discrete paths they take to a selected surface

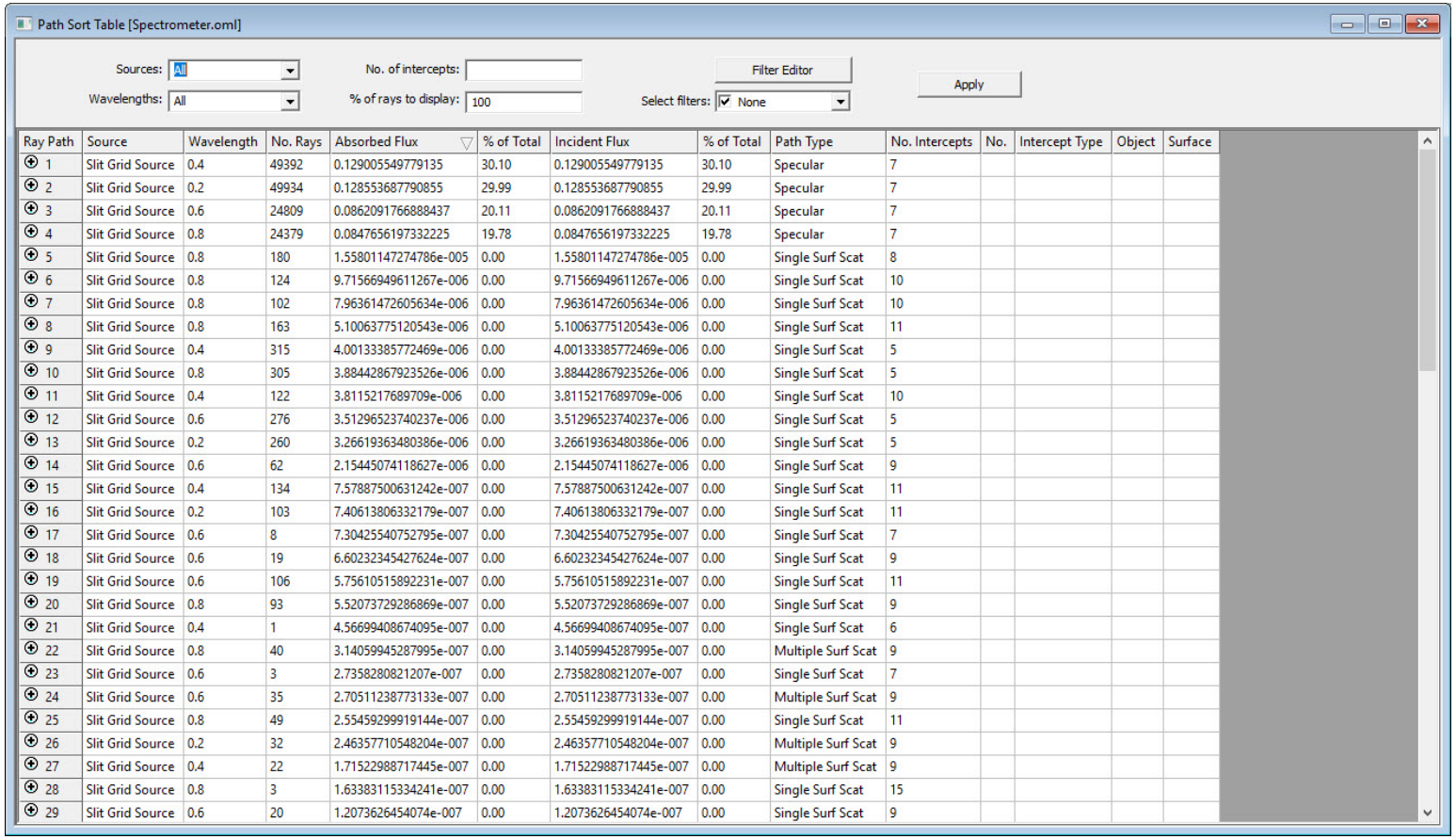
- Analysis->Path Sort Table



TracePro

Path Sort Table

Path Sort Table – Lists all the paths rays take to a selected surface

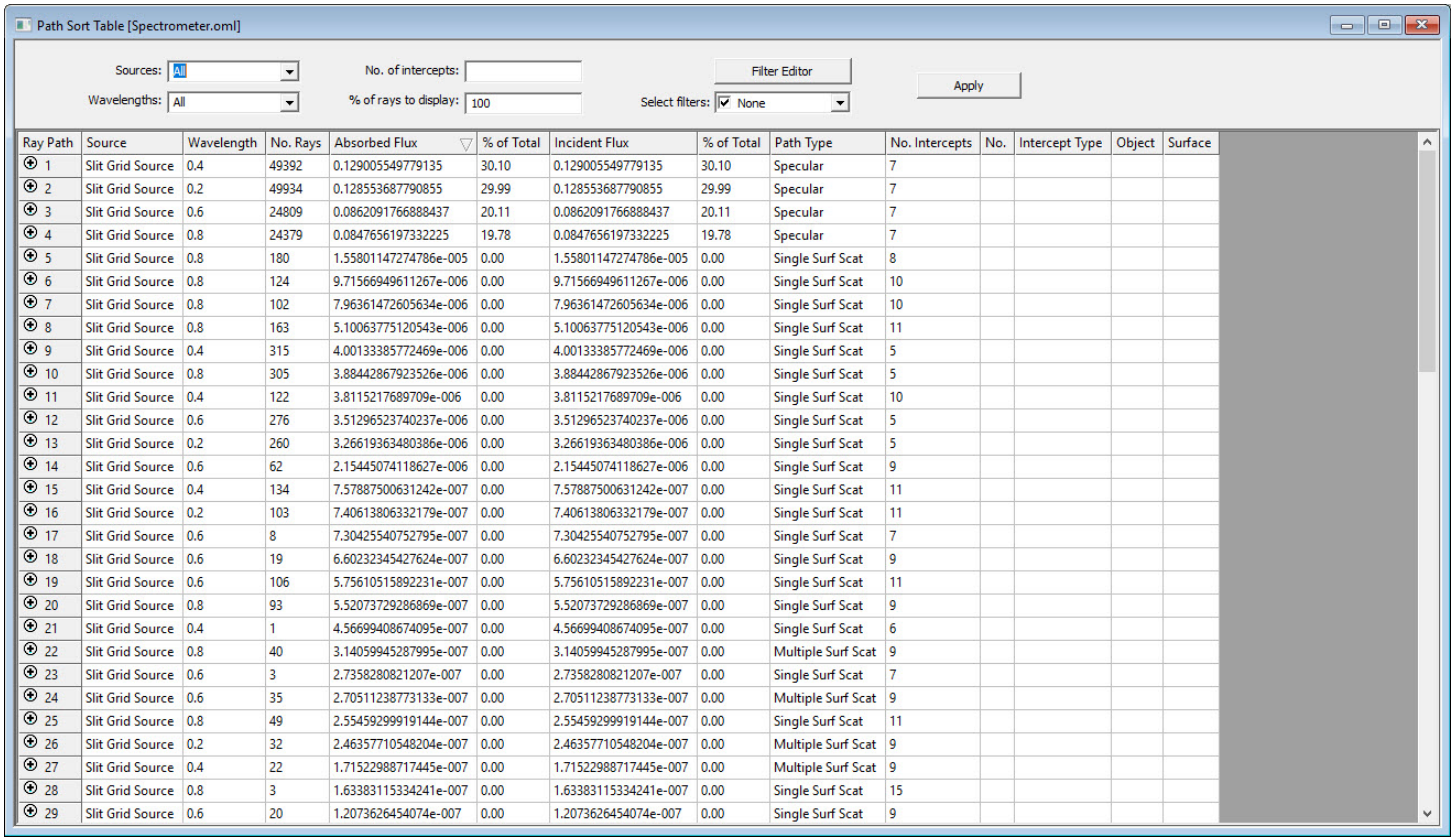


Ray Path	Source	Wavelength	No. Rays	Absorbed Flux	% of Total	Incident Flux	% of Total	Path Type	No. Intercepts	No.	Intercept Type	Object	Surface
1	Slit Grid Source	0.4	49392	0.129005549779135	30.10	0.129005549779135	30.10	Specular	7				
2	Slit Grid Source	0.2	49934	0.128553687790855	29.99	0.128553687790855	29.99	Specular	7				
3	Slit Grid Source	0.6	24809	0.0862091766888437	20.11	0.0862091766888437	20.11	Specular	7				
4	Slit Grid Source	0.8	24379	0.0847656197332225	19.78	0.0847656197332225	19.78	Specular	7				
5	Slit Grid Source	0.8	180	1.55801147274786e-005	0.00	1.55801147274786e-005	0.00	Single Surf Scat	8				
6	Slit Grid Source	0.8	124	9.71566949611267e-006	0.00	9.71566949611267e-006	0.00	Single Surf Scat	10				
7	Slit Grid Source	0.8	102	7.96361472605634e-006	0.00	7.96361472605634e-006	0.00	Single Surf Scat	10				
8	Slit Grid Source	0.8	163	5.10063775120543e-006	0.00	5.10063775120543e-006	0.00	Single Surf Scat	11				
9	Slit Grid Source	0.4	315	4.00133385772469e-006	0.00	4.00133385772469e-006	0.00	Single Surf Scat	5				
10	Slit Grid Source	0.8	305	3.88442867923526e-006	0.00	3.88442867923526e-006	0.00	Single Surf Scat	5				
11	Slit Grid Source	0.4	122	3.8115217689709e-006	0.00	3.8115217689709e-006	0.00	Single Surf Scat	10				
12	Slit Grid Source	0.6	276	3.51296523740237e-006	0.00	3.51296523740237e-006	0.00	Single Surf Scat	5				
13	Slit Grid Source	0.2	260	3.26619363480386e-006	0.00	3.26619363480386e-006	0.00	Single Surf Scat	5				
14	Slit Grid Source	0.6	62	2.15445074118627e-006	0.00	2.15445074118627e-006	0.00	Single Surf Scat	9				
15	Slit Grid Source	0.4	134	7.57887500631242e-007	0.00	7.57887500631242e-007	0.00	Single Surf Scat	11				
16	Slit Grid Source	0.2	103	7.40613806332179e-007	0.00	7.40613806332179e-007	0.00	Single Surf Scat	11				
17	Slit Grid Source	0.6	8	7.30425540752795e-007	0.00	7.30425540752795e-007	0.00	Single Surf Scat	7				
18	Slit Grid Source	0.6	19	6.60232345427624e-007	0.00	6.60232345427624e-007	0.00	Single Surf Scat	9				
19	Slit Grid Source	0.6	106	5.75610515892231e-007	0.00	5.75610515892231e-007	0.00	Single Surf Scat	11				
20	Slit Grid Source	0.8	93	5.52073729286869e-007	0.00	5.52073729286869e-007	0.00	Single Surf Scat	9				
21	Slit Grid Source	0.4	1	4.56699408674095e-007	0.00	4.56699408674095e-007	0.00	Single Surf Scat	6				
22	Slit Grid Source	0.8	40	3.14059945287995e-007	0.00	3.14059945287995e-007	0.00	Multiple Surf Scat	9				
23	Slit Grid Source	0.6	3	2.7358280821207e-007	0.00	2.7358280821207e-007	0.00	Single Surf Scat	7				
24	Slit Grid Source	0.6	35	2.70511238773133e-007	0.00	2.70511238773133e-007	0.00	Multiple Surf Scat	9				
25	Slit Grid Source	0.8	49	2.55459299919144e-007	0.00	2.55459299919144e-007	0.00	Single Surf Scat	11				
26	Slit Grid Source	0.2	32	2.46357710548204e-007	0.00	2.46357710548204e-007	0.00	Multiple Surf Scat	9				
27	Slit Grid Source	0.4	22	1.71522988717445e-007	0.00	1.71522988717445e-007	0.00	Multiple Surf Scat	9				
28	Slit Grid Source	0.8	3	1.63383115334241e-007	0.00	1.63383115334241e-007	0.00	Single Surf Scat	15				
29	Slit Grid Source	0.6	20	1.2073626454074e-007	0.00	1.2073626454074e-007	0.00	Single Surf Scat	9				

TracePro

Path Sort Table

Path Sort Table – Shows Source, Wavelength, No. of Rays, Absorbed Flux, % of Total, Path Type, and No. of Intercepts for each path. Columns can be sorted in ascending or descending order.



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2	Slit Grid Source	0.2	49934	0.128553687790855	29.99	0.128553687790855	29.99	Specular	7				
3	Slit Grid Source	0.6	24809	0.0862091766888437	20.11	0.0862091766888437	20.11	Specular	7				
4	Slit Grid Source	0.8	24379	0.0847656197332225	19.78	0.0847656197332225	19.78	Specular	7				
5	Slit Grid Source	0.8	180	1.55801147274786e-005	0.00	1.55801147274786e-005	0.00	Single Surf Scat	8				
6	Slit Grid Source	0.8	124	9.71566949611267e-006	0.00	9.71566949611267e-006	0.00	Single Surf Scat	10				
7	Slit Grid Source	0.8	102	7.96361472605634e-006	0.00	7.96361472605634e-006	0.00	Single Surf Scat	10				
8	Slit Grid Source	0.8	163	5.10063775120543e-006	0.00	5.10063775120543e-006	0.00	Single Surf Scat	11				
9	Slit Grid Source	0.4	315	4.00133385772469e-006	0.00	4.00133385772469e-006	0.00	Single Surf Scat	5				
10	Slit Grid Source	0.8	305	3.88442867923526e-006	0.00	3.88442867923526e-006	0.00	Single Surf Scat	5				
11	Slit Grid Source	0.4	122	3.8115217689709e-006	0.00	3.8115217689709e-006	0.00	Single Surf Scat	10				
12	Slit Grid Source	0.6	276	3.51296523740237e-006	0.00	3.51296523740237e-006	0.00	Single Surf Scat	5				
13	Slit Grid Source	0.2	260	3.26619363480386e-006	0.00	3.26619363480386e-006	0.00	Single Surf Scat	5				
14	Slit Grid Source	0.6	62	2.15445074118627e-006	0.00	2.15445074118627e-006	0.00	Single Surf Scat	9				
15	Slit Grid Source	0.4	134	7.57887500631242e-007	0.00	7.57887500631242e-007	0.00	Single Surf Scat	11				
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17	Slit Grid Source	0.6	8	7.30425540752795e-007	0.00	7.30425540752795e-007	0.00	Single Surf Scat	7				
18	Slit Grid Source	0.6	19	6.60232345427624e-007	0.00	6.60232345427624e-007	0.00	Single Surf Scat	9				
19	Slit Grid Source	0.6	106	5.75610515892231e-007	0.00	5.75610515892231e-007	0.00	Single Surf Scat	11				
20	Slit Grid Source	0.8	93	5.52073729286869e-007	0.00	5.52073729286869e-007	0.00	Single Surf Scat	9				
21	Slit Grid Source	0.4	1	4.56699408674095e-007	0.00	4.56699408674095e-007	0.00	Single Surf Scat	6				
22	Slit Grid Source	0.8	40	3.14059945287995e-007	0.00	3.14059945287995e-007	0.00	Multiple Surf Scat	9				
23	Slit Grid Source	0.6	3	2.7358280821207e-007	0.00	2.7358280821207e-007	0.00	Single Surf Scat	7				
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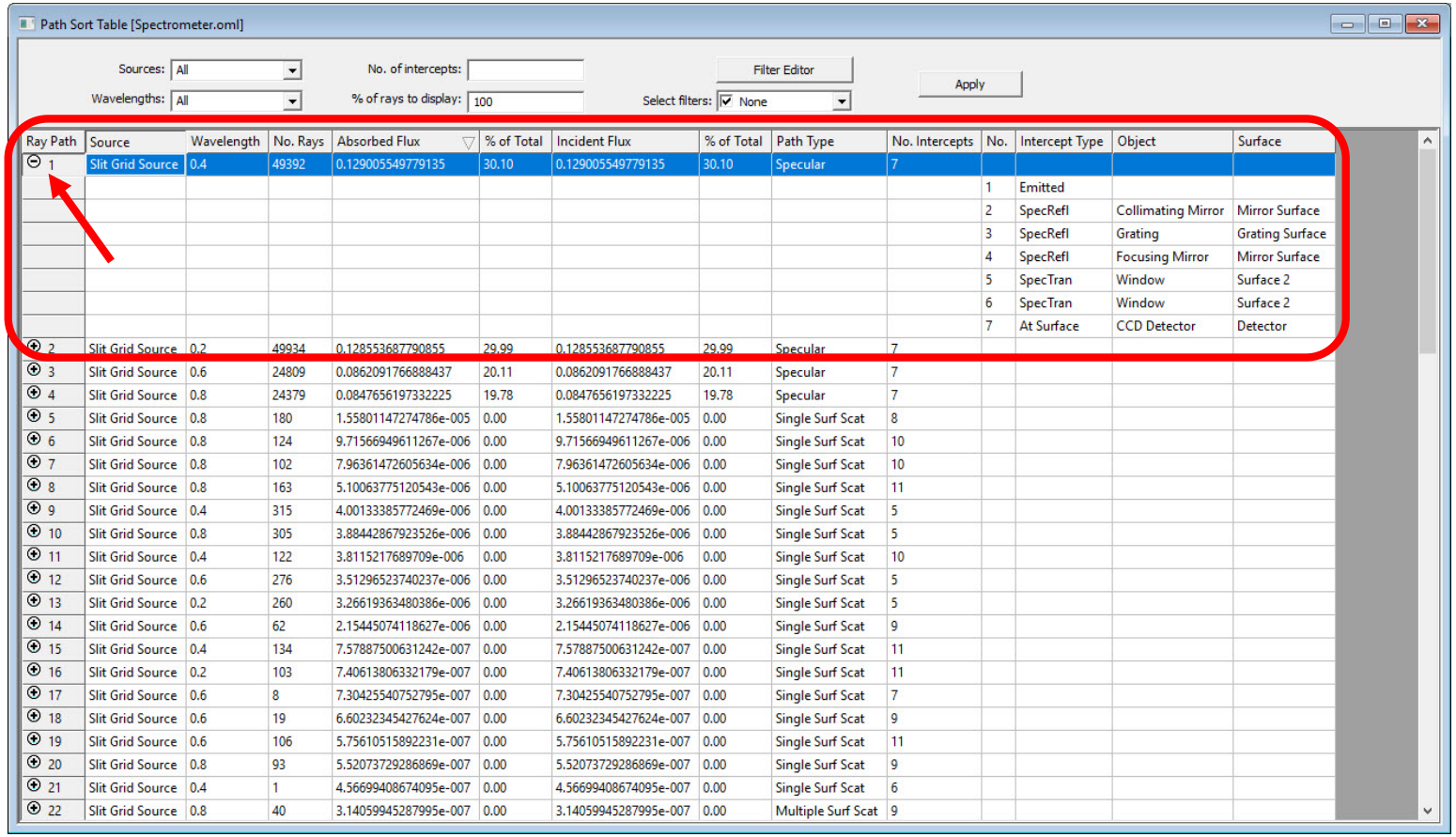
29	Slit Grid Source	0.6	20	1.2073626454074e-007	0.00	1.2073626454074e-007	0.00	Single Surf Scat	9				

Path Sort Table

Path Sort Table – Expand the path by double clicking on the “+” next to the path number to show the surface interactions for that path



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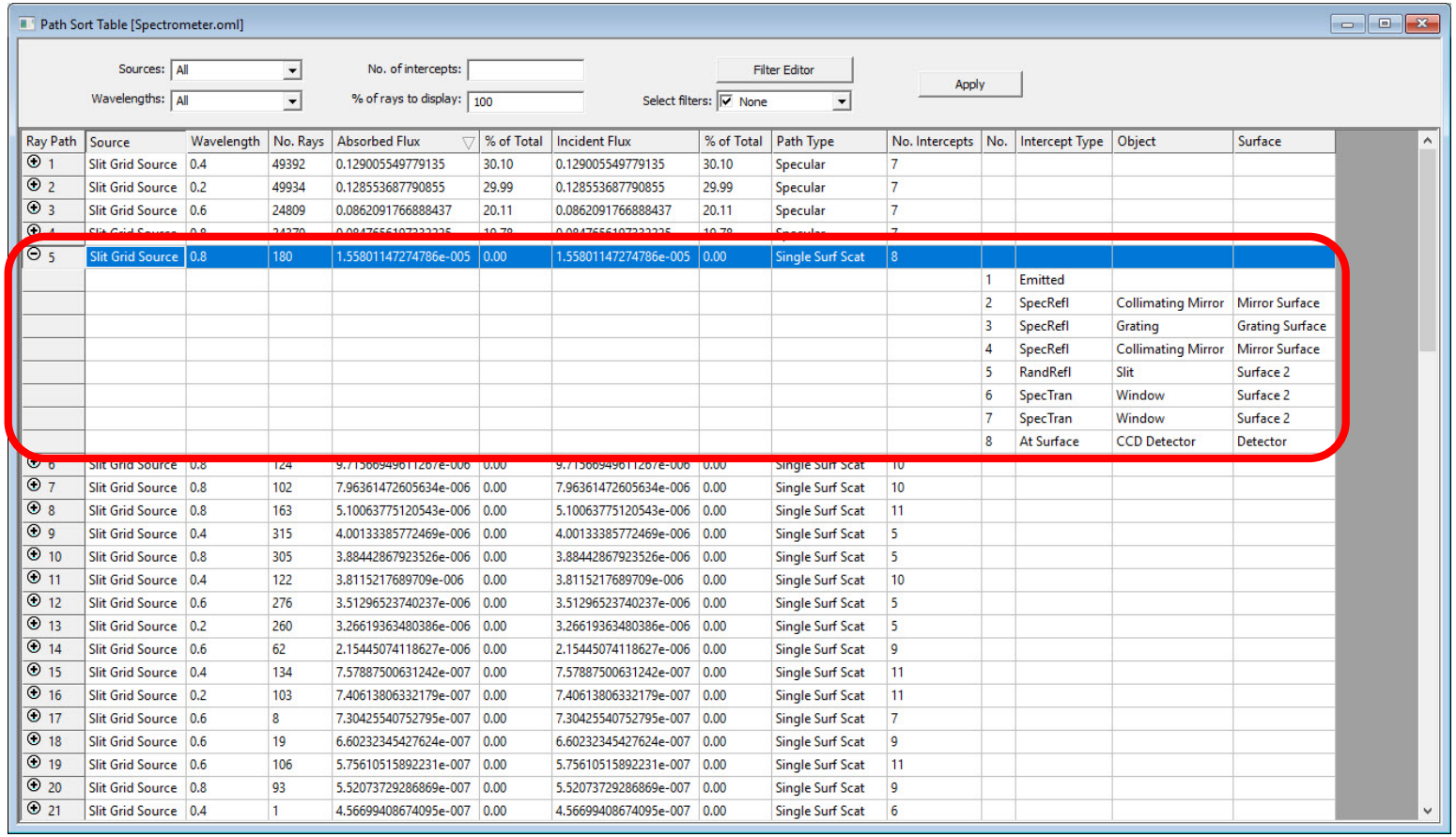
1	Slit Grid Source	0.4	49392	0.129005549779135	30.10	0.129005549779135	30.10	Specular	7				
										1	Emitted		
										2	SpecRefl	Collimating Mirror	Mirror Surface
										3	SpecRefl	Grating	Grating Surface
										4	SpecRefl	Focusing Mirror	Mirror Surface
										5	SpecTran	Window	Surface 2
										6	SpecTran	Window	Surface 2
										7	At Surface	CCD Detector	Detector
2	Slit Grid Source	0.2	49934	0.128553687790855	29.99	0.128553687790855	29.99	Specular	7				
3	Slit Grid Source	0.6	24809	0.0862091766888437	20.11	0.0862091766888437	20.11	Specular	7				
4	Slit Grid Source	0.8	24379	0.0847656197332225	19.78	0.0847656197332225	19.78	Specular	7				
5	Slit Grid Source	0.8	180	1.55801147274786e-005	0.00	1.55801147274786e-005	0.00	Single Surf Scat	8				
6	Slit Grid Source	0.8	124	9.71566949611267e-006	0.00	9.71566949611267e-006	0.00	Single Surf Scat	10				
7	Slit Grid Source	0.8	102	7.96361472605634e-006	0.00	7.96361472605634e-006	0.00	Single Surf Scat	10				
8	Slit Grid Source	0.8	163	5.10063775120543e-006	0.00	5.10063775120543e-006	0.00	Single Surf Scat	11				
9	Slit Grid Source	0.4	315	4.00133385772469e-006	0.00	4.00133385772469e-006	0.00	Single Surf Scat	5				
10	Slit Grid Source	0.8	305	3.88442867923526e-006	0.00	3.88442867923526e-006	0.00	Single Surf Scat	5				
11	Slit Grid Source	0.4	122	3.8115217689709e-006	0.00	3.8115217689709e-006	0.00	Single Surf Scat	10				
12	Slit Grid Source	0.6	276	3.51296523740237e-006	0.00	3.51296523740237e-006	0.00	Single Surf Scat	5				
13	Slit Grid Source	0.2	260	3.26619363480386e-006	0.00	3.26619363480386e-006	0.00	Single Surf Scat	5				
14	Slit Grid Source	0.6	62	2.15445074118627e-006	0.00	2.15445074118627e-006	0.00	Single Surf Scat	9				
15	Slit Grid Source	0.4	134	7.57887500631242e-007	0.00	7.57887500631242e-007	0.00	Single Surf Scat	11				
16	Slit Grid Source	0.2	103	7.40613806332179e-007	0.00	7.40613806332179e-007	0.00	Single Surf Scat	11				
17	Slit Grid Source	0.6	8	7.30425540752795e-007	0.00	7.30425540752795e-007	0.00	Single Surf Scat	7				
18	Slit Grid Source	0.6	19	6.60232345427624e-007	0.00	6.60232345427624e-007	0.00	Single Surf Scat	9				
19	Slit Grid Source	0.6	106	5.75610515892231e-007	0.00	5.75610515892231e-007	0.00	Single Surf Scat	11				
20	Slit Grid Source	0.8	93	5.52073729286869e-007	0.00	5.52073729286869e-007	0.00	Single Surf Scat	9				
21	Slit Grid Source	0.4	1	4.56699408674095e-007	0.00	4.56699408674095e-007	0.00	Single Surf Scat	6				
22	Slit Grid Source	0.8	40	3.14059945287995e-007	0.00	3.14059945287995e-007	0.00	Multiple Surf Scat	9				

Path Sort Table

Path Sort Table – Expand the path by clicking on the “+” next to the path number to show the surface interactions for that path

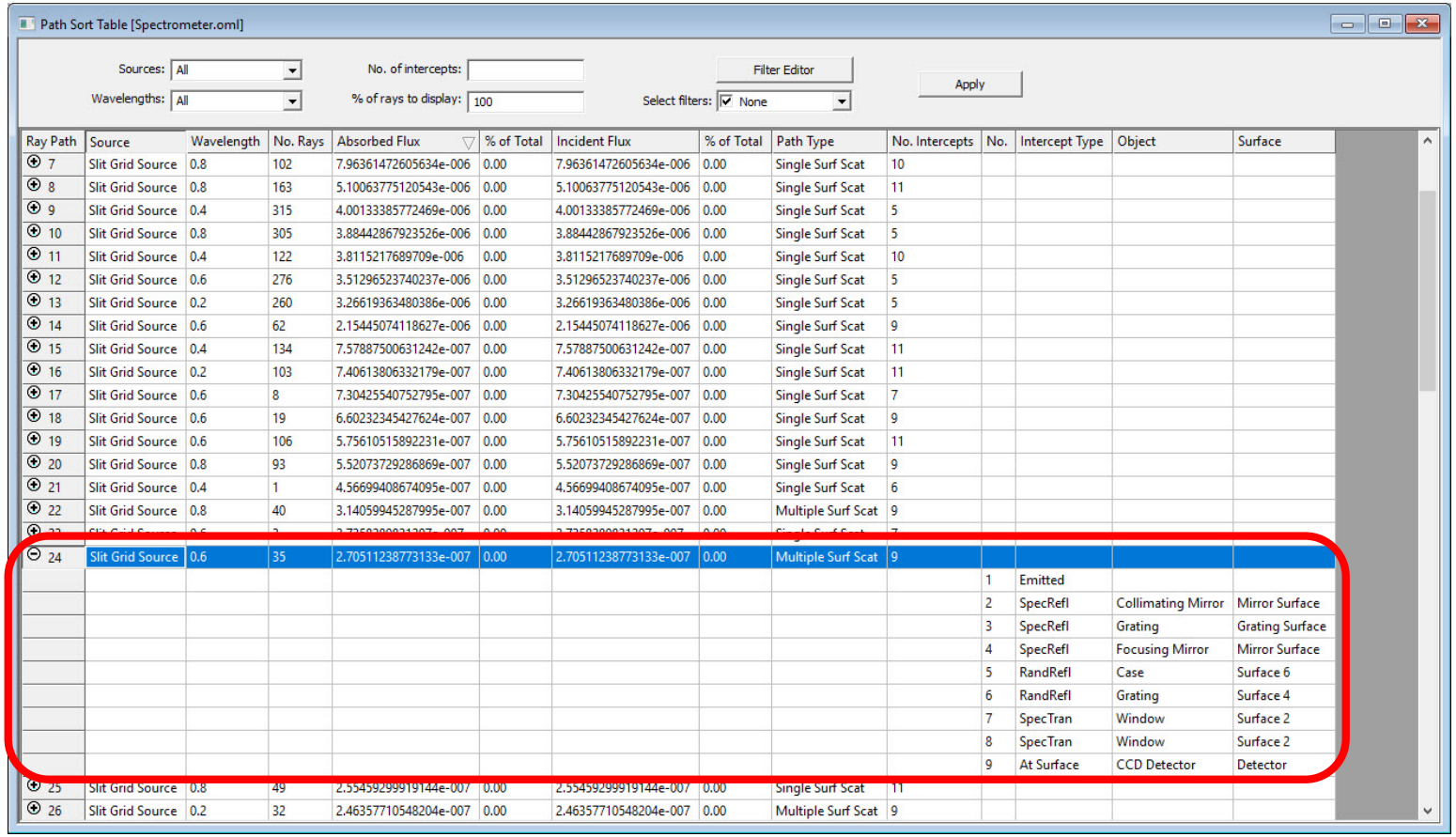


Ray Path	Source	Wavelength	No. Rays	Absorbed Flux	% of Total	Incident Flux	% of Total	Path Type	No. Intercepts	No.	Intercept Type	Object	Surface
1	Slit Grid Source	0.4	49392	0.129005549779135	30.10	0.129005549779135	30.10	Specular	7				
2	Slit Grid Source	0.2	49934	0.128553687790855	29.99	0.128553687790855	29.99	Specular	7				
3	Slit Grid Source	0.6	24809	0.0862091766888437	20.11	0.0862091766888437	20.11	Specular	7				
5	Slit Grid Source	0.8	180	1.55801147274786e-005	0.00	1.55801147274786e-005	0.00	Single Surf Scat	8				
										1	Emitted		
										2	SpecRefl	Collimating Mirror	Mirror Surface
										3	SpecRefl	Grating	Grating Surface
										4	SpecRefl	Collimating Mirror	Mirror Surface
										5	RandRefl	Slit	Surface 2
										6	SpecTran	Window	Surface 2
										7	SpecTran	Window	Surface 2
										8	At Surface	CCD Detector	Detector
7	Slit Grid Source	0.8	102	7.96361472605634e-006	0.00	7.96361472605634e-006	0.00	Single Surf Scat	10				
8	Slit Grid Source	0.8	163	5.10063775120543e-006	0.00	5.10063775120543e-006	0.00	Single Surf Scat	11				
9	Slit Grid Source	0.4	315	4.00133385772469e-006	0.00	4.00133385772469e-006	0.00	Single Surf Scat	5				
10	Slit Grid Source	0.8	305	3.88442867923526e-006	0.00	3.88442867923526e-006	0.00	Single Surf Scat	5				
11	Slit Grid Source	0.4	122	3.8115217689709e-006	0.00	3.8115217689709e-006	0.00	Single Surf Scat	10				
12	Slit Grid Source	0.6	276	3.51296523740237e-006	0.00	3.51296523740237e-006	0.00	Single Surf Scat	5				
13	Slit Grid Source	0.2	260	3.26619363480386e-006	0.00	3.26619363480386e-006	0.00	Single Surf Scat	5				
14	Slit Grid Source	0.6	62	2.15445074118627e-006	0.00	2.15445074118627e-006	0.00	Single Surf Scat	9				
15	Slit Grid Source	0.4	134	7.57887500631242e-007	0.00	7.57887500631242e-007	0.00	Single Surf Scat	11				
16	Slit Grid Source	0.2	103	7.40613806332179e-007	0.00	7.40613806332179e-007	0.00	Single Surf Scat	11				
17	Slit Grid Source	0.6	8	7.30425540752795e-007	0.00	7.30425540752795e-007	0.00	Single Surf Scat	7				
18	Slit Grid Source	0.6	19	6.60232345427624e-007	0.00	6.60232345427624e-007	0.00	Single Surf Scat	9				
19	Slit Grid Source	0.6	106	5.75610515892231e-007	0.00	5.75610515892231e-007	0.00	Single Surf Scat	11				
20	Slit Grid Source	0.8	93	5.52073729286869e-007	0.00	5.52073729286869e-007	0.00	Single Surf Scat	9				
21	Slit Grid Source	0.4	1	4.56699408674095e-007	0.00	4.56699408674095e-007	0.00	Single Surf Scat	6				

TracePro

Path Sort Table

Path Sort Table – Expand the path by clicking on the “+” next to the path number to show the surface interactions for that path

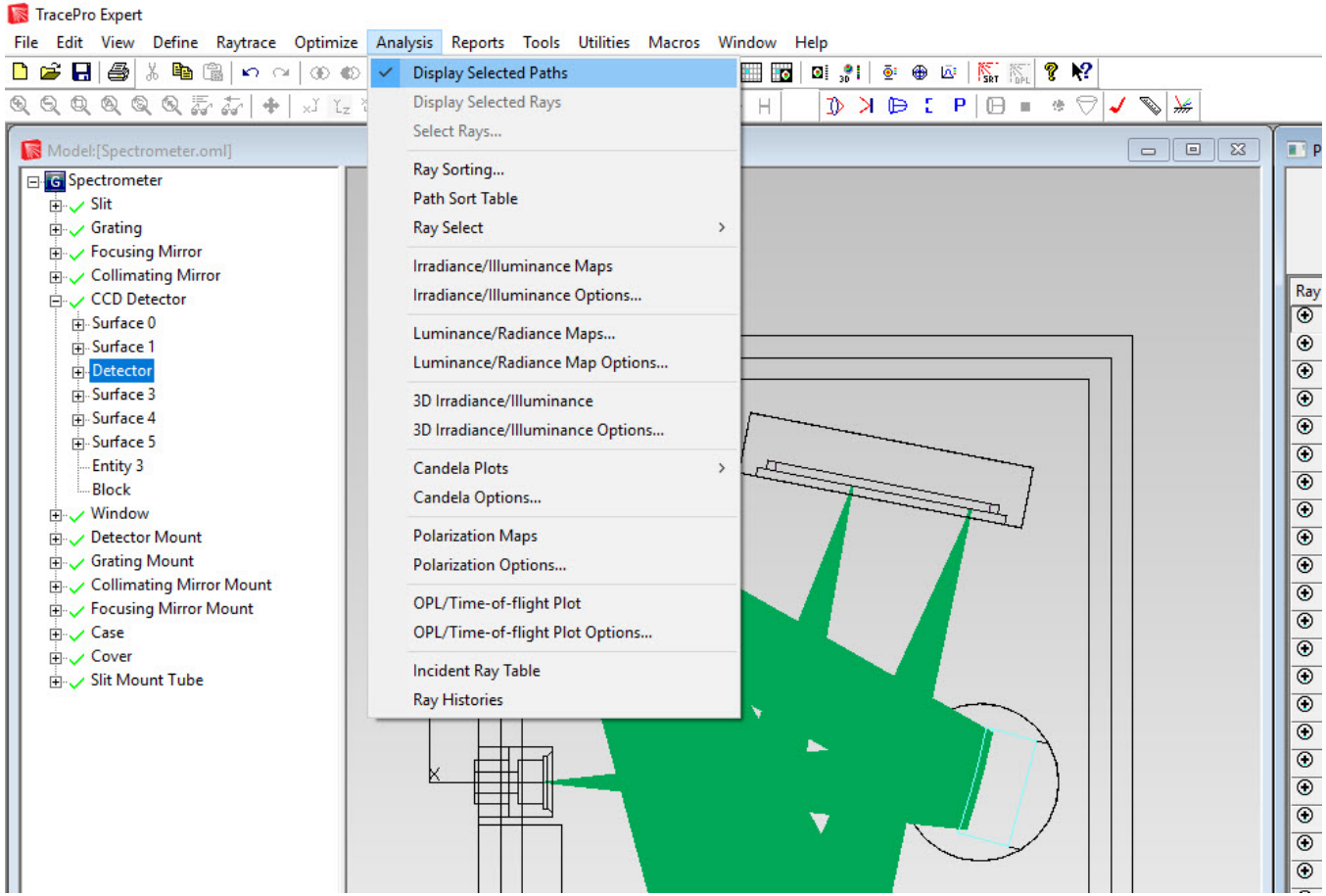


Ray Path	Source	Wavelength	No. Rays	Absorbed Flux	% of Total	Incident Flux	% of Total	Path Type	No. Intercepts	No.	Intercept Type	Object	Surface
7	Slit Grid Source	0.8	102	7.96361472605634e-006	0.00	7.96361472605634e-006	0.00	Single Surf Scat	10				
8	Slit Grid Source	0.8	163	5.10063775120543e-006	0.00	5.10063775120543e-006	0.00	Single Surf Scat	11				
9	Slit Grid Source	0.4	315	4.00133385772469e-006	0.00	4.00133385772469e-006	0.00	Single Surf Scat	5				
10	Slit Grid Source	0.8	305	3.88442867923526e-006	0.00	3.88442867923526e-006	0.00	Single Surf Scat	5				
11	Slit Grid Source	0.4	122	3.8115217689709e-006	0.00	3.8115217689709e-006	0.00	Single Surf Scat	10				
12	Slit Grid Source	0.6	276	3.51296523740237e-006	0.00	3.51296523740237e-006	0.00	Single Surf Scat	5				
13	Slit Grid Source	0.2	260	3.26619363480386e-006	0.00	3.26619363480386e-006	0.00	Single Surf Scat	5				
14	Slit Grid Source	0.6	62	2.15445074118627e-006	0.00	2.15445074118627e-006	0.00	Single Surf Scat	9				
15	Slit Grid Source	0.4	134	7.57887500631242e-007	0.00	7.57887500631242e-007	0.00	Single Surf Scat	11				
16	Slit Grid Source	0.2	103	7.40613806332179e-007	0.00	7.40613806332179e-007	0.00	Single Surf Scat	11				
17	Slit Grid Source	0.6	8	7.30425540752795e-007	0.00	7.30425540752795e-007	0.00	Single Surf Scat	7				
18	Slit Grid Source	0.6	19	6.60232345427624e-007	0.00	6.60232345427624e-007	0.00	Single Surf Scat	9				
19	Slit Grid Source	0.6	106	5.75610515892231e-007	0.00	5.75610515892231e-007	0.00	Single Surf Scat	11				
20	Slit Grid Source	0.8	93	5.52073729286869e-007	0.00	5.52073729286869e-007	0.00	Single Surf Scat	9				
21	Slit Grid Source	0.4	1	4.56699408674095e-007	0.00	4.56699408674095e-007	0.00	Single Surf Scat	6				
22	Slit Grid Source	0.8	40	3.14059945287995e-007	0.00	3.14059945287995e-007	0.00	Multiple Surf Scat	9				
24	Slit Grid Source	0.6	35	2.70511238773133e-007	0.00	2.70511238773133e-007	0.00	Multiple Surf Scat	9				
										1	Emitted		
										2	SpecRefl	Collimating Mirror	Mirror Surface
										3	SpecRefl	Grating	Grating Surface
										4	SpecRefl	Focusing Mirror	Mirror Surface
										5	RandRefl	Case	Surface 6
										6	RandRefl	Grating	Surface 4
										7	SpecTran	Window	Surface 2
										8	SpecTran	Window	Surface 2
										9	At Surface	CCD Detector	Detector
25	Slit Grid Source	0.8	49	2.55459299919144e-007	0.00	2.55459299919144e-007	0.00	Single Surf Scat	11				
26	Slit Grid Source	0.2	32	2.46357710548204e-007	0.00	2.46357710548204e-007	0.00	Multiple Surf Scat	9				

TracePro

Path Sort Table

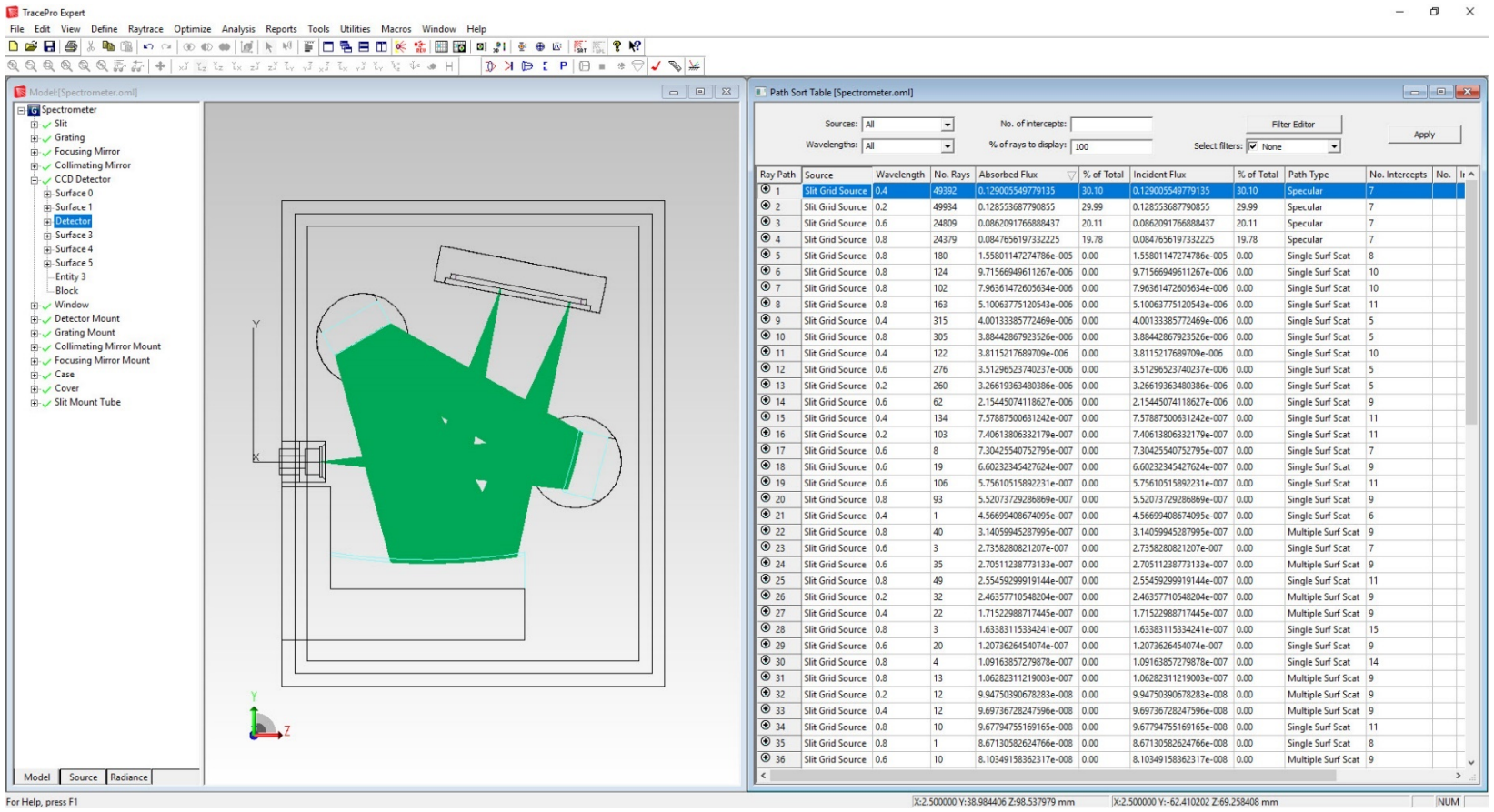
Analysis -> Display Selected Paths – Shows the selected path graphically



TracePro

Path Sort Table

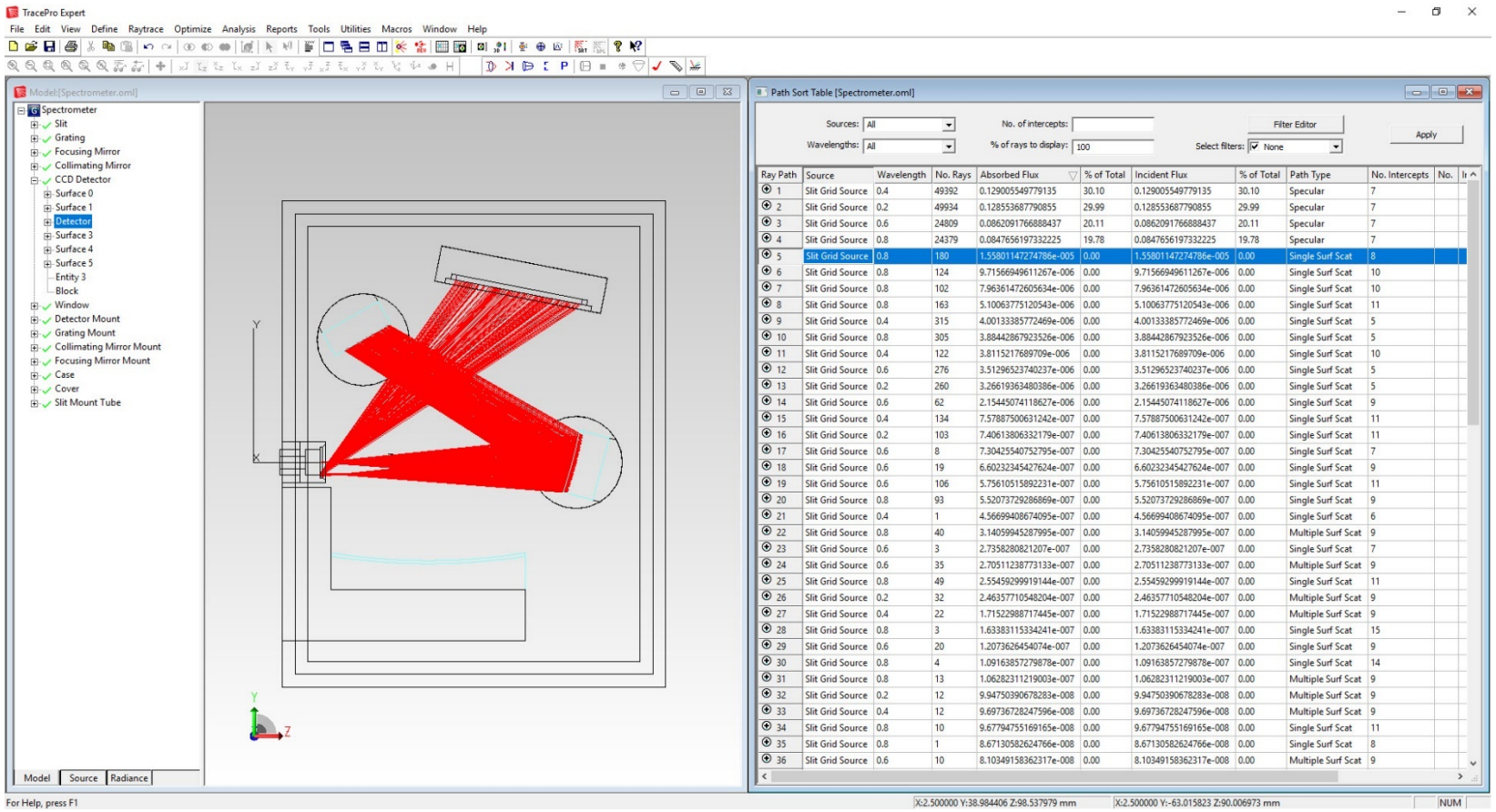
Analysis -> Display Selected Paths – Shows the selected path graphically



TracePro

Path Sort Table

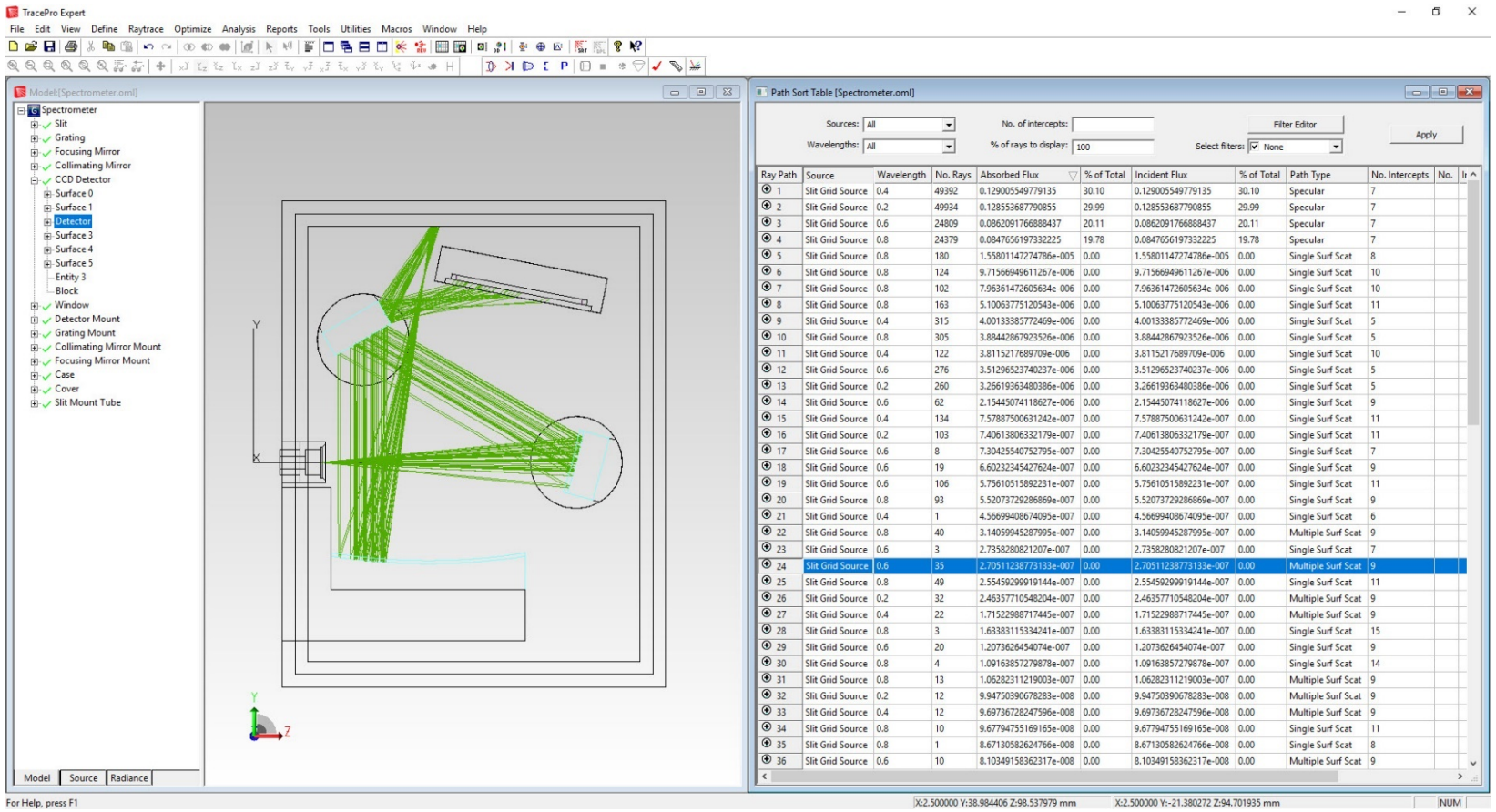
Analysis -> Display Selected Paths – Shows the selected path graphically



TracePro

Path Sort Table

Analysis -> Display Selected Paths – Shows the selected path graphically



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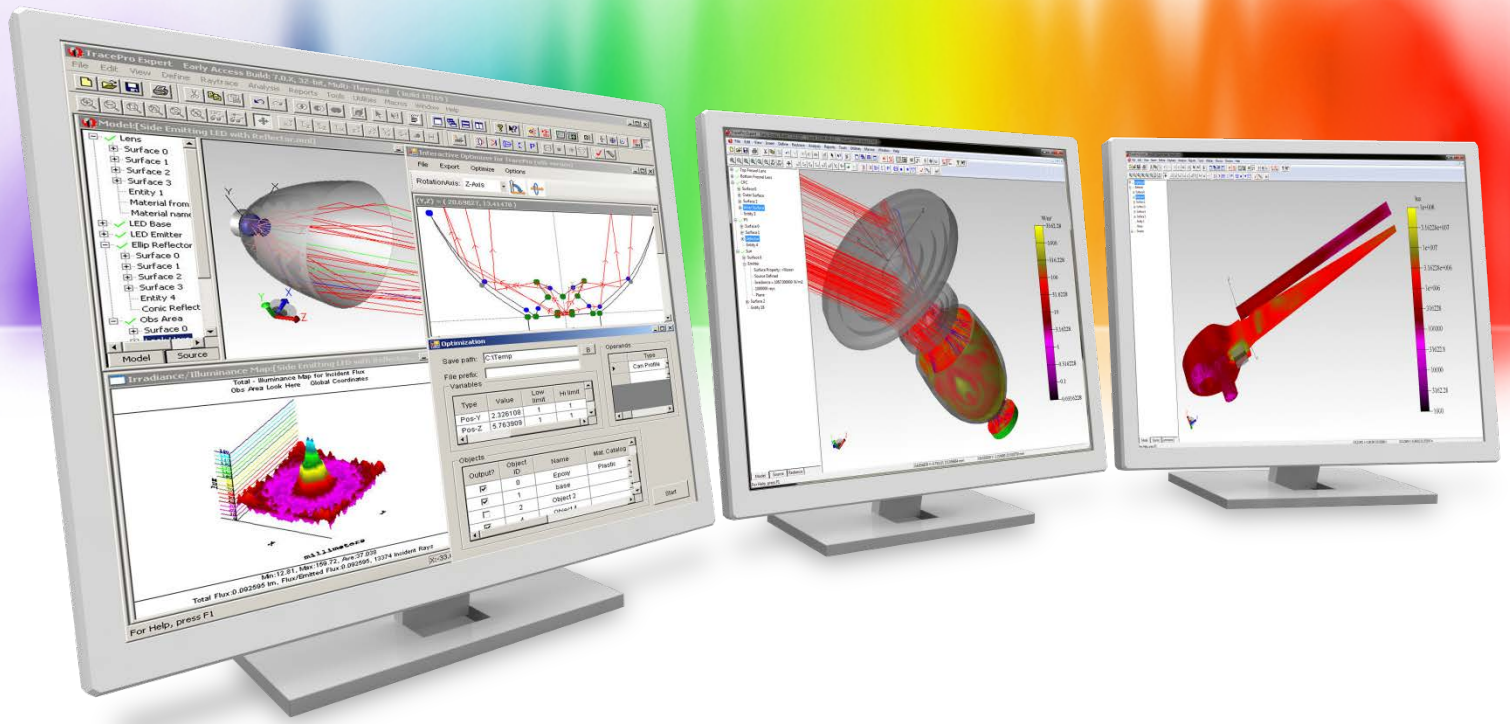

Path Sort Filters

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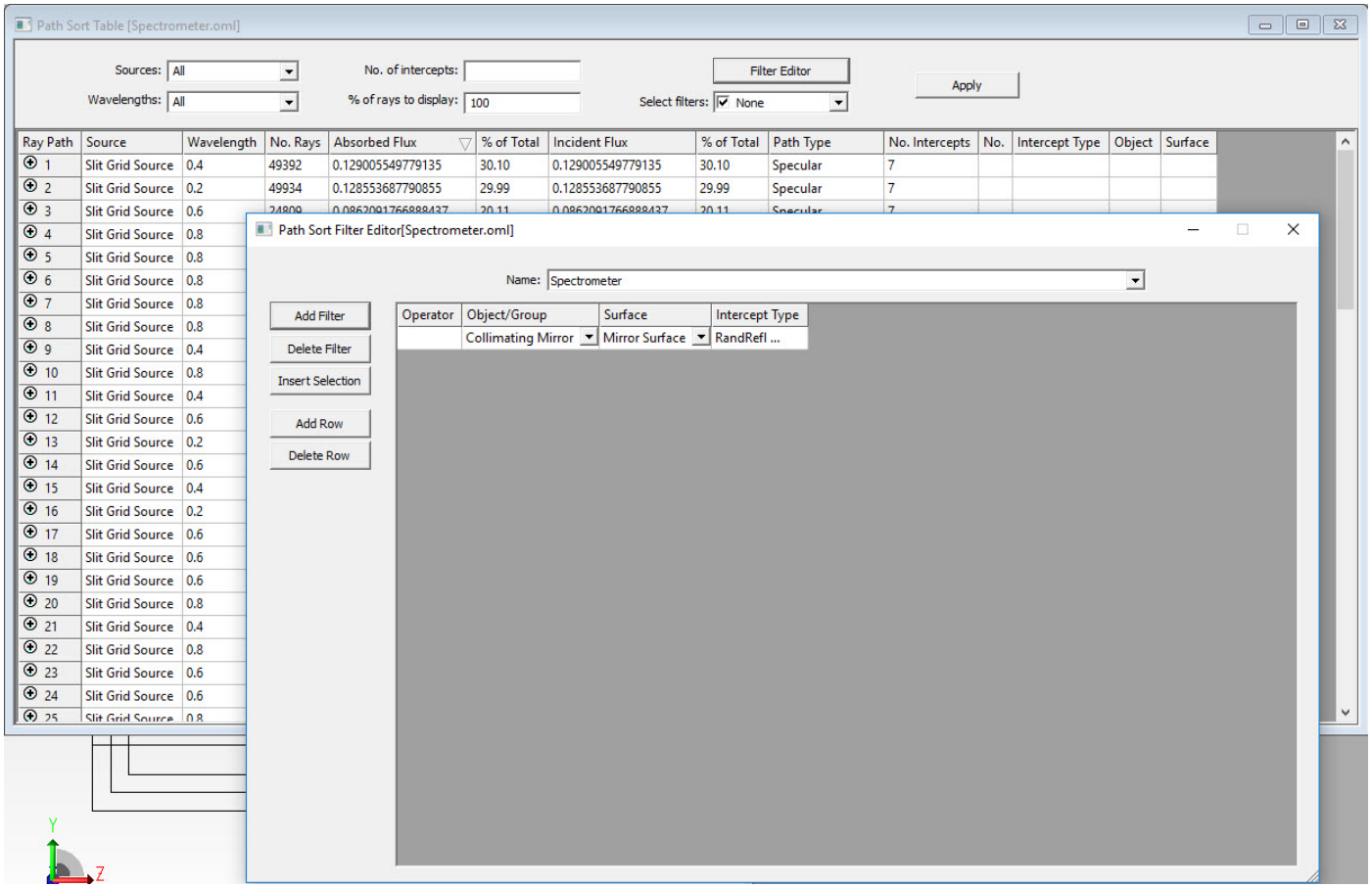
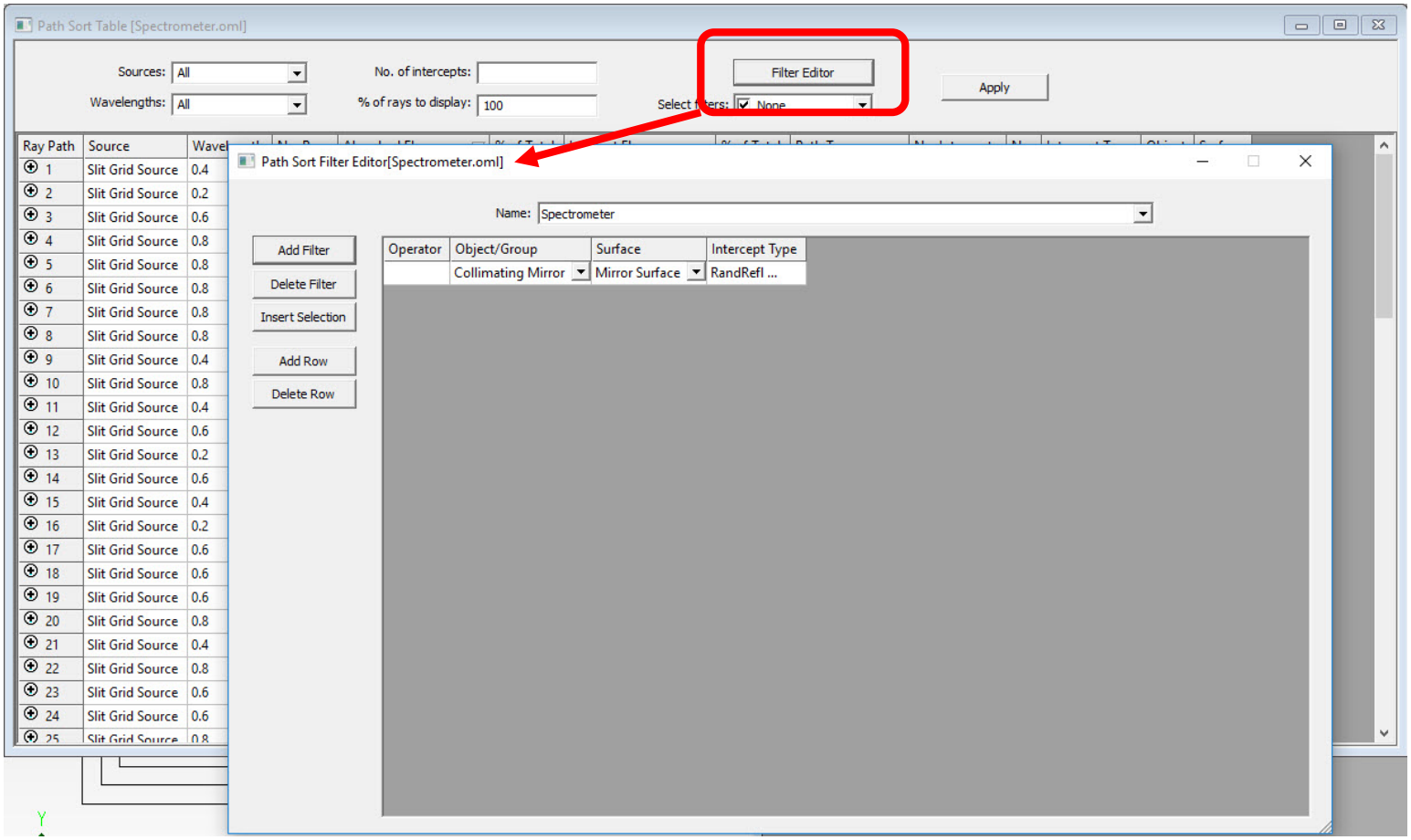
Path Sort Filters

TracePro 7.8 adds the ability to apply filters to the Path Sort table to look for specific path types



Path Sort Filters

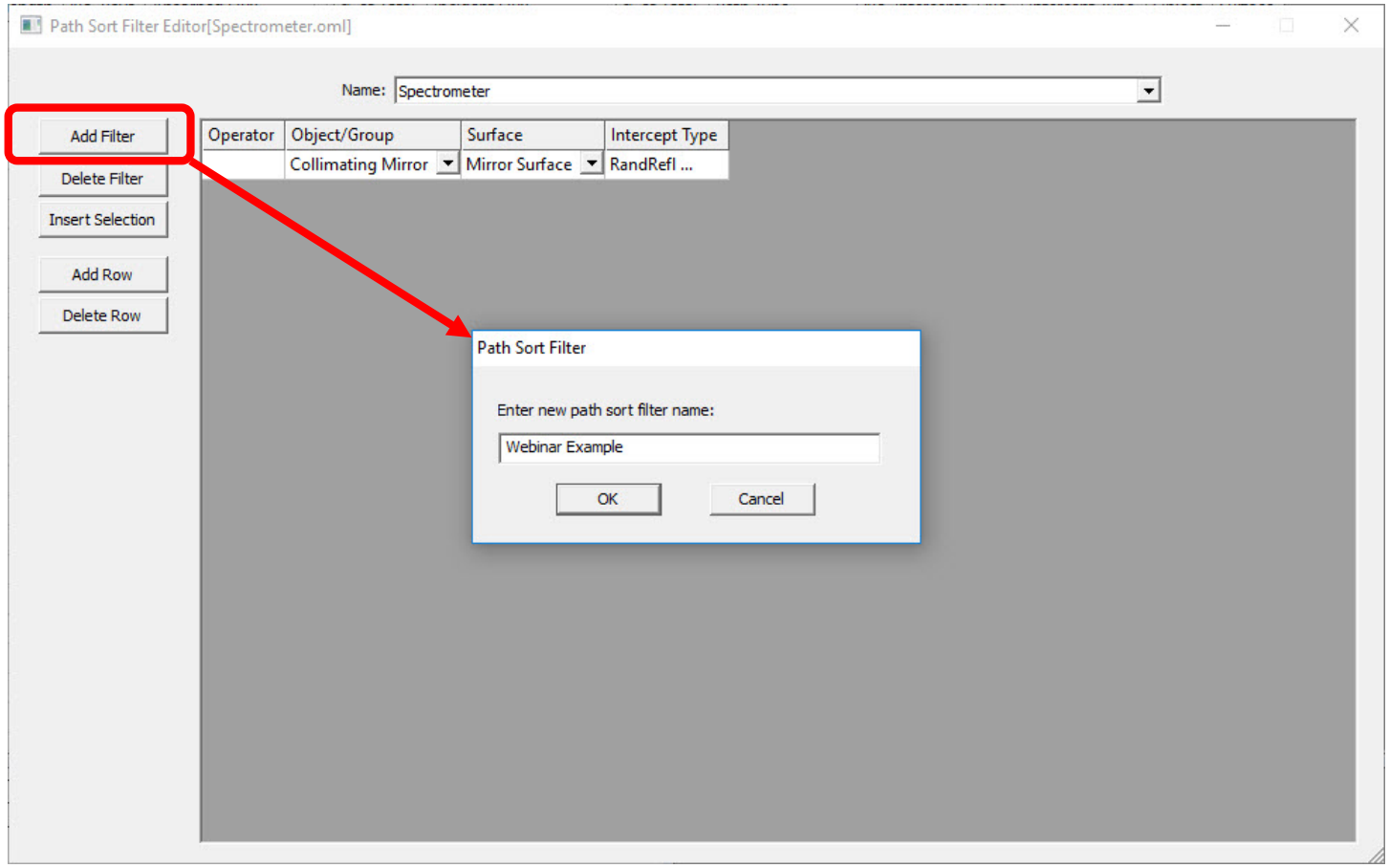
Click Filter Editor in the Path Sort Table to open the Path Sort Filter Editor



TracePro

Path Sort Filters

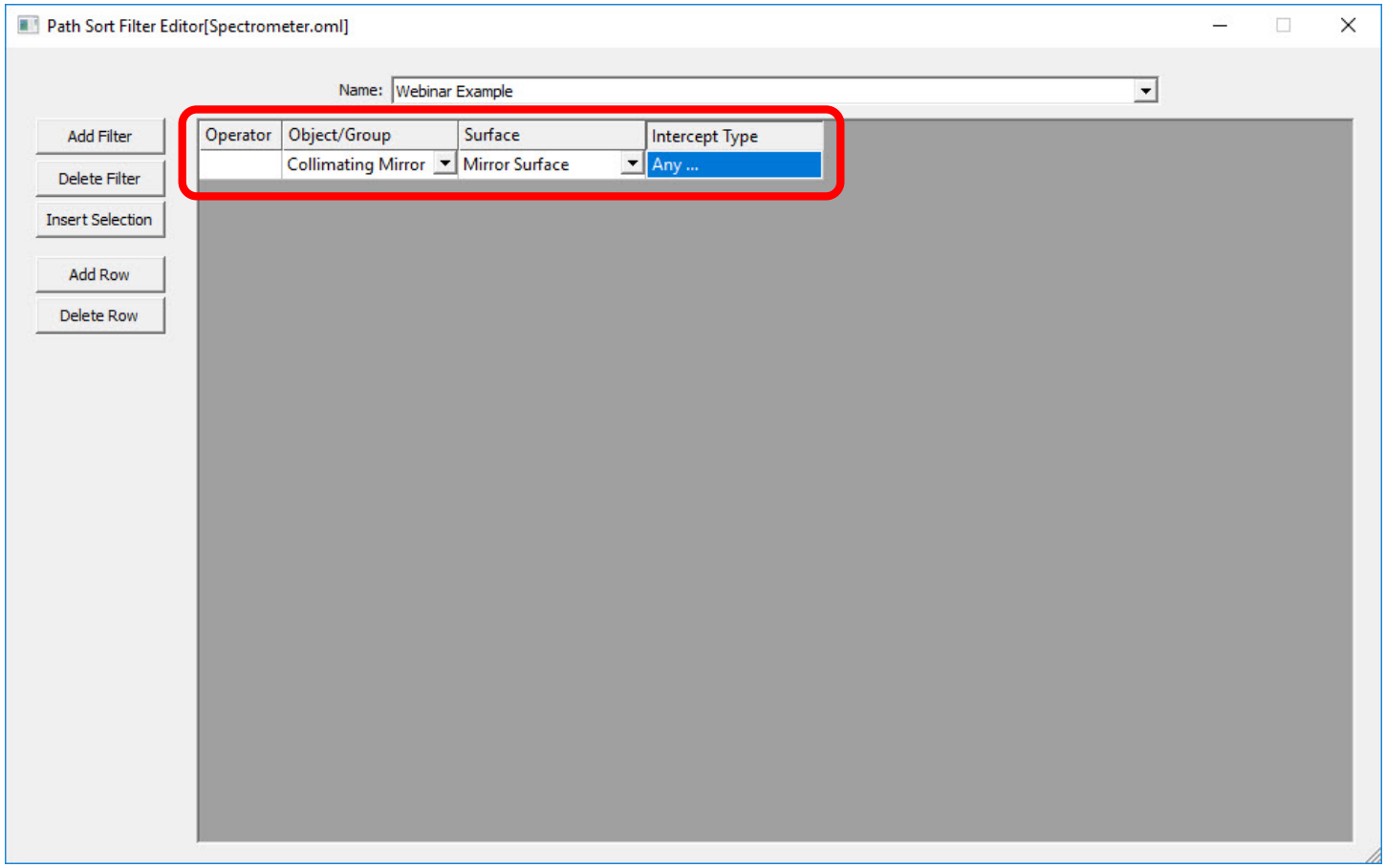
To define a new Path Sort Filter, click Add Filter, enter a name for the Filter, and then click OK.



TracePro

Path Sort Filters

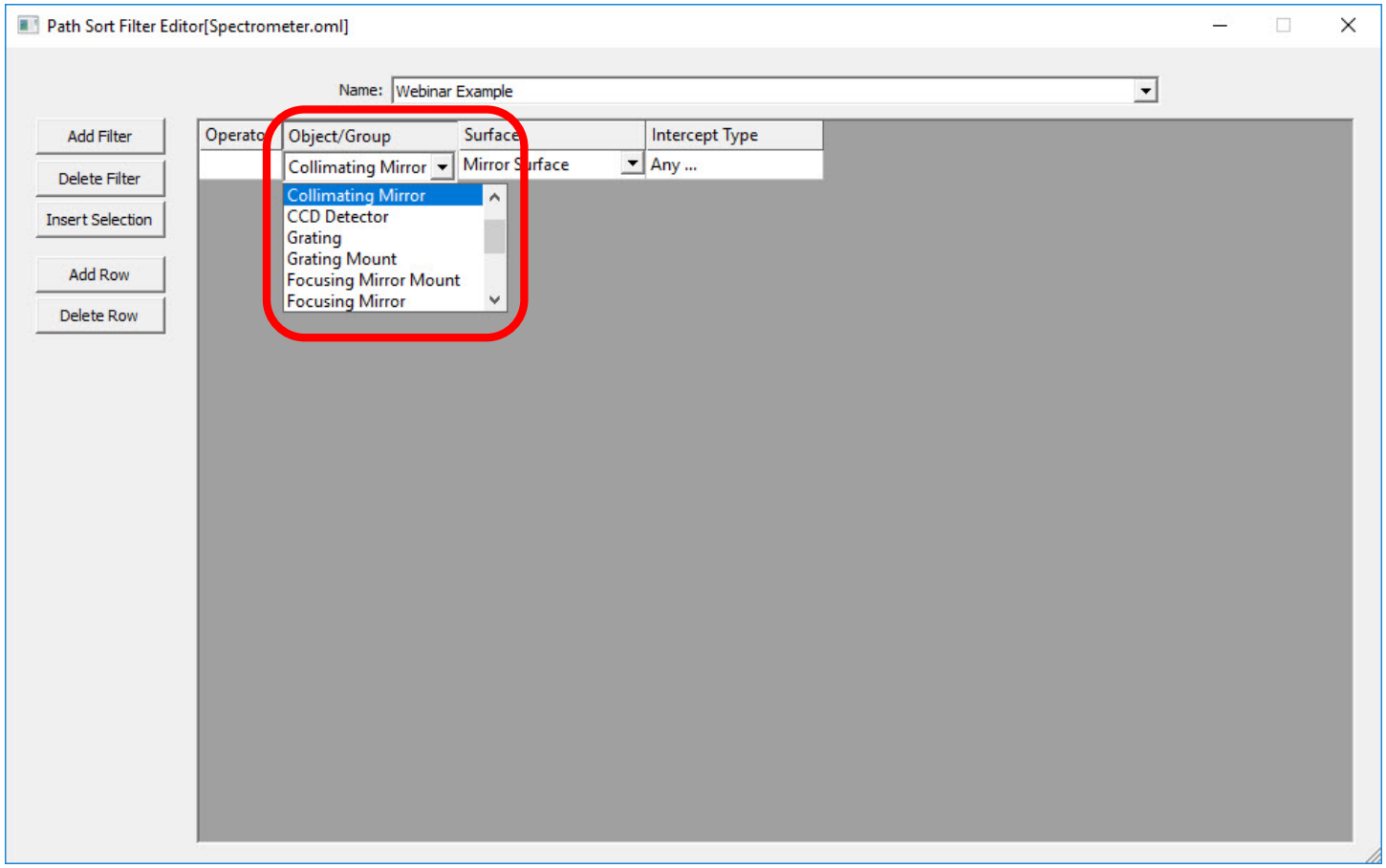
The Path Sort Filter Editor allows you to define the objects, surfaces, surface intercept types, and an operator for the filter



TracePro

Path Sort Filters

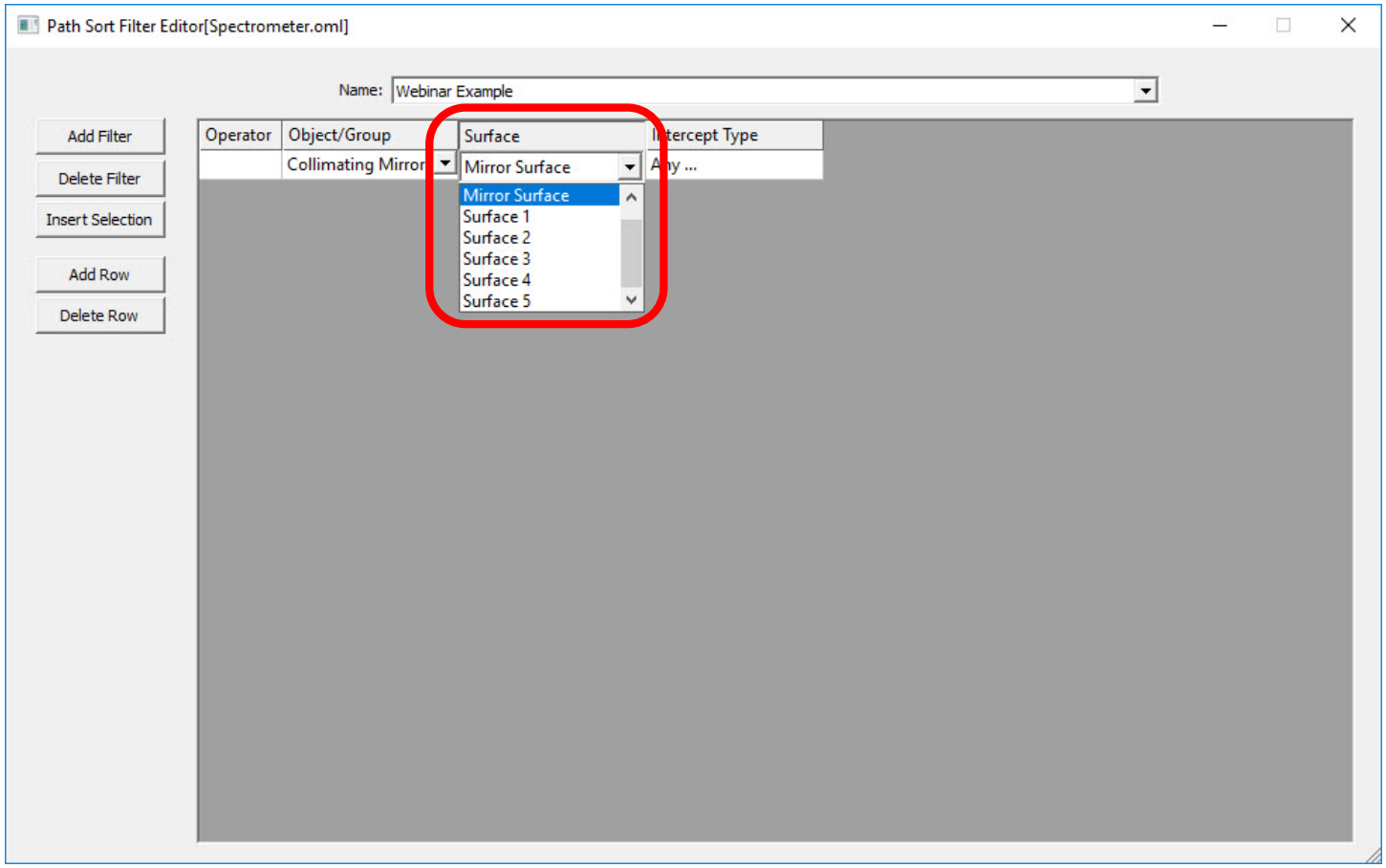
The Object/Group dropdown menu lists the objects and groups in the current TracePro model



TracePro

Path Sort Filters

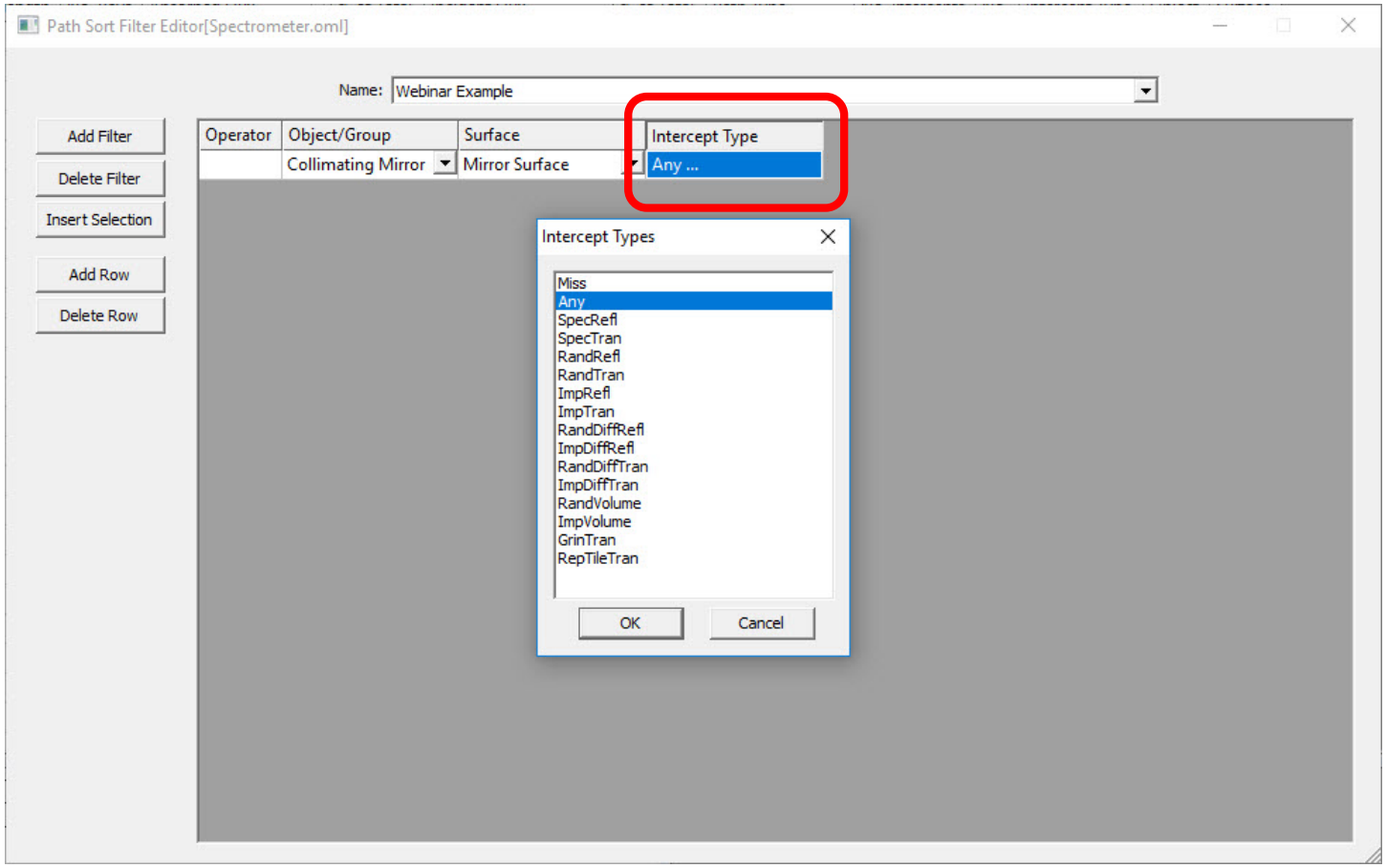
The Surface dropdown menu lists the surfaces for the selected Object/Group



TracePro

Path Sort Filters

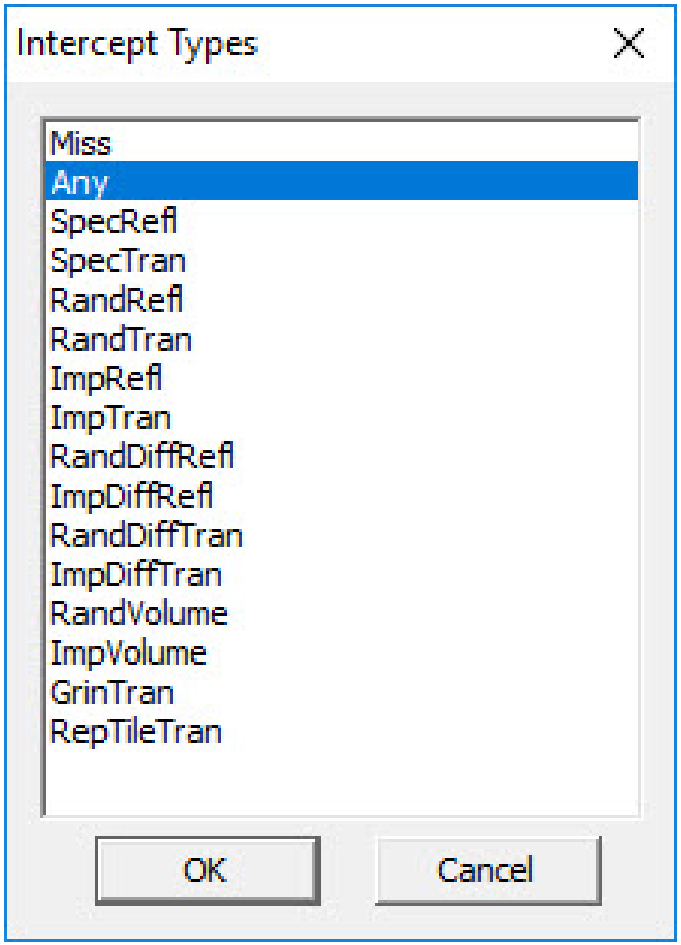
The Intercept dropdown menu lists the options for the surface intercept/interactions



TracePro

Path Sort Filters

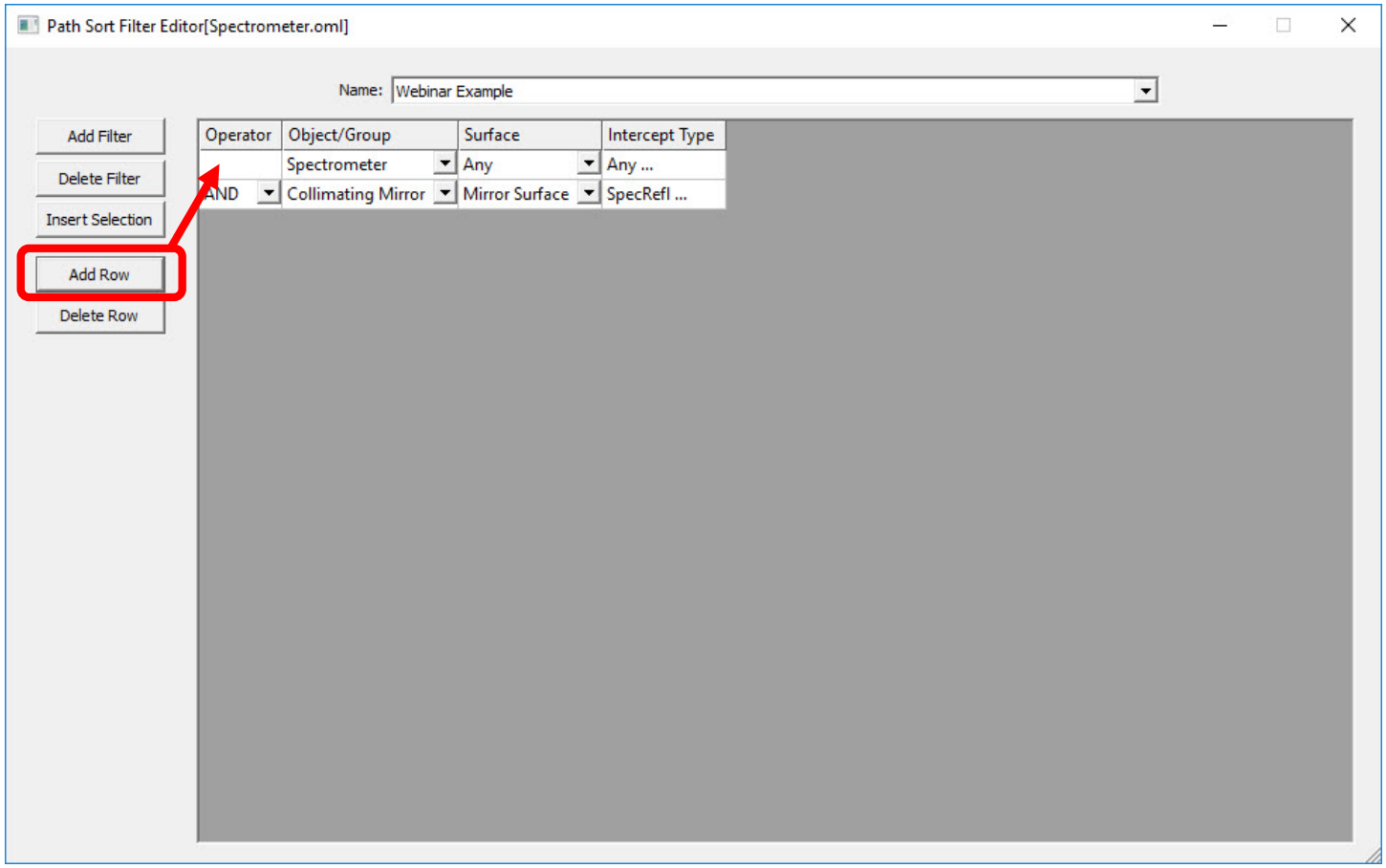
Available Intercept Types



TracePro

Path Sort Filters

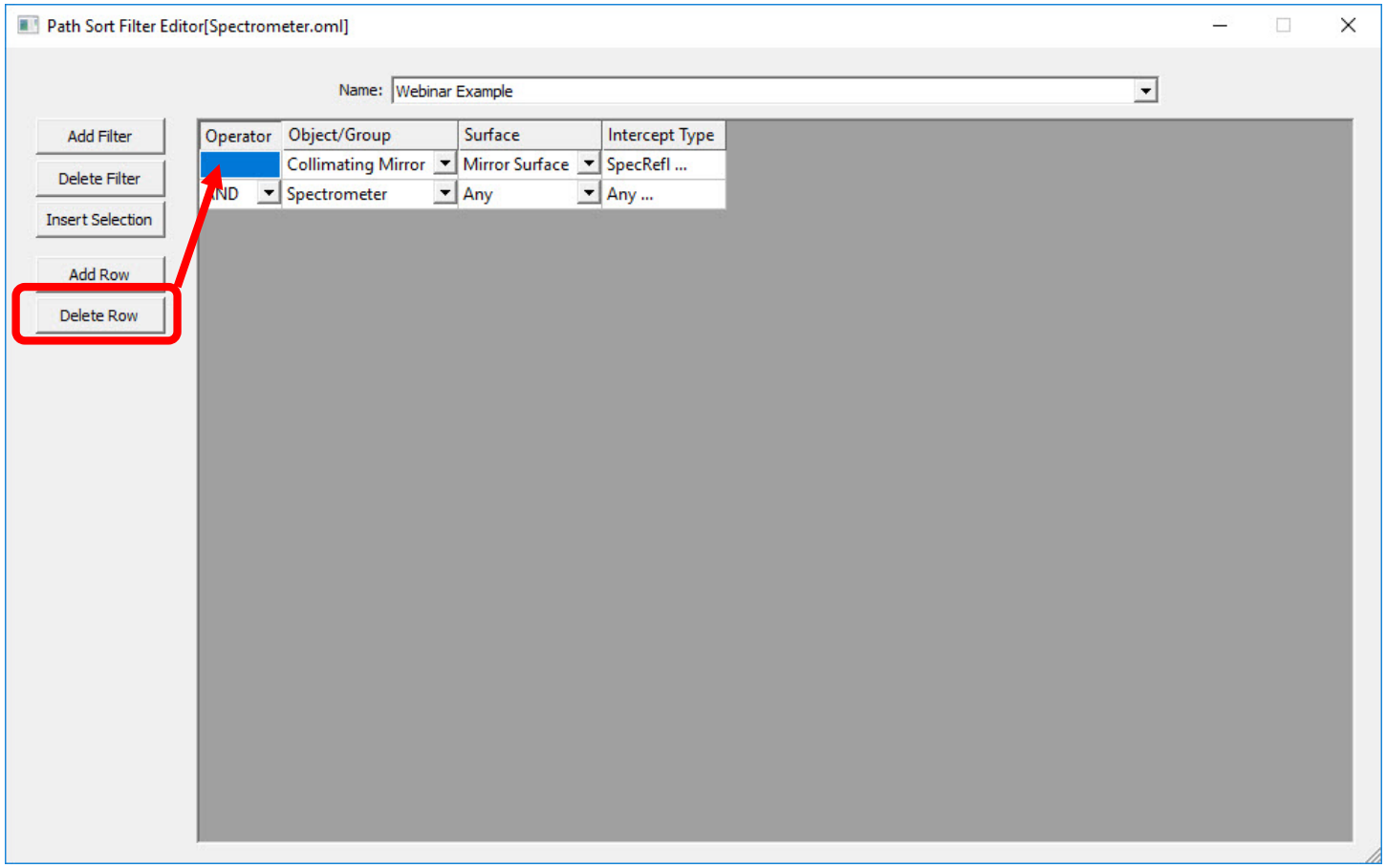
Click Add Row to add a new row to the Filter table



TracePro

Path Sort Filters

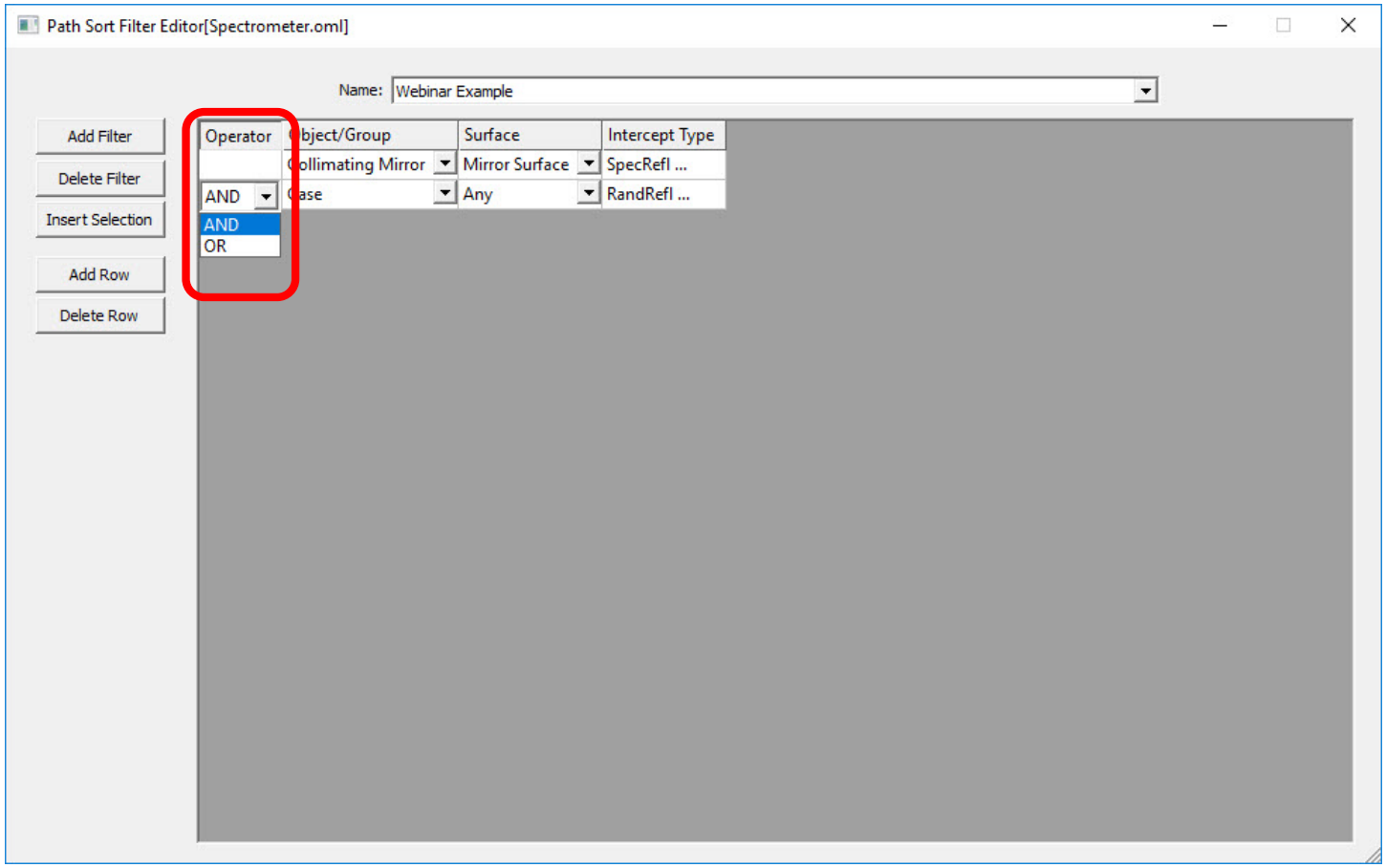
To delete a row, select the row and then click Delete Row



TracePro

Path Sort Filters

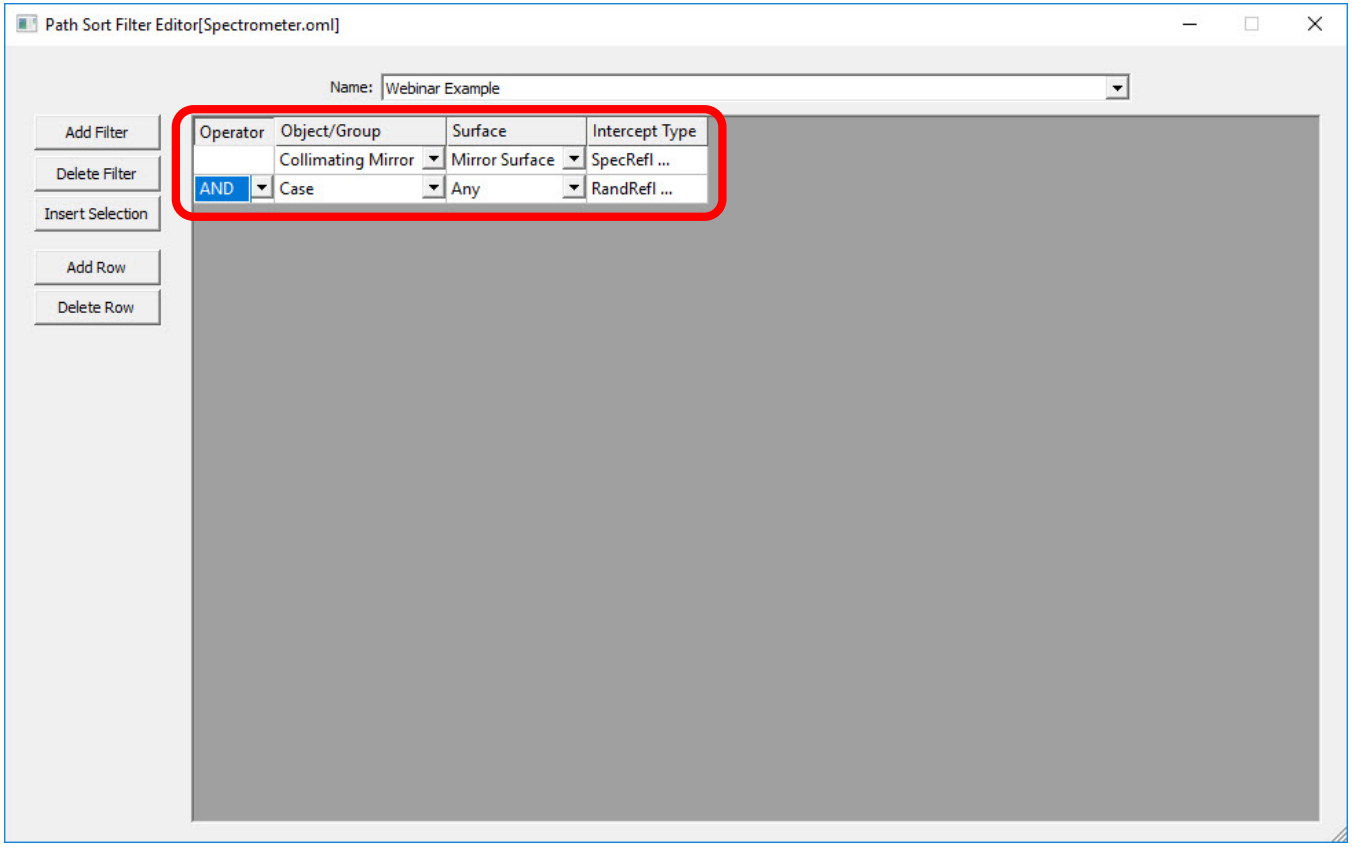
The available Operators are AND and OR



TracePro

Path Sort Filters

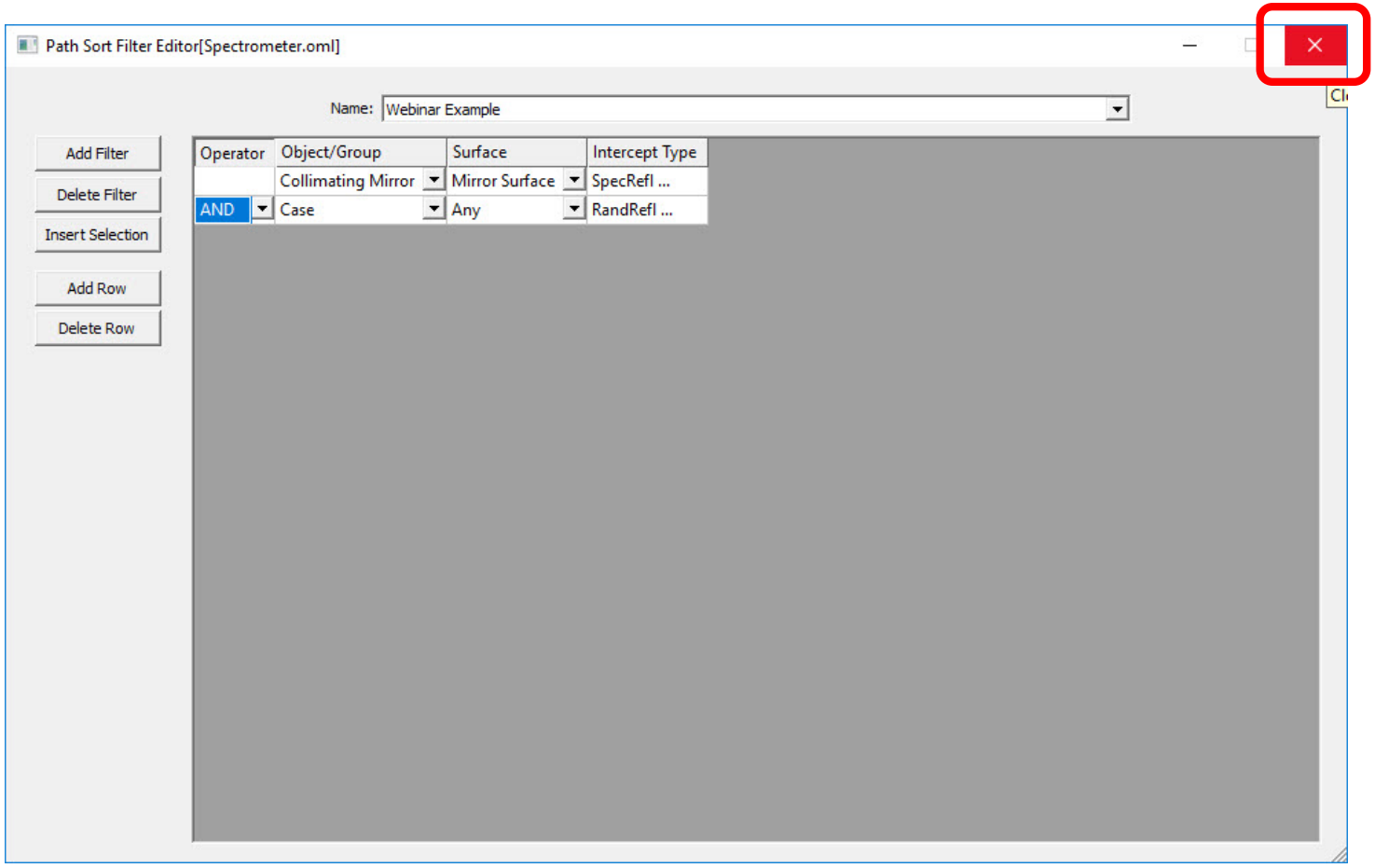
The following filter example will show the ray paths that have a Specular Reflection from the Mirror Surface of the Collimating Mirror and a Random Reflection from any surface of the Case



TracePro

Path Sort Filters

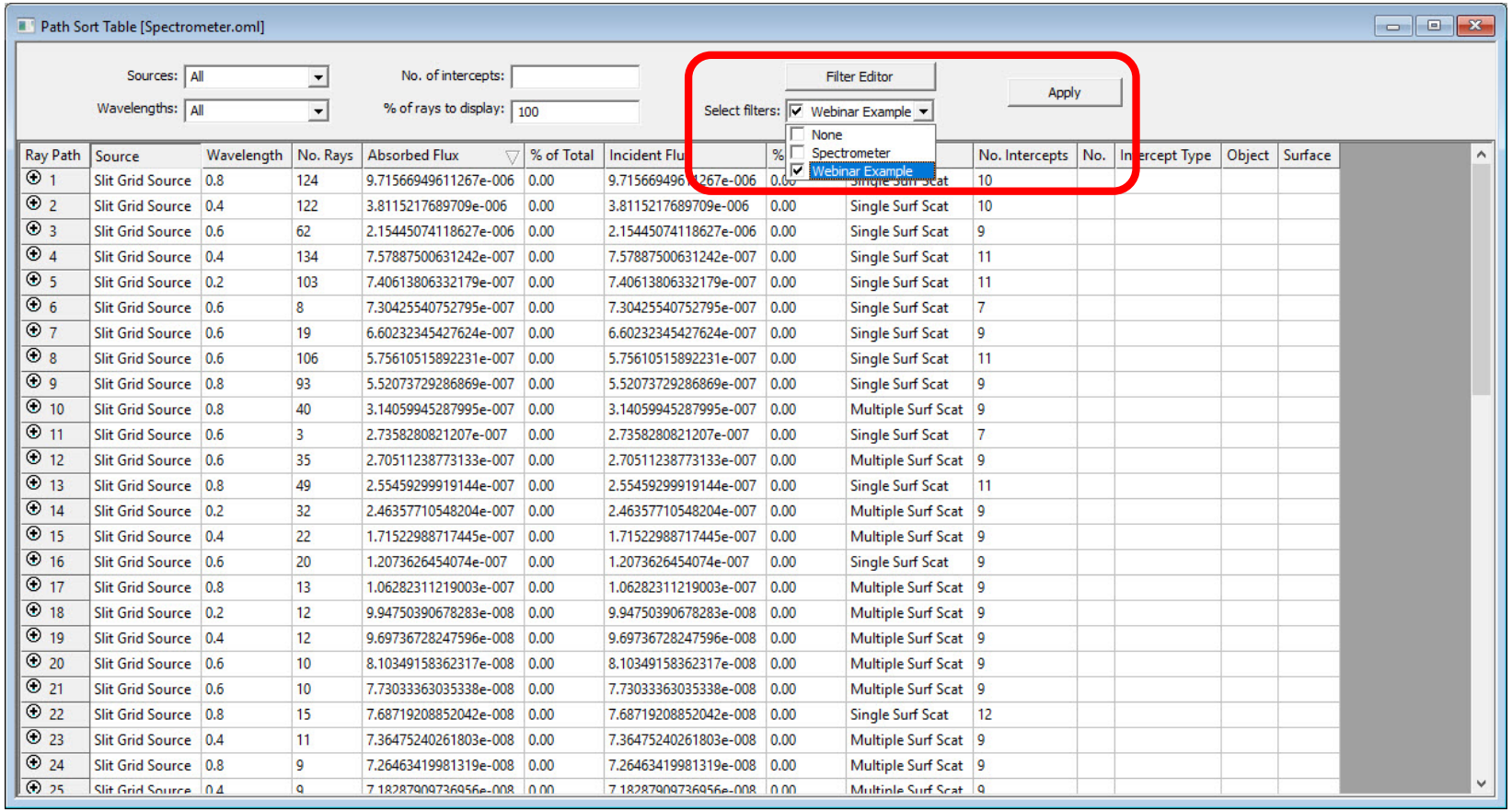
Click the X in the upper right corner to save the filter and close the Path Sort Filter Editor



TracePro

Path Sort Filters

Path Sort Filters are saved with the TracePro model



Ray Path	Source	Wavelength	No. Rays	Absorbed Flux	% of Total	Incident Flu	%		No. Intercepts	No.	Intercept Type	Object	Surface
1	Slit Grid Source	0.8	124	9.71566949611267e-006	0.00	9.715669496 1267e-006	0.00		10				
2	Slit Grid Source	0.4	122	3.8115217689709e-006	0.00	3.8115217689709e-006	0.00	Single Surf Scat	10				
3	Slit Grid Source	0.6	62	2.15445074118627e-006	0.00	2.15445074118627e-006	0.00	Single Surf Scat	9				
4	Slit Grid Source	0.4	134	7.57887500631242e-007	0.00	7.57887500631242e-007	0.00	Single Surf Scat	11				
5	Slit Grid Source	0.2	103	7.40613806332179e-007	0.00	7.40613806332179e-007	0.00	Single Surf Scat	11				
6	Slit Grid Source	0.6	8	7.30425540752795e-007	0.00	7.30425540752795e-007	0.00	Single Surf Scat	7				
7	Slit Grid Source	0.6	19	6.60232345427624e-007	0.00	6.60232345427624e-007	0.00	Single Surf Scat	9				
8	Slit Grid Source	0.6	106	5.75610515892231e-007	0.00	5.75610515892231e-007	0.00	Single Surf Scat	11				
9	Slit Grid Source	0.8	93	5.52073729286869e-007	0.00	5.52073729286869e-007	0.00	Single Surf Scat	9				
10	Slit Grid Source	0.8	40	3.14059945287995e-007	0.00	3.14059945287995e-007	0.00	Multiple Surf Scat	9				
11	Slit Grid Source	0.6	3	2.7358280821207e-007	0.00	2.7358280821207e-007	0.00	Single Surf Scat	7				
12	Slit Grid Source	0.6	35	2.70511238773133e-007	0.00	2.70511238773133e-007	0.00	Multiple Surf Scat	9				
13	Slit Grid Source	0.8	49	2.55459299919144e-007	0.00	2.55459299919144e-007	0.00	Single Surf Scat	11				
14	Slit Grid Source	0.2	32	2.46357710548204e-007	0.00	2.46357710548204e-007	0.00	Multiple Surf Scat	9				
15	Slit Grid Source	0.4	22	1.71522988717445e-007	0.00	1.71522988717445e-007	0.00	Multiple Surf Scat	9				
16	Slit Grid Source	0.6	20	1.2073626454074e-007	0.00	1.2073626454074e-007	0.00	Single Surf Scat	9				
17	Slit Grid Source	0.8	13	1.06282311219003e-007	0.00	1.06282311219003e-007	0.00	Multiple Surf Scat	9				
18	Slit Grid Source	0.2	12	9.94750390678283e-008	0.00	9.94750390678283e-008	0.00	Multiple Surf Scat	9				
19	Slit Grid Source	0.4	12	9.69736728247596e-008	0.00	9.69736728247596e-008	0.00	Multiple Surf Scat	9				
20	Slit Grid Source	0.6	10	8.10349158362317e-008	0.00	8.10349158362317e-008	0.00	Multiple Surf Scat	9				
21	Slit Grid Source	0.6	10	7.73033363035338e-008	0.00	7.73033363035338e-008	0.00	Multiple Surf Scat	9				
22	Slit Grid Source	0.8	15	7.68719208852042e-008	0.00	7.68719208852042e-008	0.00	Single Surf Scat	12				
23	Slit Grid Source	0.4	11	7.36475240261803e-008	0.00	7.36475240261803e-008	0.00	Multiple Surf Scat	9				
24	Slit Grid Source	0.8	9	7.26463419981319e-008	0.00	7.26463419981319e-008	0.00	Multiple Surf Scat	9				
25	Slit Grid Source	0.4	9	7.18287909736956e-008	0.00	7.18287909736956e-008	0.00	Multiple Surf Scat	9				

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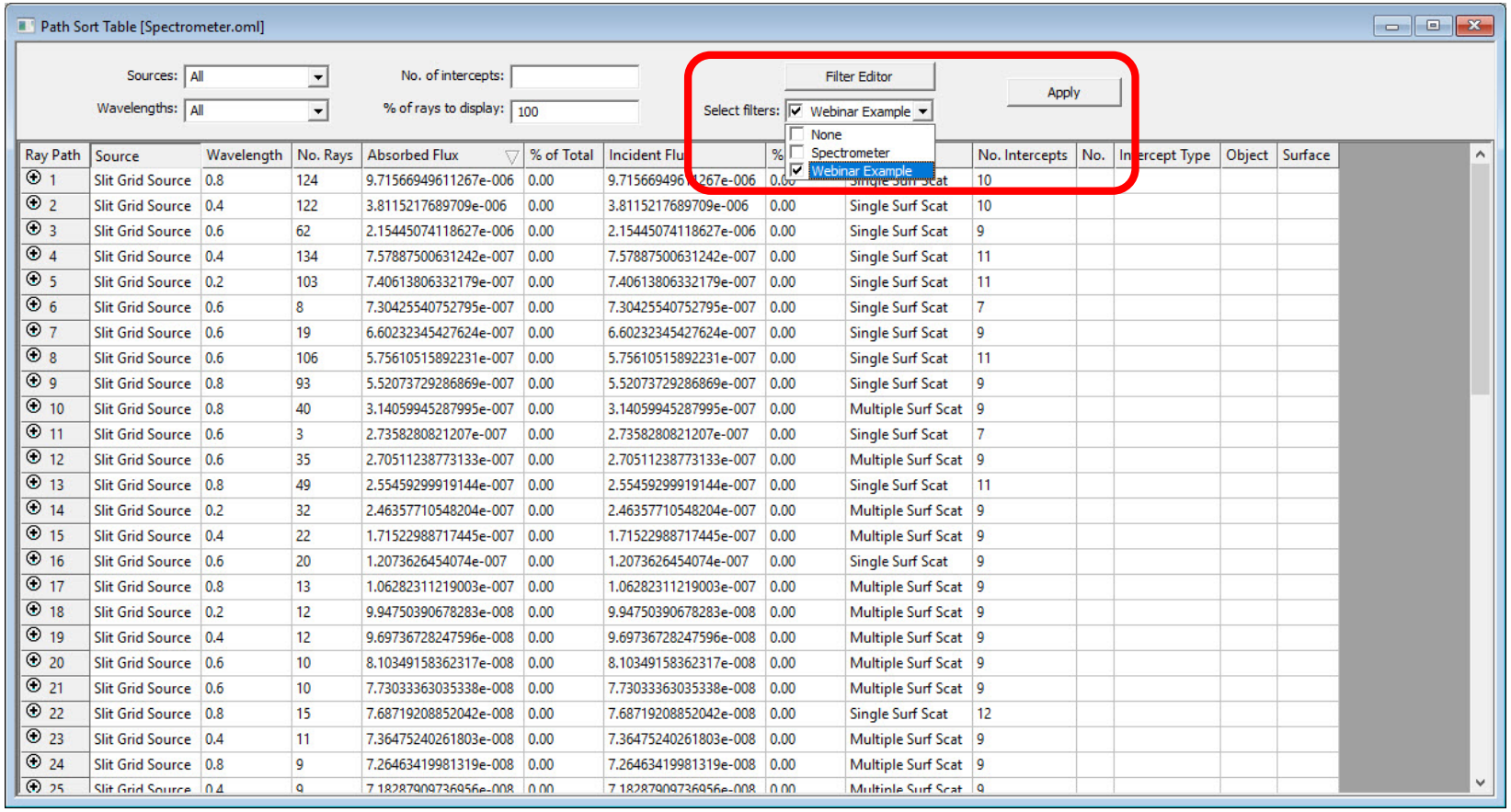
Path Sort Filters

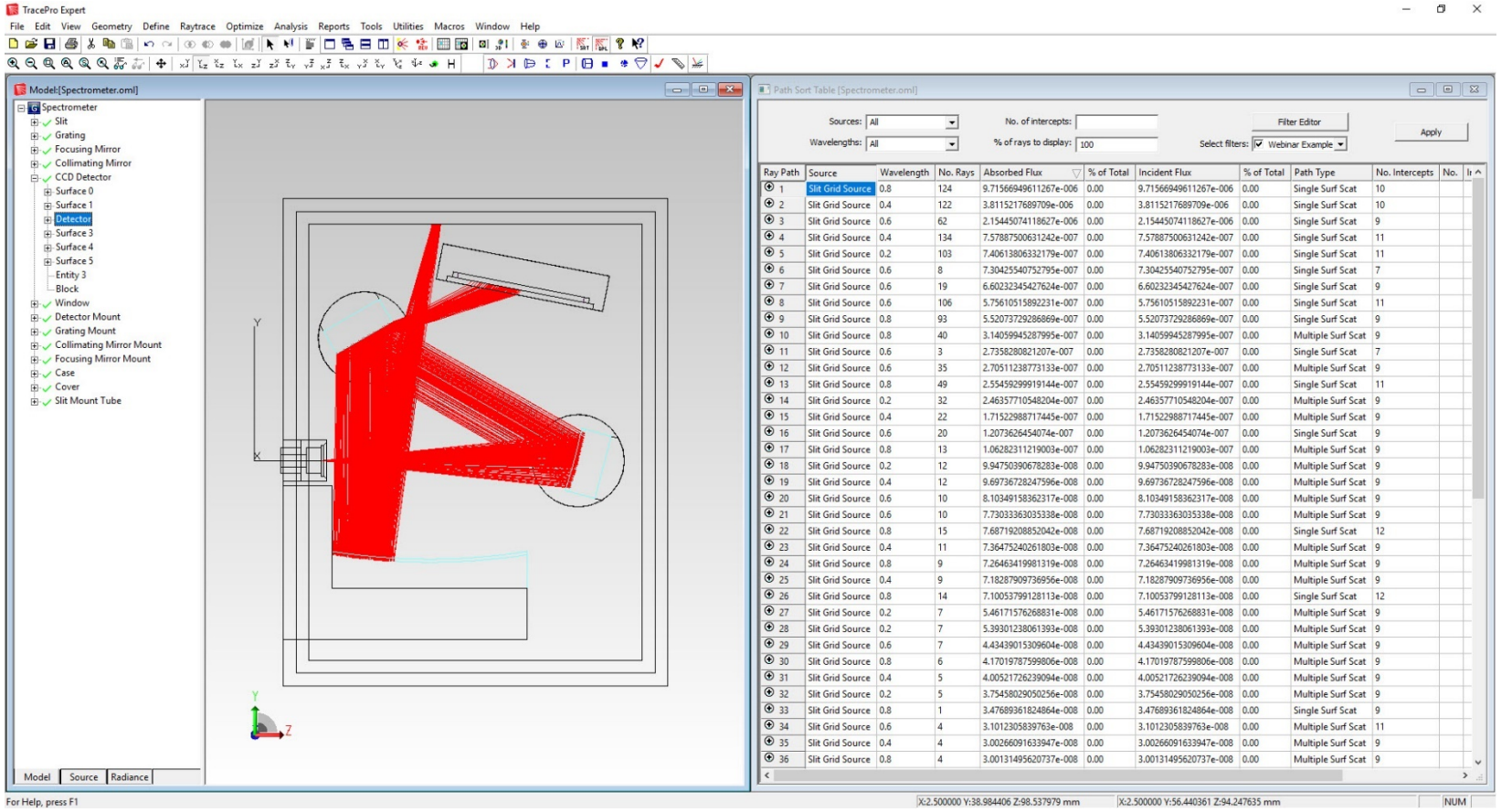
Select the new Filter in the Select Filters dropdown menu and then click Apply to apply the filter to the Path Sort Table



TracePro

Path Sort Filters

Example paths from the filtered Path Sort Table



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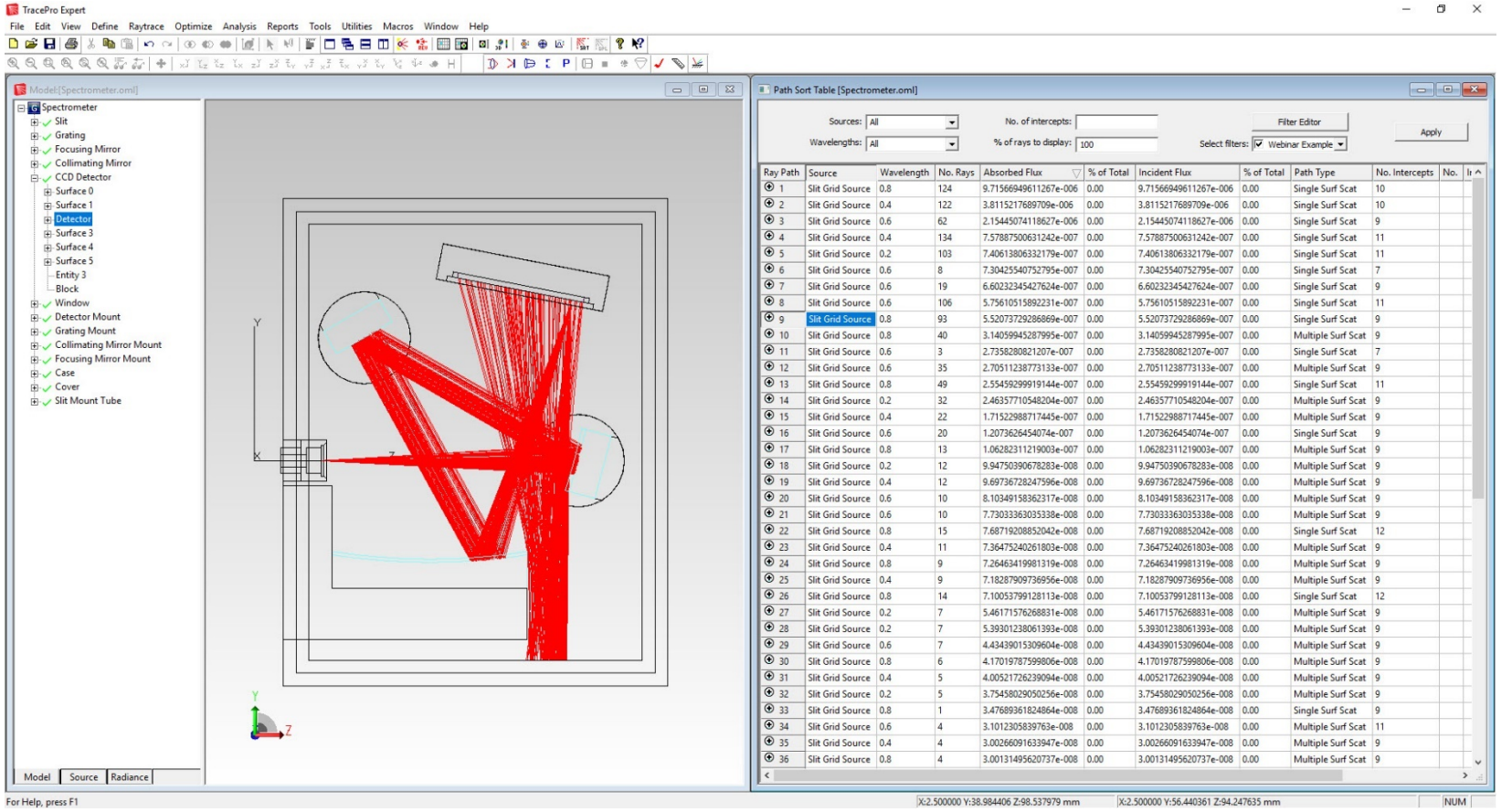
Path Sort Filters

Example paths from the filtered Path Sort Table



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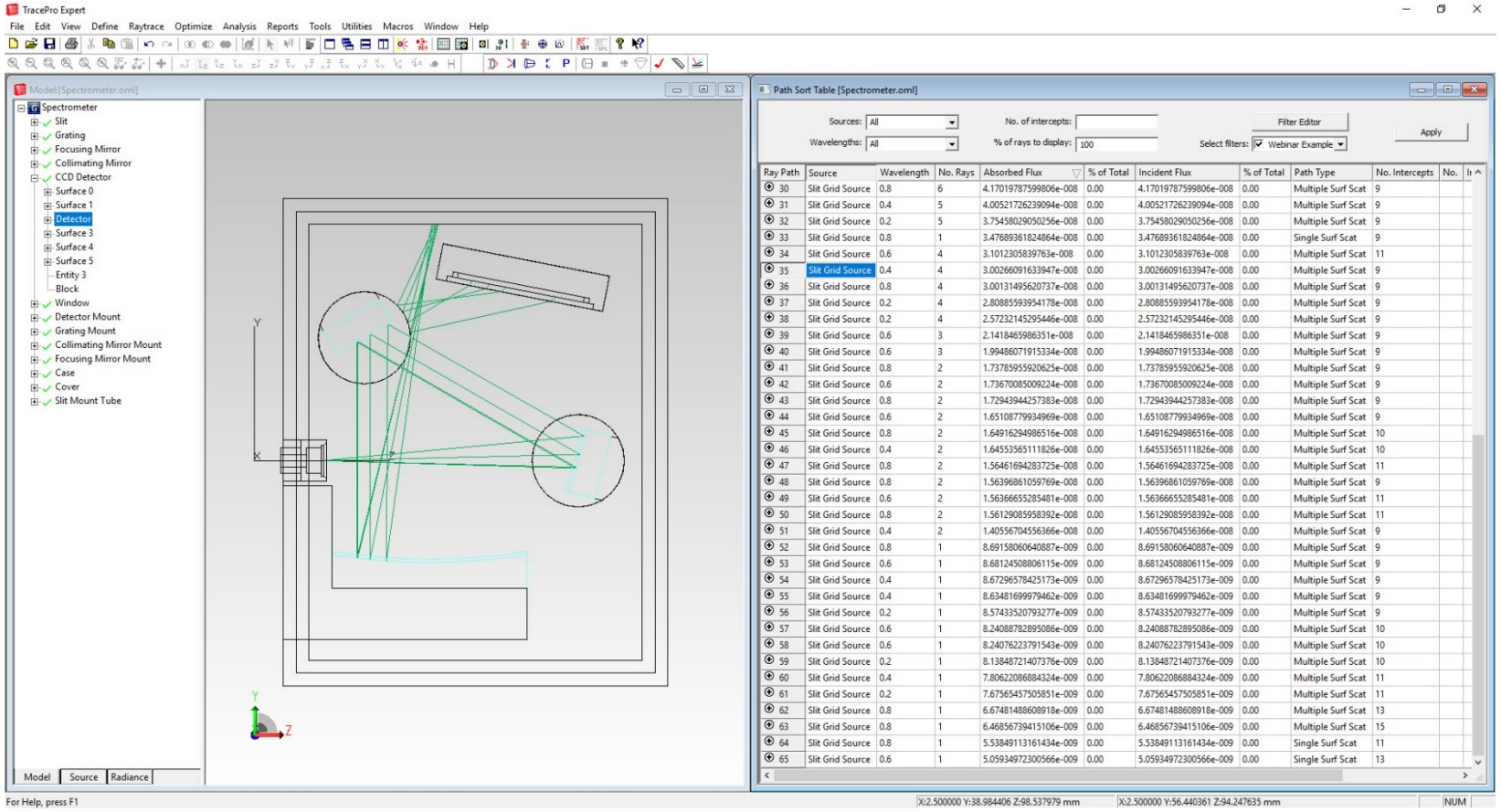
Path Sort Filters

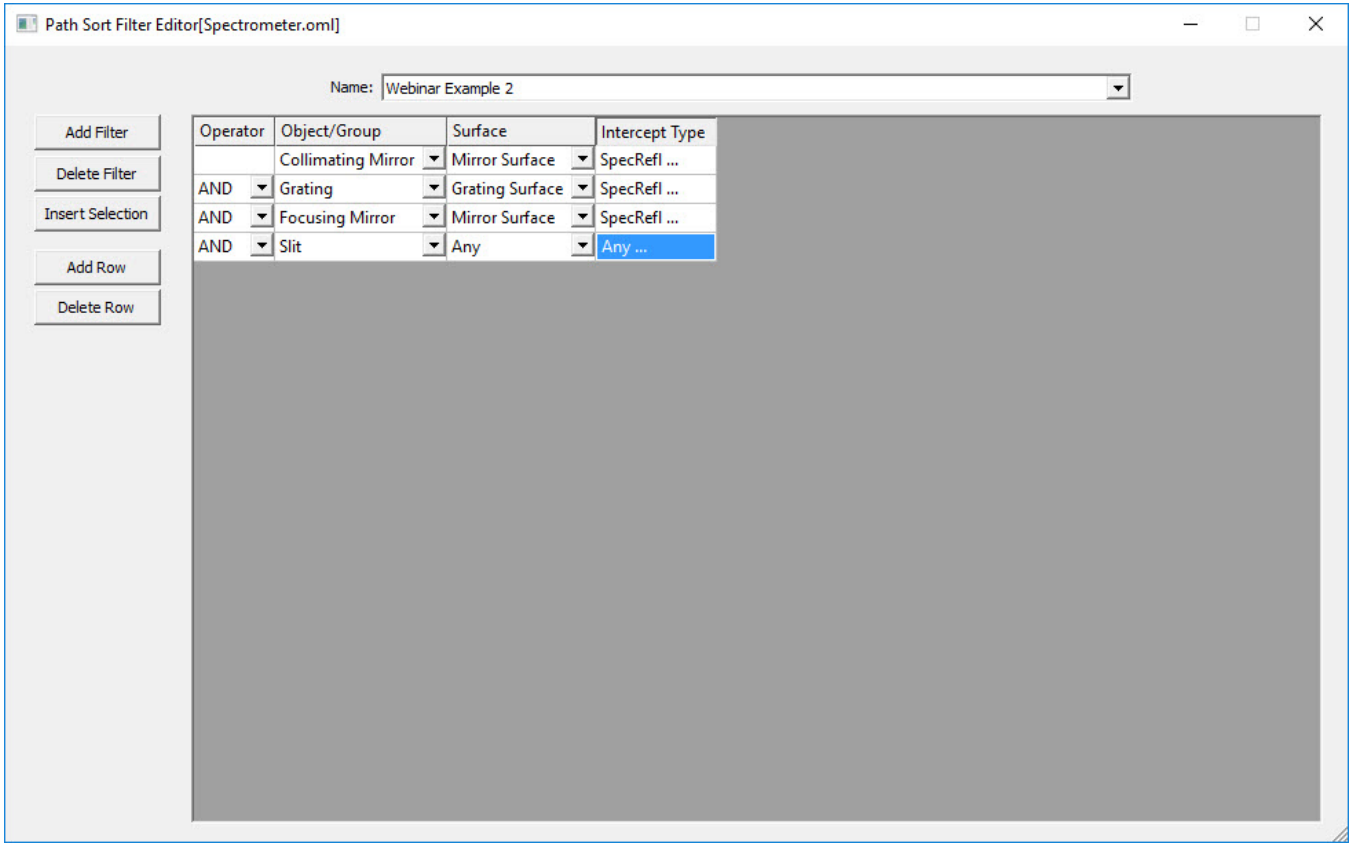
Example paths from the filtered Path Sort Table



TracePro

Path Sort Filters

More complex path filters can be defined – the following filter shows ray paths that have a Specular Reflection from the Collimating Mirror, Grating, Focusing Mirror, and any type of reflection from the Slit.



TracePro

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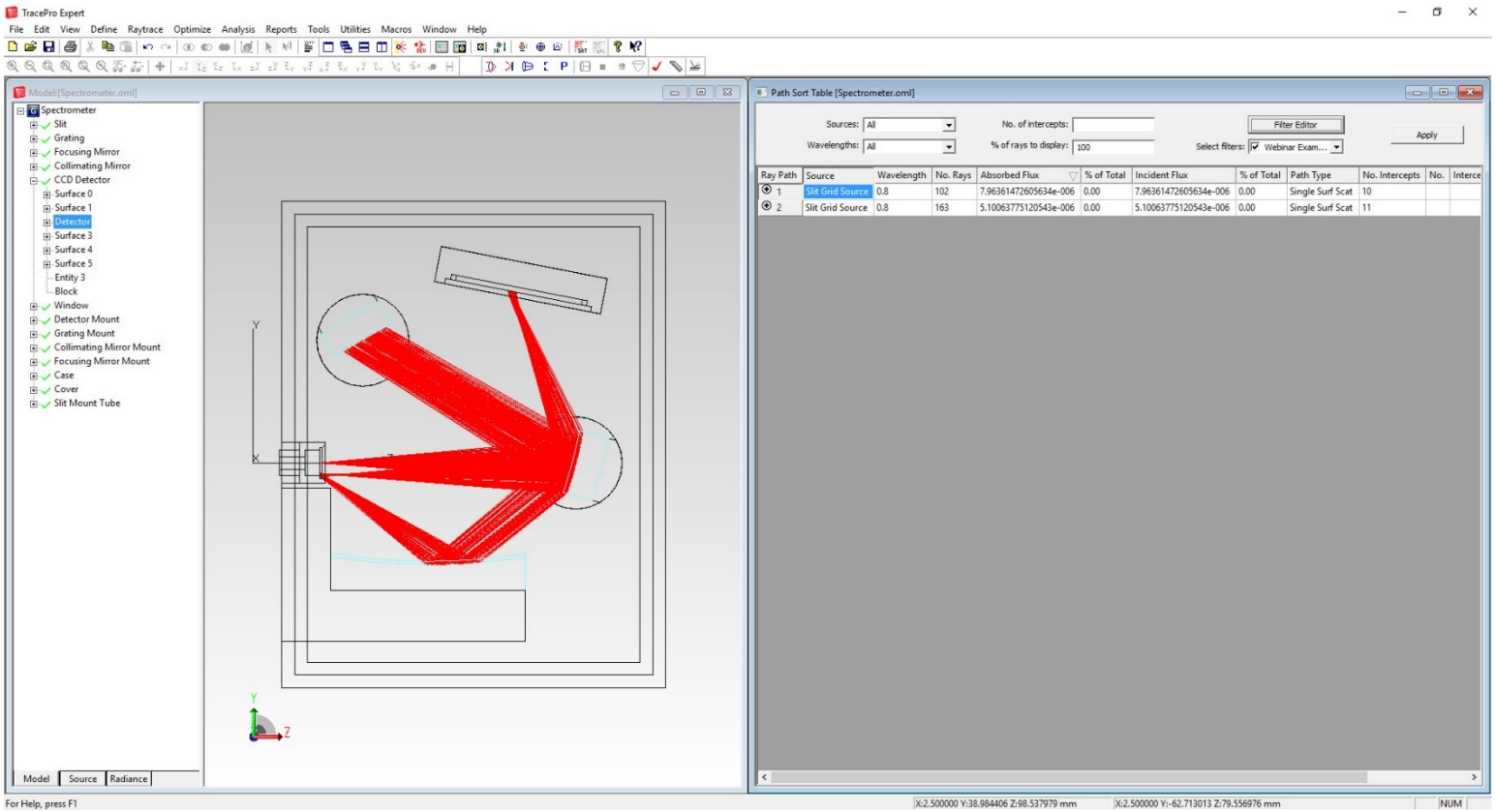

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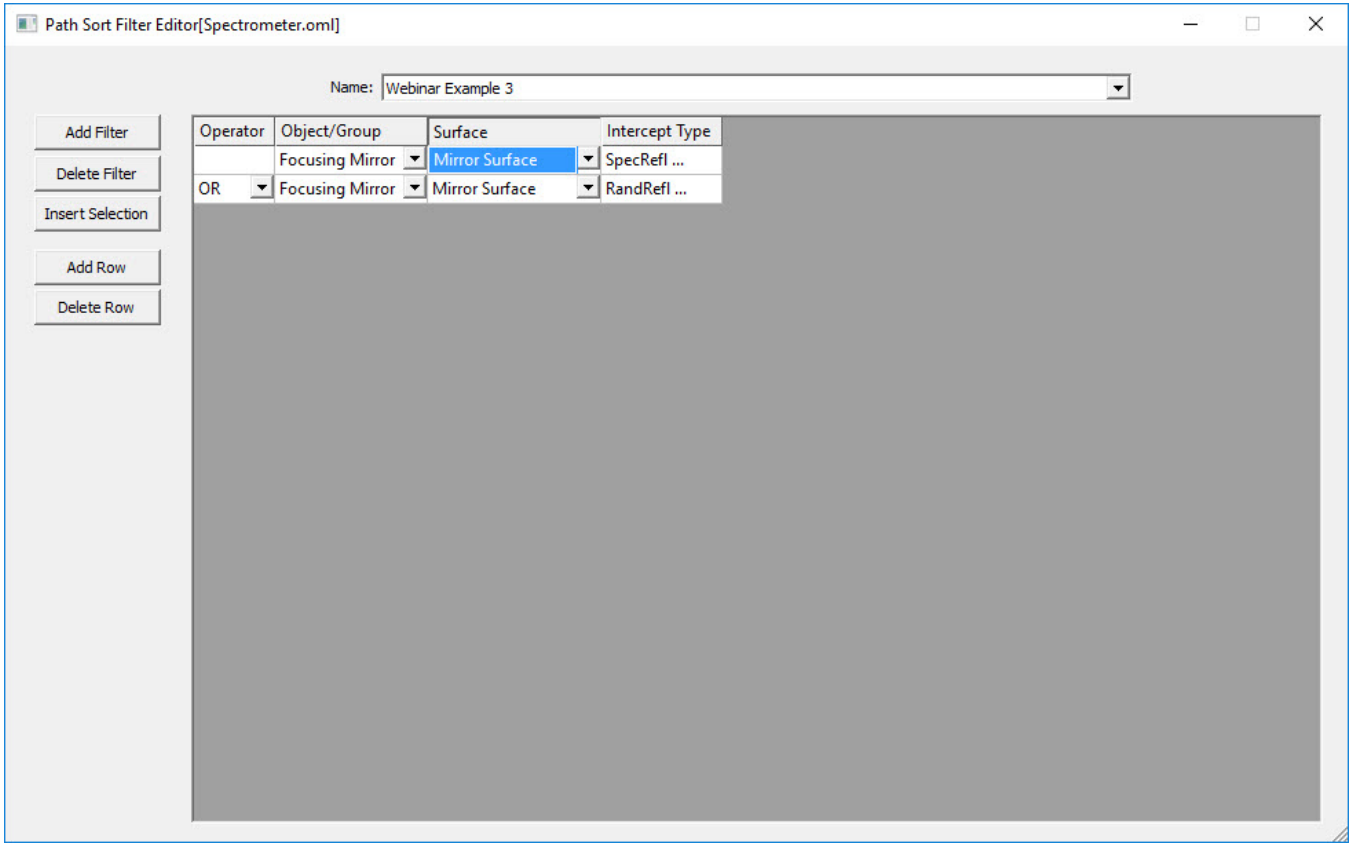
Path Sort Filters

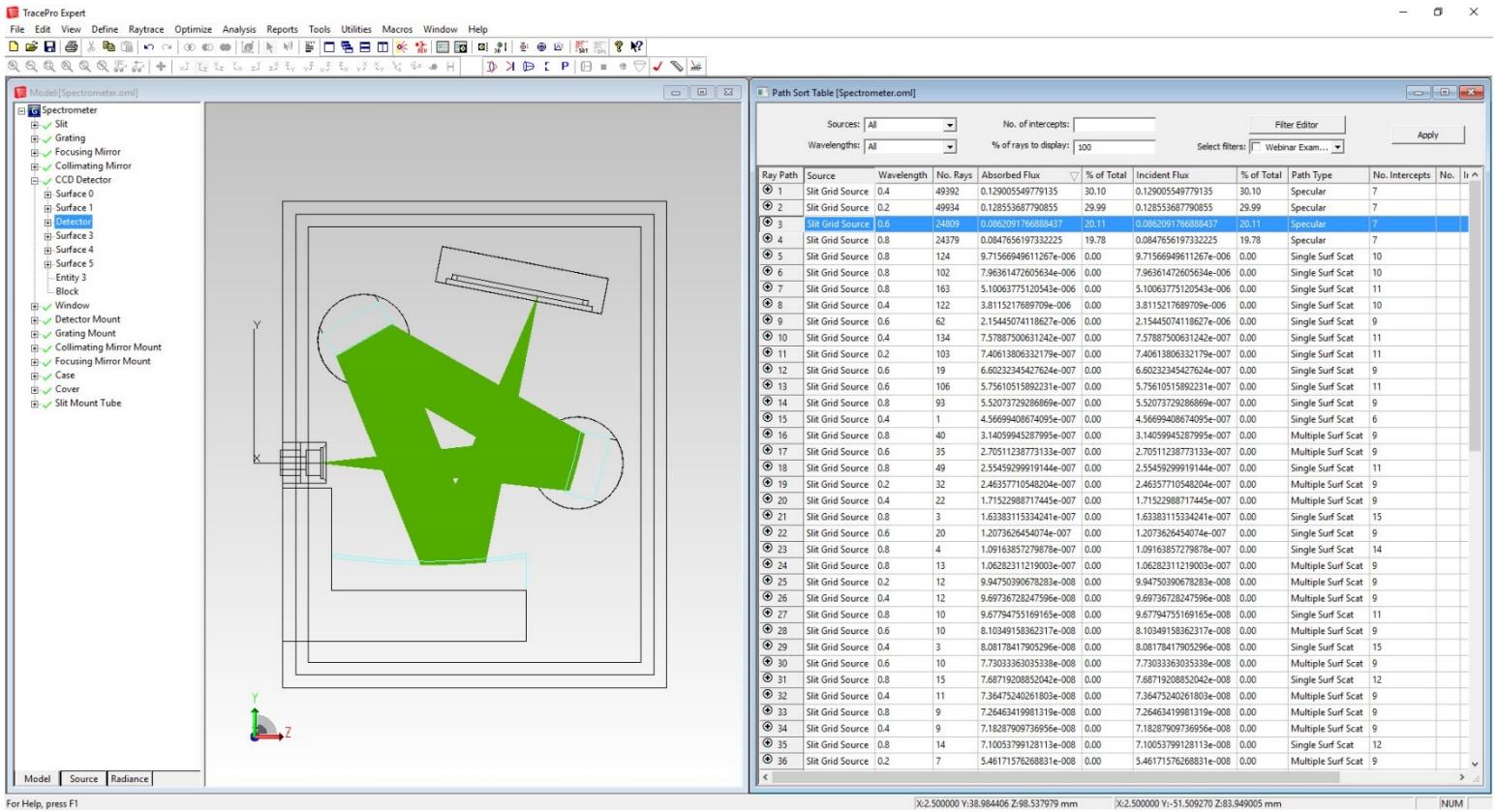
The following filter shows ray paths that have either a Specular or Random Reflection from the Focusing Mirror



TracePro

Path Sort Filters

The following filter shows ray paths that have either a Specular or Random Reflection from the Focusing Mirror



TracePro

Path Sort Filters

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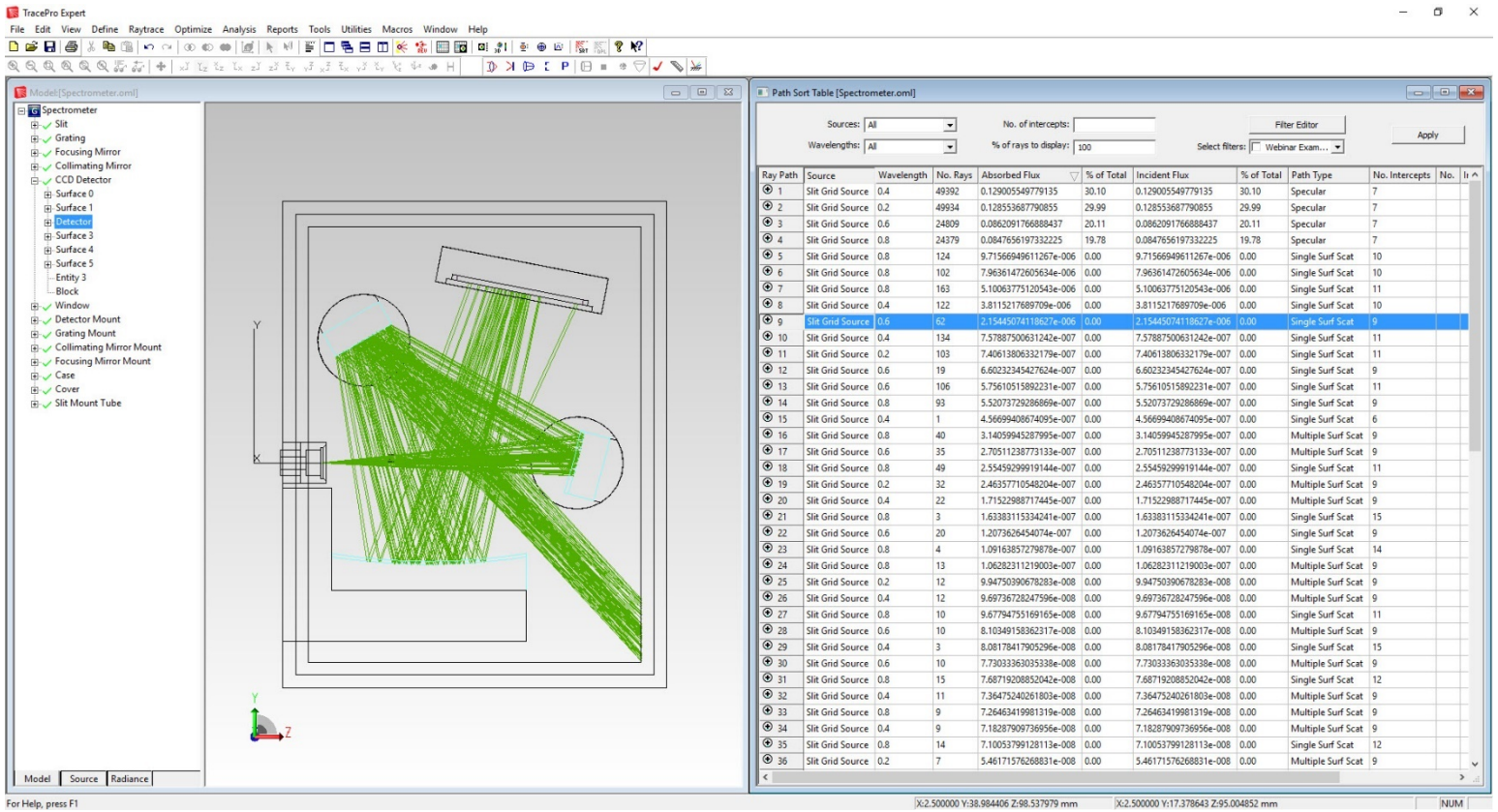

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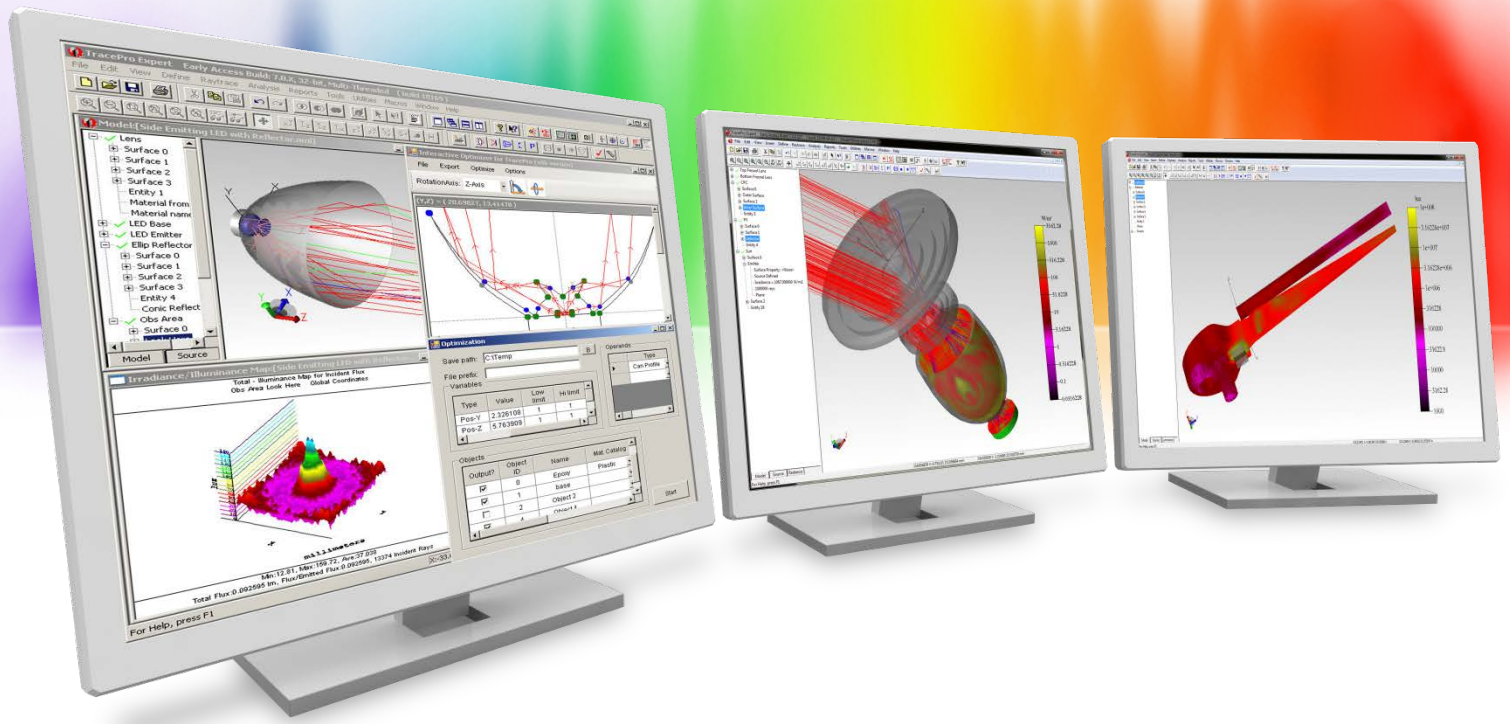

Ray and Path Sorting Uses

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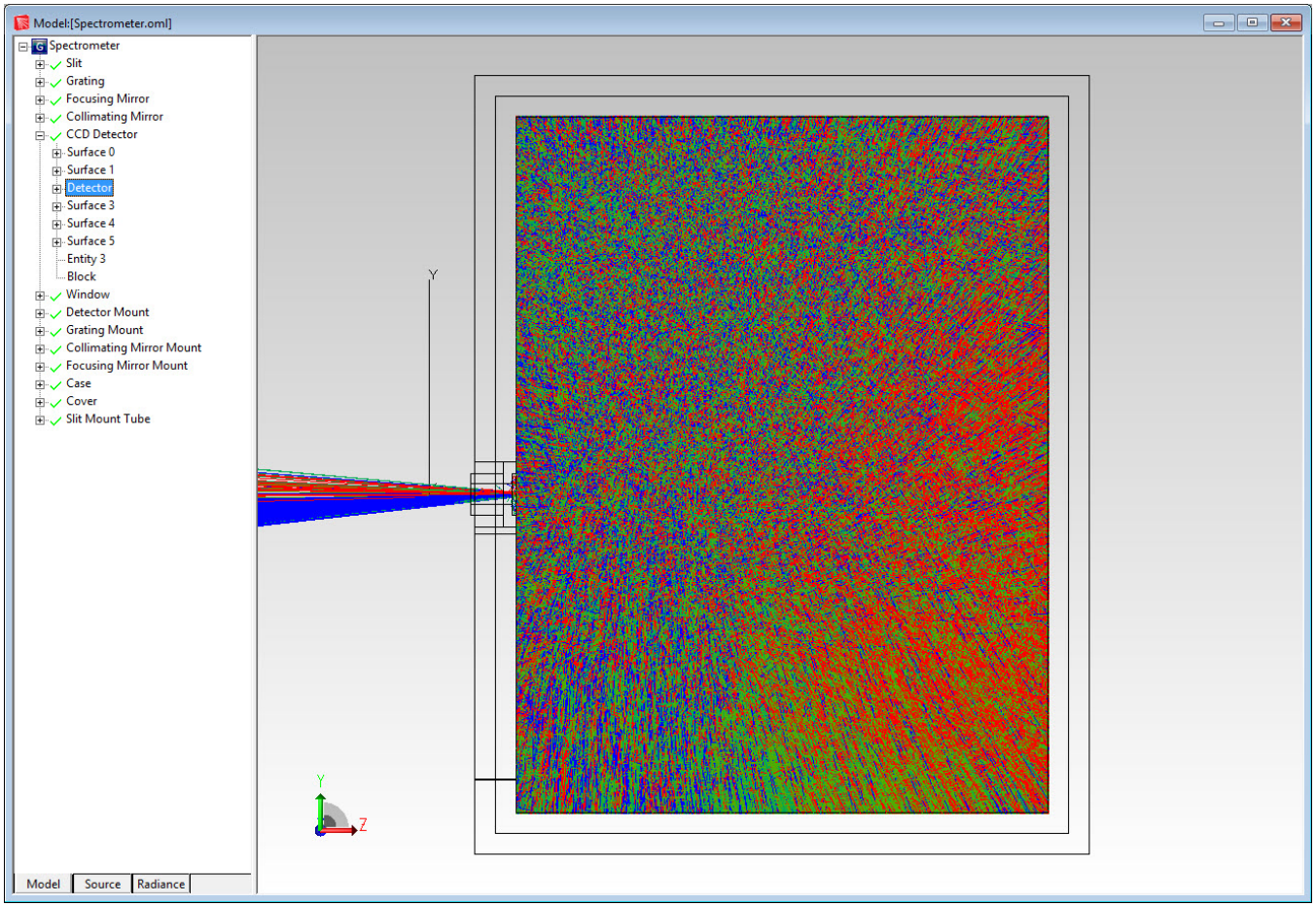
Ray and Path Sorting Uses

- Simplifying raytrace results
- Reducing number of rays shown on screen
- Identifying anomalous ray paths
- Stray light analysis
- Ray and Path Sorting can also be used with the Irradiance/Illuminance Maps in TracePro

Ray and Path Sorting Uses

Initial raytrace results – not useable for analysis



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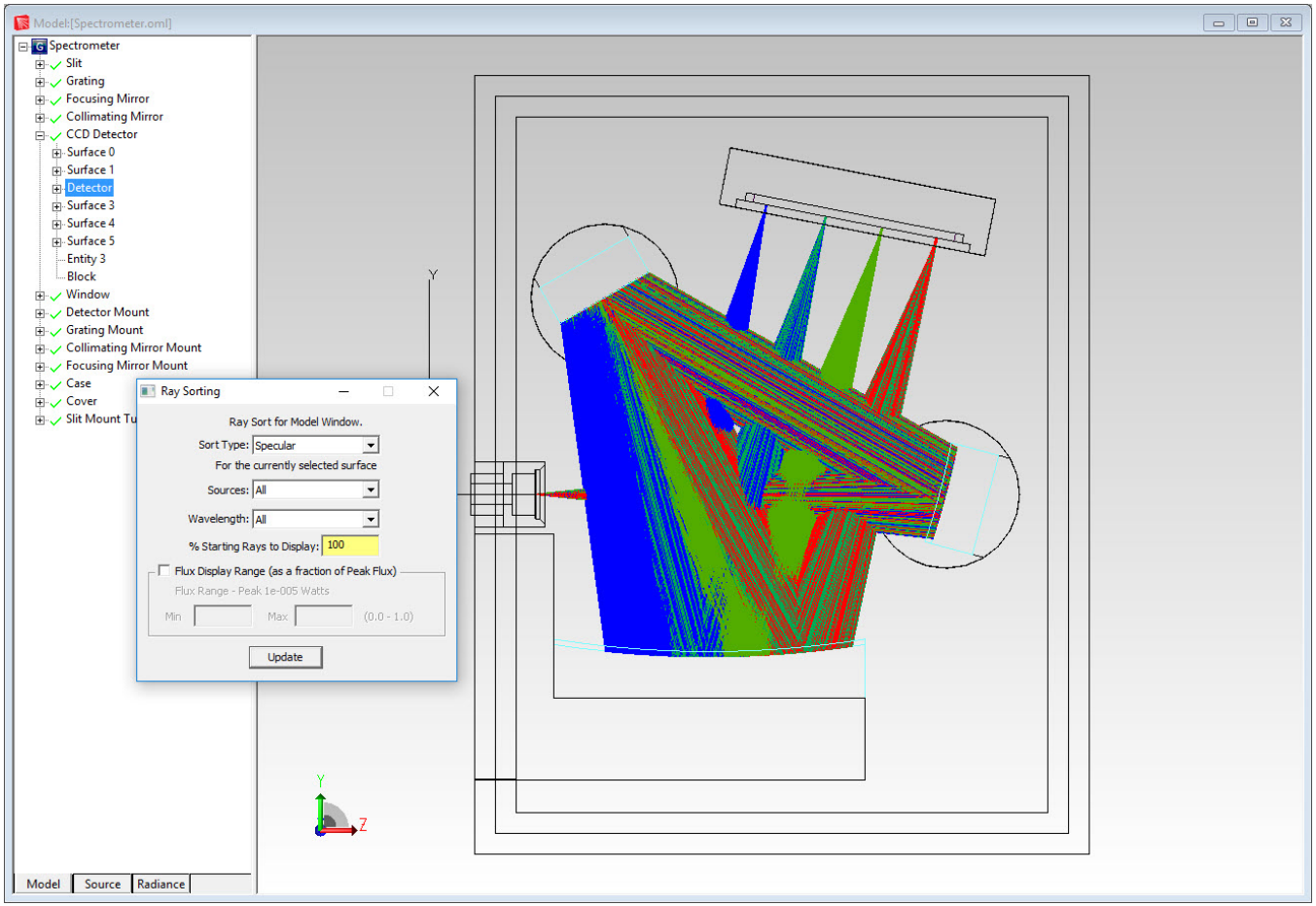
Ray and Path Sorting Uses

Specular rays shown



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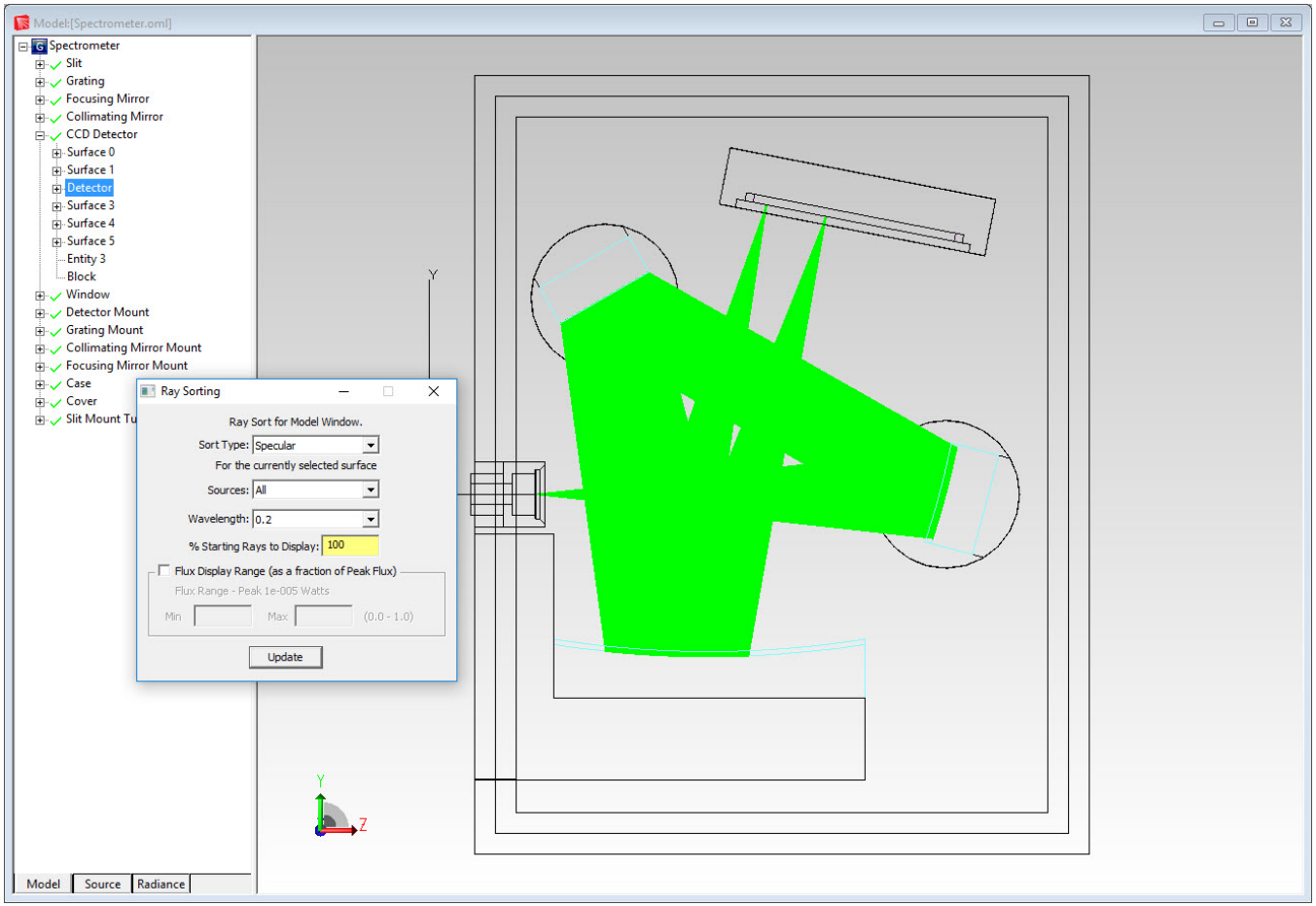
Ray and Path Sorting Uses

Specular rays with 0.2um wavelength shown



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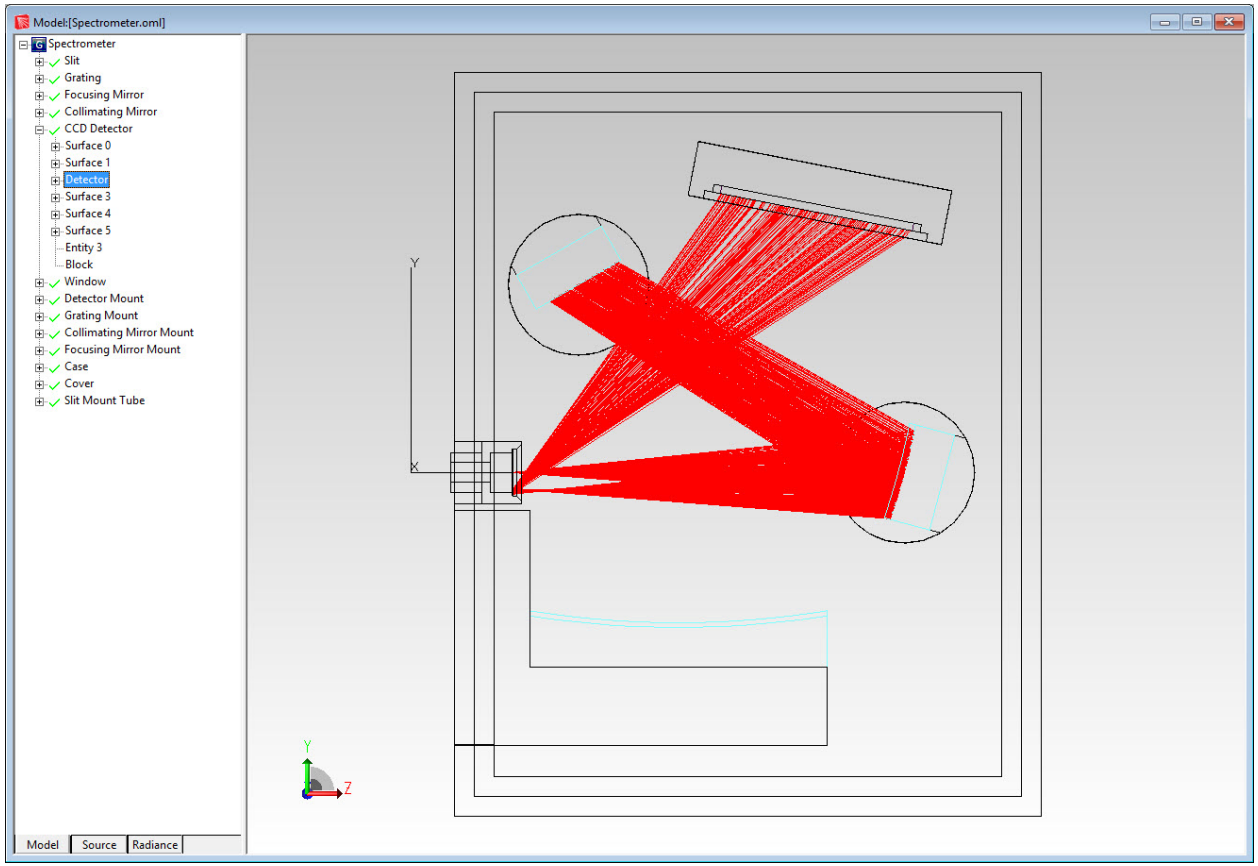
Ray and Path Sorting Uses

Path Sorting can show anomalous ray paths that may need to be mitigated. This example shows unwanted reflections from the slit.



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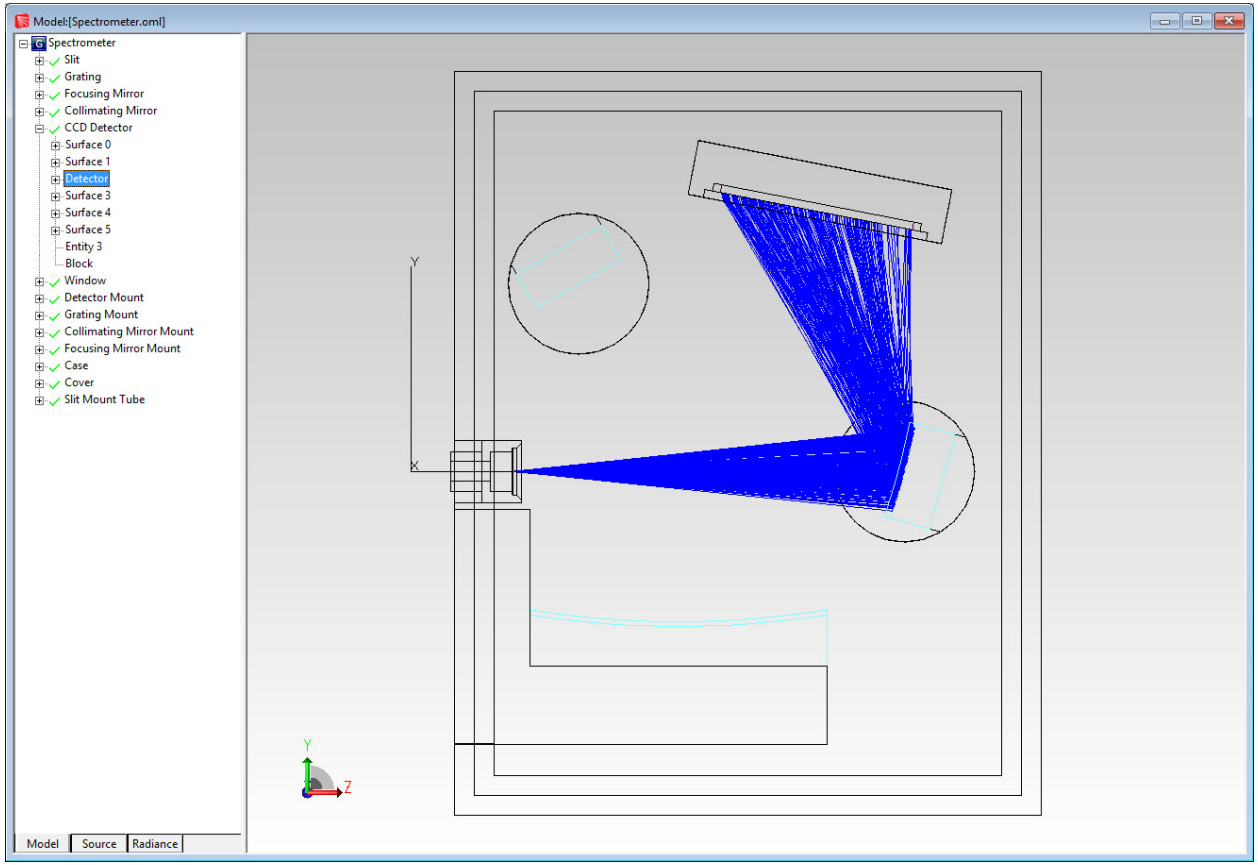
Ray and Path Sorting Uses

Stray light can be analyzed and evaluated using Path Sorting. The example below shows light scattered to the detector from the collimating mirror.



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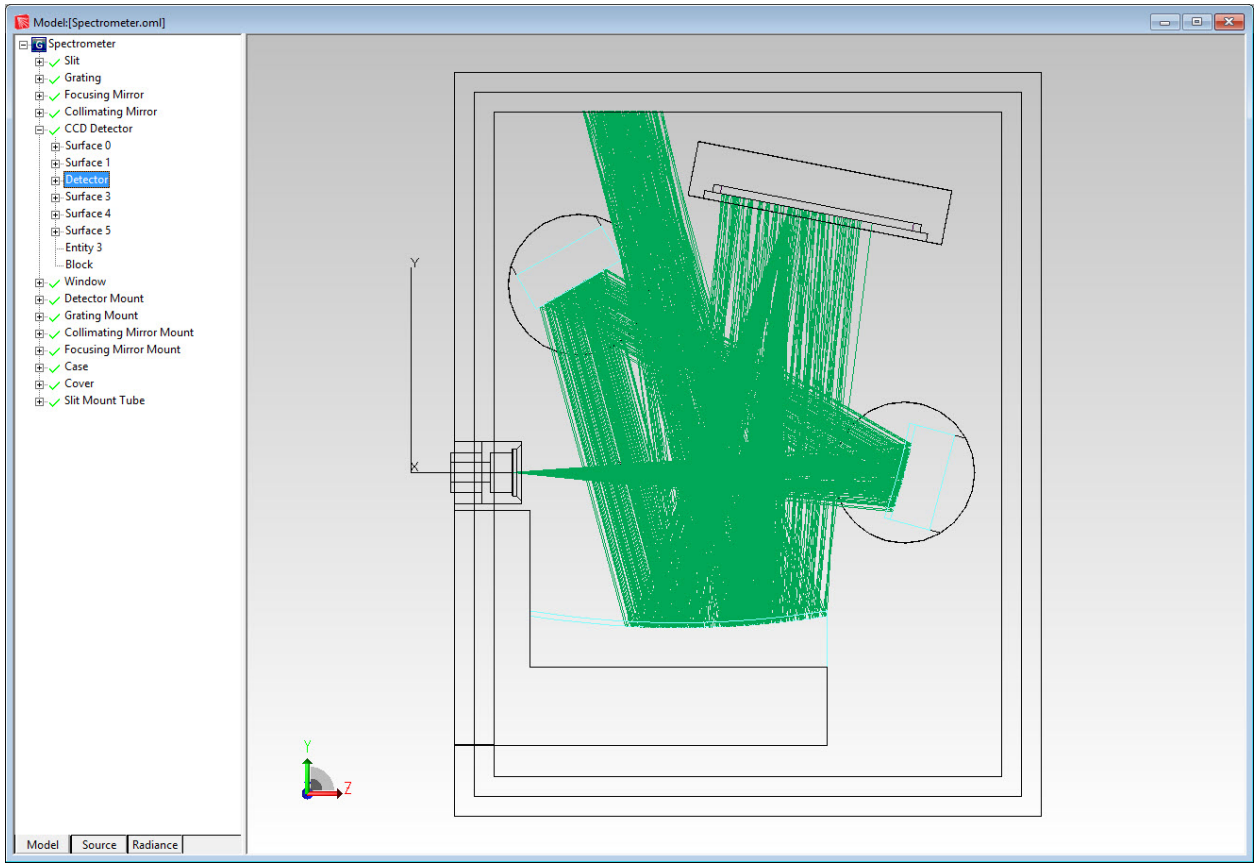
Ray and Path Sorting Uses

Stray light can be analyzed and evaluated using Path Sorting. The example below shows light scattered to the detector from the spectrometer case.



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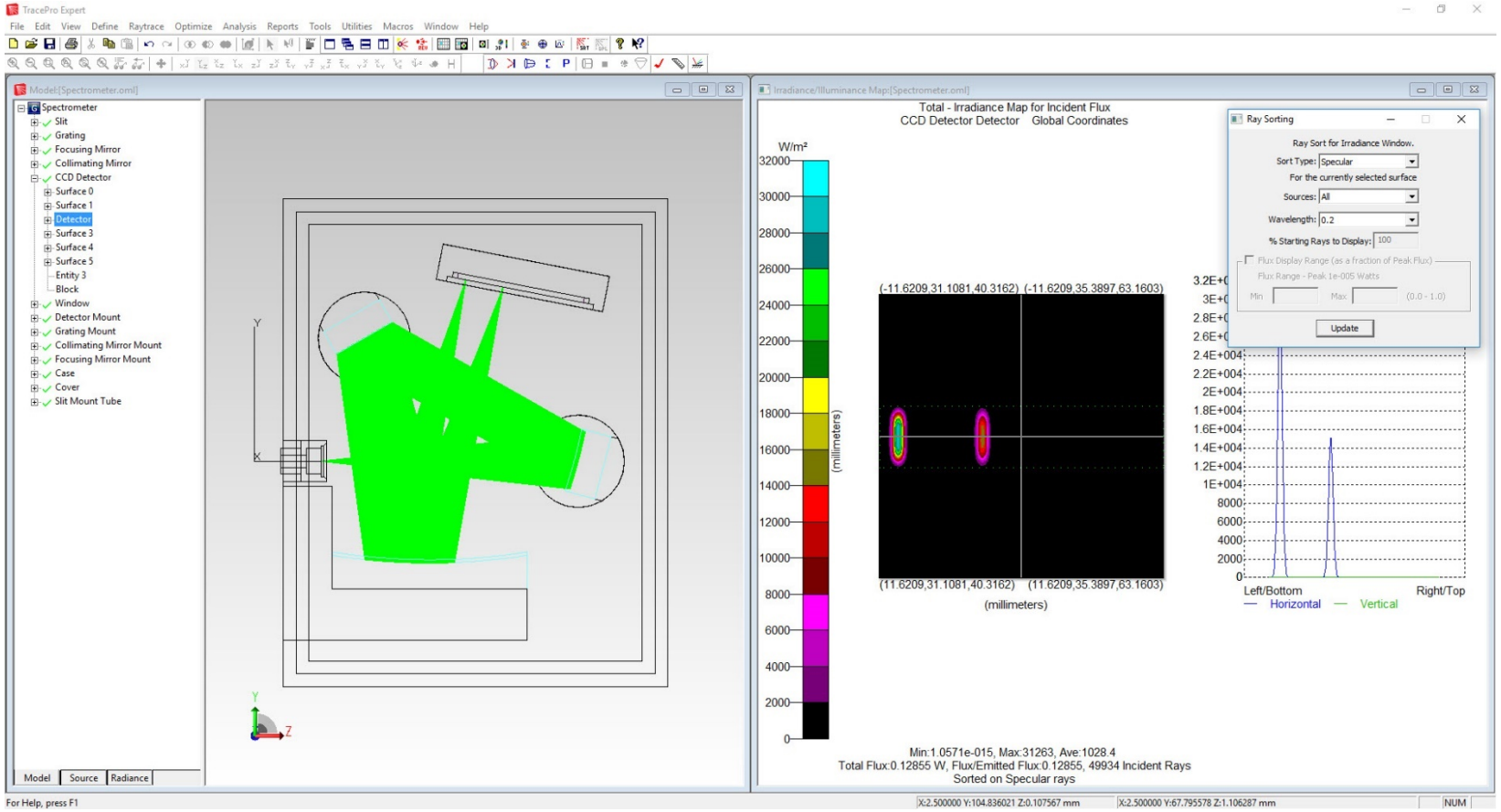
Ray and Path Sorting Uses

The Ray and Path Sorting tables can also be used in conjunction with the Irradiance/Illuminance Maps.

- To use Ray Sorting, open the Irradiance/Illuminance Map, and then go to Analysis->Ray Sorting
- The Ray Sorting selections can then applied in the same manner as for graphical ray sorting
- To use Path Sorting, open the Path Sort Table, select a path, go to Analysis->Display Selected Paths, and then open the Irradiance/Illuminance Map
- Selecting a different path in the Path Sort Table will update the Irradiance/Illuminance Map

Ray and Path Sorting Uses

Ray Sorting in Irradiance/Illuminance Map to show 0.2um rays



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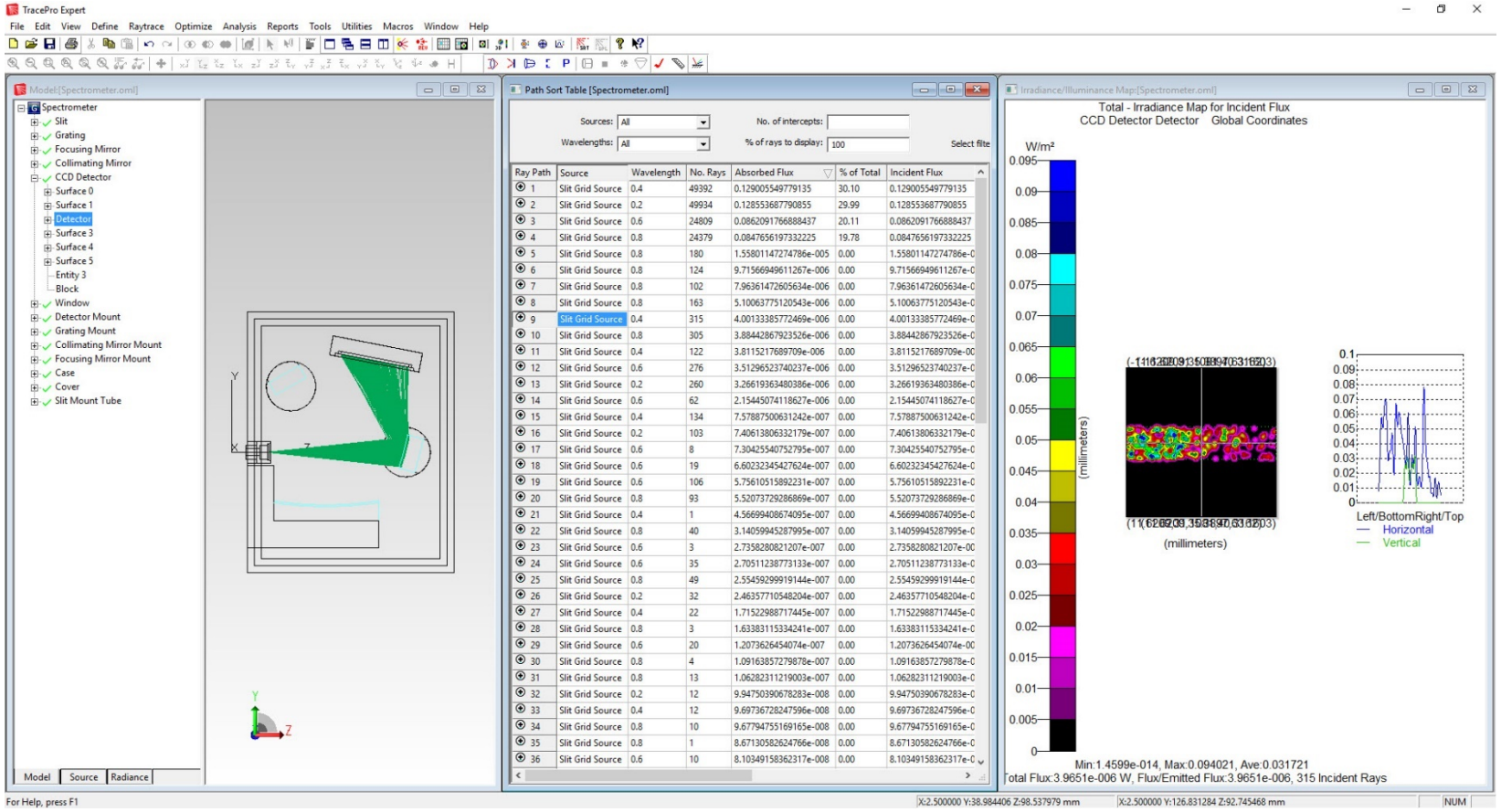
Ray and Path Sorting Uses

Irradiance/Illuminance Map results for a selected path



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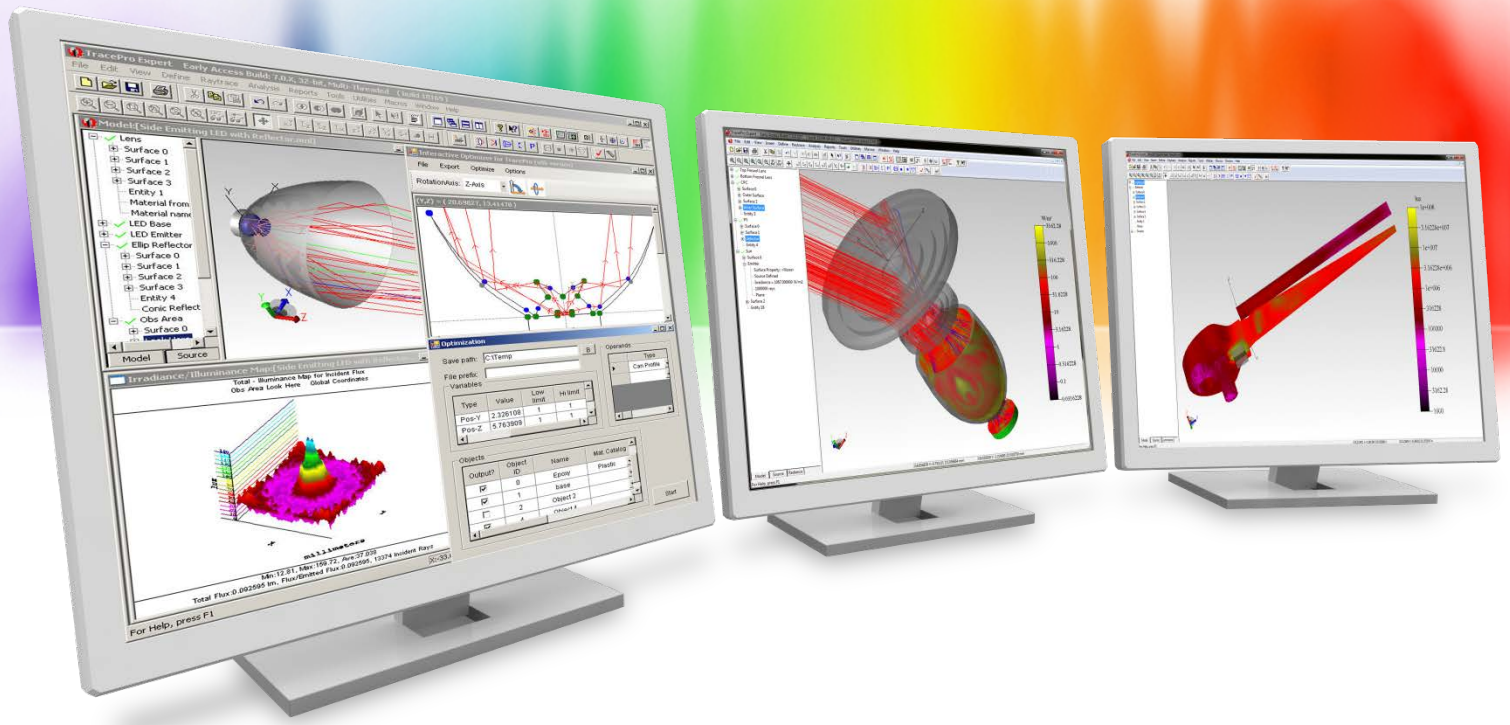

Summary and Questions

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Summary and Questions

The TracePro features powerful and easy to use Ray and Path Sorting tools:

- ✓ The ray display can be simplified for better clarity and understanding
- ✓ Sort rays based on criteria such as surface interaction type, wavelength, percentage of starting rays, etc…
- ✓ Sort rays based on the path they take to get to a selected surface
- ✓ Sorted results can also be displayed in the Irradiance/Illuminance Map
- ✓ Excellent tools for stray light analysis

For more information or to sign up for our free 30-day trial please visit us at:

www.lambdares.com

Phone: +1 978-486-0766 E-mail: sales@lambdares.com

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