



Update Guide Release 2023.4

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INTRODUCTION

This document serves as a guide for new features, changes, and updates in TracePro 2023.3. This release has several new features to make TracePro more convenient to use and expand its capabilities. This release also fixes several problems reported by TracePro users.

WHAT'S NEW IN TRACEPRO 2023.4?

Changes in TracePro 2023.4 consist of new types of surface properties to support Diffractive Optical Elements (DOE) as well as fixes to issues reported by our customers and found by our staff. New features include:

- New surface property types to model Diffractive Optical Elements.
 - Holographic Optical Element (HOE)
 - Computer-Generated Hologram (CGH)
 - Radially symmetric
 - Asymmetric x-y
 - Asymmetric x-y (absolute value)
 - o Zernike phase
- Updates to Stray Light Analyzer

For more details, please refer to the Revision History on the Current Release page in the TracePro Support section at <u>www.lambdares.com</u>.

SURFACE PROPERTIES FOR DIFFRACTIVE OPTICAL ELEMENTS

New surface property types are now available for modeling Diffractive Optical Elements (DOEs). All of the surface property types are modeled like gratings. The types available are:

- Holographic Optical Element (HOE)
- Computer-Generated Hologram (CGH)
 - Radially symmetric
 - Asymmetric x-y
 - Asymmetric x-y (absolute value)
 - Zernike phase

Each property type requires its own input when defining the property and when applying it.

Holographic Optical Element

A Holographic Optical Element (HOE) surface behaves like a hologram formed by the interference of two spherical waves. The property is like a grating; you can add diffraction orders as you wish.

To make a HOE type Surface Property, choose type HOE from the **Type** list in the **Surface Property Editor** (**Define**|**Edit Property Data>Surface Properties**) and set the **Construction Wavelength** of the laser used to make the hologram.

Surface Property Edit	itor												
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Catalog	Catalog: OSLC) DOE Import	✓ Name:	HOE_SPH.len Surface 3		•							^
Add Catalog	Description:												
Delete Catalog	Type: HOE		▼ Scatter: ABg		Retror	eflector							
Add Property					Polariz								
Delete Property	Construction 0.58 Wavelength:	756	(µm)										
Copy Property													
-Data Points													~
Sort by	Temperature (K)	Wavelength (µm)	Incident Angle (deg)	Azimuth Angle (deg)	Order	Absorptance	Specular Refl	Specular Trans	Integrated BRDF	BRDF A	BRDF B	BRDF g	Integrated BTD
<u>A</u> dd	300	0.58756	0	0	1		0	1					
Delete					Total:	0	0	1	0	0	0.1	0	0
Solve For:													
Absorptance -													
Plot Options													
	<												>
	Grid												

Figure 1. Surface Property Editor with an example HOE property.

To apply a HOE surface property, select the surface in the **Model Window** and select **Define**|**Apply Properties>Surface**. Select the **Catalog** and **Name** of the property, and the HOE tab in the lower box will provide inputs for the locations of the point sources used to form the hologram. These locations are offsets from the local vertex of the surface, with the optical axis as the local z axis.

Apply Properties	- 🗆 X
Apply Properties Bulk Scatter Class and User Data Color Diffraction Exit Surface Fluorescence Gradient Index Importance Sampling Material Mueller Matrix Prescription Raytrace Flag RepTile Surface Surface Surface Source Temperature Temperature Distribution	— × Surface Surface Catalog: OSLO DOE Import Name: HOE_SPH.len Surface 3 Description:
	Point Source 2 X: 0 Y: 0 Z: 10 Apply View Data

Figure 2. Apply Properties dialog box with inputs for locations of point sources used to form the hologram for the HOE surface.

Computer-Generated Hologram

A computer-generated hologram (CGH) is a hologram created from a specific phase distribution. The phase distribution is represented by a polynomial. The surface is modeled as a grating, so you can add grating orders as you wish. Three polynomial types are available:

- Radially Symmetric
- Asymmetric x-y
- Asymmetric x-y (absolute value)

A CGH surface property requires data for the **Design Wavelength**, the number of polynomial terms, and the coefficients of the polynomial terms. Figure 3 and Figure 4 show the input for the Symmetric type.

Surface Property Edi	itor										23
22 🛛 🗧 🔒	🗖 🗖 🐨 🗖	3									
Catalog	Catalog: OSLC	DOE Import	▼ Name:	CGH_SPH_symmetric.len	Surface	3 🔻					^
Add Catalog	Description:										
Delete Catalog	Type: CGH		✓ Scatter: ABg	r	Retror	eflector					
Add Property					Polariz						
Delete Property	Design 0.58 Wavelength:	756	(µm) Polynomial Ty	/pe: Symmetric	-						
Copy Property	Max Power: 2										
Data Points											~
Sort by	Temperature (K)	Wavelength (µm)	Incident Angle (deg)	Azimuth Angle (deg)	Order	Absorptance	Specular Refl	Specular Trans	Integrated BRDF	BRDF A	BR
<u>A</u> dd	300	0.58756	0	0	1		0	1			
Delete,					Total:	0	0	1	0	0	0.1
Solve For:											
Absorptance											
Plot Options											
	<	Galanta									>
	Grid Coef	ficients									

Figure 3. Surface Property data for a Symmetric CGH, Grid tab.

Surface Property Ed	litor	- • •
22 22 🔒 🔒		
Catalog	Catalog: OSLO DOE Import Name: CGH_SPH_symmetric.len Surface 3	^
Add Catalog	Description:	
Delete Catalog		
Add Property		
Delete Property	Design 0.58756 (um) Polynomial Type: Symmetric	
Copy Property	Max Power: 2	
Data Points		~
Sort by	Term Coefficient	
<u>A</u> dd	1 0	
Delete	r^1 0	
Solve For:	r^2 -0.02	
Absorptance		
Plot Options		
	Grid Coefficients	

Figure 4. Surface Property data for a Symmetric CGH, Coefficients tab.

When applying a CGH surface property, you must specify the **Construction data** for the CGH, namely the **Center** of the polynomial (i.e., the vertex of the surface), the **Optical axis vector** (local z axis of the surface) and the **Up Vector** to orient the local y axis for asymmetric polynomials. You can also check the **Automatically calculate** checkbox and if the surface is an optical surface, i.e., created by the **Geometry|Lens Element** dialog box, TracePro will set the values from the lens creation. The **Apply Properties** dialog box input for an example CGH property is shown in Figure 5.

Apply Properties	- 🗆 X
Apply Properties Bulk Scatter Class and User Data Color Diffraction Exit Surface Fluorescence Gradient Index Importance Sampling Material Mueller Matrix	Surface Catalog: OSLO DOE Import Name: CGH_SPH_symmetric.len Surface 3 Description: Scatter: ABg Scatter
Prescription Raytrace Flag RepTile Surface Surface Source Temperature Temperature Distribution	Reference Data Type: CGH, no polarization, no retroreflector Construction Data Center position Optical axis vector X: Y: Y: Z: Automatically calculate Apply

Figure 5. Apply Properties dialog box for applying a CGH surface property.

Zernike Phase

The Zernike Phase type of DOE is like the CGH type, except the phase is represented by a sum of Zernike polynomials. Again, it is modeled as a grating, so you can add whatever diffraction orders you wish.

A Zernike phase surface property has the option of specifying phase in units of waves or millimeters. The highest order of the terms, and the coefficients of the polynomial terms are also required. The highest order of the terms is the highest power of ρ . The inputs for a Zernike Phase property with units of mm is shown in Figure 6 and Figure 7.

Surface Property Ed	litor										×
22 22 🔒 🤒	🗖 🗖 🐨 🗷	3									
Catalog ^	Catalog: OSLC	DOE Import	✓ Name:	CGH_SPH_Asym_Zern_p	hase.len	i Suri 💌					^
Add Catalog	Description:										
Delete Catalog					Petror	eflector					
Add Property	Type: Zerni		Scatter: ABg		Polariz						
Delete Property	Design 0.58 Wavelength:	756	(µm) Units		-						
Copy Property	Max n: 3			J	_						
Data Points	ļ										~
Sort by	Temperature (K)	Wavelength (µm)	Incident Angle (deg)	Azimuth Angle (deg)	Order	Absorptance	Specular Refl	Specular Trans	Integrated BRDF	BRDF A	BF
<u>A</u> dd	300	0.58756	0	0	1		0	1			
Delete					Total:	0	0	1	0	0	0.
Solve For:											
Absorptance 💌											
Plot Options											
· · · ·	<	e :									>
< >	Grid Coef	ficients									

Figure 6. Surface Property Editor with example Zernike Phase type DOE, Grid tab, with units of mm.

Surface Property Edit	itor			×
22 🛛 🗧 🦷	🗖 🗖 🐨 🗖	1		
Catalog	Catalog: OSLC	DOE Import	▼ Name: CGH_SPH_Asym_Zern_phase.len Suri ▼	^
Add Catalog	Description:			
Delete Catalog				
Add Property	Type: Zerni	ke Phase	Scatter: ABg Retroreflector Polarization	
Delete Property	Design Wavelength: 0.58	756	(µm) Units: mm	
Copy Property	Max n: 3			
Data Points	, ,			~
Sort by	Term	Coefficient		
<u>A</u> dd	1	0.001		
Delete	ρsinθ	0.0011		
Solve For:	ρ cosθ	0.0012		
Absorptance 💌	ρ^2 sin2θ	0.0015		
	2p^2 - 1	-0.5		
Plot Options	ρ^2 cos2θ	-0.0014		
	ρ^3 sin3θ	0		
	(3p^2 - 2)ρ sinθ	0		
	(3p^2 - 2)ρ cosθ	0		
	ρ^3 cos3θ	0		
	Grid Coef	ficients		

Figure 7. Surface Property Editor with example Zernike Phase type DOE, Coefficients tab, with units of mm.

Importing an OSLO file with DOE surfaces

If you design an optical system in OSLO with one or more DOE surfaces, you can open the .len or .osl file in TracePro. Doing so will create a new Surface Property for each DOE surface, in a catalog named *OSLO DOE Import*, and assign the property to the surface in TracePro. The property will have one diffraction order, corresponding to the DOR value in OSLO, with a transmittance value of 1.0 and all others property values zero. If you wish to model stray light from unwanted diffraction orders or scattering, you can edit the property as you wish.

Examples

The following sections provide examples of making various types of DOEs "from scratch," i.e., by making a property using the Surface Property Editor, then applying the property to an optical surface of a lens element.

HOE

The following is a recipe for making an example Holographic Optical Element.

- 1. In a new document, make a Lens Element using **Geometry**|Lens Element. Use all default input values, except on the **Position** tab, set the *First Surface Center* to x=0, y=0, z=10.
- 2. Open the Surface Property Editor (Define|Edit Property Data>Surface Properties...). Make a new catalog or select an existing catalog.
- 3. Make a new property by clicking Add Property... and entering a name, then selecting ABg for the *Scatter Model*, and finally clicking OK.
- 4. Change the **Type** of the property to *HOE*.
- 5. The property has diffracted orders like a grating. In the *Data Points* box, click the **Add...** button and add a diffraction order equal to 1.
- 6. In the *Data Points* box, click the **Delete...** button and delete the grating order 0.
- 7. In the data grid, set the *Specular Trans* value for Order 1 to 1.0 and the absorptance to zero. All of the flux incident on the surface will be directed into the Order 1 transmitted beam. The completed property should appear as in Figure 8. Save the property and close the **Surface Property Editor** window.
- 8. In the System Tree, select Surface 0 of the Lens Element you created earlier. Open the Apply Properties dialog box (Define Apply Properties...), and select the Catalog and Name of the property you created. In the Construction Data box in the HOE Data tab, set Point Source 1 to x=0, y=0, z=-1e8, and Point Source 2 to x=0, y=0, z=10, as shown in Figure 9. Click Apply. This will create a HOE that will focus collimated light at 10 mm beyond the Lens Element This focal length is for light at the Construction Wavelength entered in the property. (Actually, not quite, because of the finite thickness of the plate.)
- 9. In the **Source Tree**, enable **Grid Source 1**. Open the Grid Source and set the **Grid Pattern** to *Cross*. On the Wavelengths tab, add wavelength 0.633 to match the **Construction Wavelength** of the property. Click Modify and close the **Grid Source** dialog box.
- 10. Trace rays and observe that the two wavelengths focus at different distances from the Lens Element as shown in Figure 10.

You can adjust the HOE surface property if you wish to see the effects of unwanted diffracted orders, reflected orders, or scattered light.

Surface Property Edi	tor									×
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Catalog	Catalog: DOE	examples	✓ Name:	HOE example		-				^
Add Catalog	Description:									
Delete Catalog	Type: HOE		✓ Scatter: ABg	r	Retror	effector				
Add Property	,				Polariz					
Delete Property	Construction 0.63 Wavelength:	3	(µm)							
Copy Property										
-Data Points										~
Sort by	Temperature (K)	Wavelength (µm)	Incident Angle (deg)	Azimuth Angle (deg)	Order	Absorptance	Specular Refl	Specular Trans	Integrated BRDF	BRDF
<u>A</u> dd	300	0.5461	0	0	1		0	1		
Delete					Total:	1	0	1	0	0
Solve For:										
None										
Plot Options										
	< Grid									>
	Grid									

Figure 8. Surface Property Editor showing the completed HOE type surface property.

Apply Properties		_	×
Apply Properties Bulk Scatter Class and User Data Color Diffraction Exit Surface Fluorescence Gradient Index Importance Sampling Material Mueller Matrix Prescription Raytrace Flag RepTile Surface Surface Surface Source Temperature Temperature Distribution	Surface Catalog: DOE examples Name: HOE example Description: Scatter: ABg Scatter HOE Data Reference Data Construction Data Point Source 1 X: 0 Y: 0 Z: -1e8 Point Source 2		×
	Point Source 2 X: 0 Y: 0 Z: 10 Apply View Data		

Figure 9. Apply Properties dialog box, showing the construction points for a HOE type surface property.

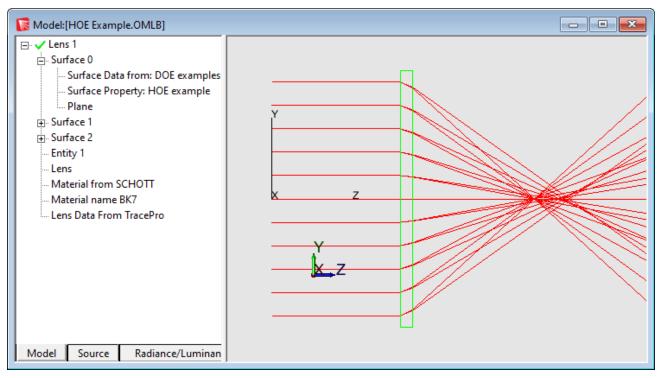


Figure 10. HOE ray-trace with wavelengths 0.5461 and 0.633 μm converging at different distances behind the glass plate.

CGH

The following is a recipe for making an example Computer-Generated Hologram.

- 1. In a new document, make a Lens Element using **Geometry**|Lens Element. Use all default input values, except on the **Position** tab, set the *First Surface Center* to x=0, y=0, z=10.
- Open the Surface Property Editor (Define|Edit Property Data>Surface Properties...). Make a new catalog or select an existing catalog.
- 3. Make a new property by clicking Add Property... and entering a name, then selecting ABg for the *Scatter Model*, and finally clicking OK.
- 4. Change the **Type** of the property to *CGH*.
- 5. The property has diffracted orders like a grating. In the *Data Points* box, click the **Add...** button and add a diffraction order equal to 1.
- 6. In the *Data Points* box, click the **Delete...** button and delete the grating order 0.
- 7. In the data grid, set the *Specular Trans* value for Order 1 to 1.0 and the absorptance to zero. All of the flux incident on the surface will be directed into the Order 1 transmitted beam.
- 8. Select the **Coefficients** tab and enter -0.02 for the r² term. The completed property should appear as in Figure 11. Save the property and close the **Surface Property Editor** window.
- 9. In the System Tree, select Surface 0 of the Lens Element you created earlier. Open the Apply Properties dialog box (Define|Apply Properties...), and select the Catalog and Name of the property you created. In the Construction Data box in the Reference Data tab, note that Automatically calculate is checked and calculated values are entered, as shown in Figure 12. Click Apply.
- 10. In the **Source Tree**, enable **Grid Source 1**. Open the Grid Source and set the **Grid Pattern** to *Cross*. Click Modify and close the **Grid Source** dialog box.
- 11. Trace rays and observe that the diffracted rays converge behind the Lens Element as shown in Figure 13.

You can adjust the CGH surface property if you wish to see the effects of unwanted diffracted orders, reflected orders, or scattered light.

Surface Property Education	or 🗖	
22		
Catalog ^	Catalog: DOE examples Name: CGH Example	^
Add Catalog	Description:	
Delete Catalog		
Add Property	Polarization	
Delete Property	Design 0.5461 (µm) Polynomial Type: Symmetric	
Copy Property	Max Power: 4	
Data Points		~
Sort by	Term Coefficient	
<u>A</u> dd	1 0.0	
Delete	r^1 0.0	
Solve For:	r^2 -0.02	
None	r^3 0.0	
Plot Options		
< >>	Grid Coefficients	

Figure 11. Example CGH surface property.

Apply Properties	- 🗆 X
Bulk Scatter Class and User Data	Surface
Color Diffraction Exit Surface Fluorescence Gradient Index Importance Sampling Material Mueller Matrix Prescription Raytrace Flag RepTile Surface	Catalog: DOE examples Name: CGH Example Description: Scatter: ABg Scatter Reference Data
Surface Source Temperature Temperature Distribution	Type: CGH, no polarization, no retroreflector Construction Data Center position X: 0 Y: 0 Z: 10 Z: 11 Z: 11 Z: 11 Z: 11 Z: 11 Z: 10 View Data

Figure 12. Applying the example CGH surface property with *Automatically calculate* checked for the Construction Data.

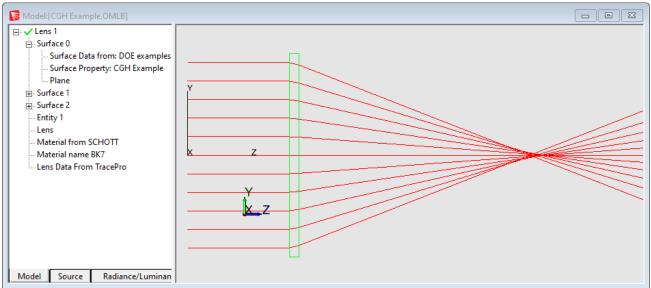


Figure 13. Rays traced through the Lens Element with example CGH surface property applied.

Zernike Phase

The following is a recipe for making an example Zernike Phase surface property.

- 1. In a new document, make a Lens Element using **Geometry**|Lens Element. Use all default input values, except on the **Position** tab, set the *First Surface Center* to x=0, y=0, z=10.
- Open the Surface Property Editor (Define|Edit Property Data>Surface Properties...). Make a new catalog or select an existing catalog.
- 3. Make a new property by clicking Add Property... and entering a name, then selecting ABg for the *Scatter Model*, and finally clicking OK.
- 4. Change the **Type** of the property to *Zernike Phase*.
- 5. The property has diffracted orders like a grating. In the *Data Points* box, click the **Add...** button and add a diffraction order equal to 1.
- 6. In the Data Points box, click the Delete... button and delete the grating order 0.
- 7. In the data grid, set the *Specular Trans* value for Order 1 to 1.0 and the absorptance to zero. All of the flux incident on the surface will be directed into the Order 1 transmitted beam.
- 8. Select the **Coefficients** tab and enter -1.0 for the $2\rho^2$ 1 term. The completed property should appear as in Figure 14. Save the property and close the **Surface Property Editor** window.
- 9. In the System Tree, select Surface 0 of the Lens Element you created earlier. Open the Apply Properties dialog box (Define|Apply Properties...), and select the Catalog and Name of the property you created. In the Construction Data box in the Reference Data tab, note that Automatically calculate is checked and calculated values for Center position, Optical axis vector and Up Vector are entered, as shown in Figure 15. Set the Normalization Radius to 10 to match the aperture radius of the surface. Click Apply.
- 10. In the **Source Tree**, enable **Grid Source 1**. Open the Grid Source and set the **Grid Pattern** to *Cross*. Click Modify and close the **Grid Source** dialog box.
- 11. Trace rays and observe that the diffracted rays converge behind the Lens Element as shown in Figure 16.

You can adjust the Zernike Phase surface property if you wish to see the effects of unwanted diffracted orders, reflected orders, or scattered light.

Surface Property Edit	tor			- • •
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Catalog	Catalog: DOE	examples	▼ Name: Zernike Phase example ▼	^
Add Catalog	Description:			
Delete Catalog			Scatter: ABg	
Add Property	Type: Zerni	ke Phase	Scatter: ABg Retroreflector Polarization	
Delete Property	Design 0.54 Wavelength:	61	(µm) Units: mm	
Copy Property	Max n: 6			
Data Points				~
Sort by	Term	Coefficient		^
<u>A</u> dd	1	0.0		
Delete	ρsinθ	0		
Solve For:	ρ cosθ	0		
None 💌	ρ^2 sin2θ	0		
	2p^2 - 1	-1.0		
Plot Options	ρ^2 cos2θ	0		
	ρ^3 sin3θ	0		
	(3p^2 - 2)ρ sinθ	0		
	(3p^2 - 2)ρ cosθ	0		
	ρ^3 cos3θ	0		
	n=4, m=-4	0		
	n=4, m=-2	0		
	n=4, m=0	0		×
ļ	Grid Coef	ficients		

Figure 14. Example Zernike Phase surface property.

Apply Properties	_	Х
Apply Properties Bulk Scatter Class and User Data Color Diffraction Exit Surface Fluorescence Gradient Index Importance Sampling Material Mueller Matrix Prescription Raytrace Flag RepTile Surface Surface Surface Source Temperature Temperature Distribution	Surface Catalog: DOE examples Name: Zernike Phase example Description: Image: Catalog: Scatter: ABg Scatter Reference Data Image: Catalog: Type: Zernike Phase, no polarization, no retroreflector Construction Data Optical axis vector X: 0 Y: 0 Y: 0	×
	Y: 0 Y: 0 Z: 10 Z: 1 Z: 10 I I	
	Apply View Data	

Figure 15. Applying the example Zernike Phase surface property with *Automatically calculate* checked for the Construction Data.

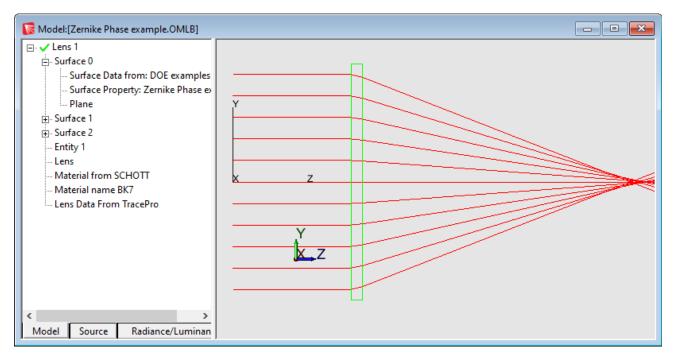


Figure 16. Rays traced through the Lens Element with example Zernike Phase surface property applied.

STRAY LIGHT ANALYZER

The Stray Light Analyzer automates many of the tasks involved in the stray light analysis of an optical system including defining multiple light sources positions and rotations as well as populating the Path Sort Analysis Table. This feature is available in TracePro Standard and Expert.

The Stray Light Analyzer Lens System View window allows a user to load a lens model from TracePro and automatically assign unique names to the lens elements and surfaces.

ð	∕ *	2 1						
)isplay	r: Di	splay all objects & surfaces	~		Advanced	Select	Л л	
Diff	ID	Object/Surface Name	Catalog Name		Property Name	^		
	1,2	Lens_1	SCHOTT	~	BASF51	~		
	1	Lens_1_S1		~		~		
	2	Lens_1_S2		~		~		
	-1	Lens_1_Edge2		~		~		
	3,4	Lens_2	SCHOTT	~	LAKN7	~		
	3	Lens_2_S3		~		~		13
	4	Lens_2_S4		~		~	2 46 8 10 12	13
	-1	Lens_2_Edge2		~		~	2 40 0 10 12	
	5,6	Lens_3	SCHOTT	~	SF1	~	6	
	6	Lens_3_S6		~		\sim		
	5	Lens_3_S5		~		~		
	-1	Lens_3_Edge2		\sim		~		
	-1	Lens_3_Edge3		~		~		
	7.8	Lens_4	SCHOTT	\sim	BASF2	~		
	7	Lens_4_S7		~		~ ~		$ \rightarrow $
oply	Materia	I I Property to Selected Objects -				·		
Mada	rial Cat	alog ·	Property Name :		An	olv		

Figure 17. Lens System View window

The Stray Light Analysis Control Panel gives users the option to use either an auto-generated file source or a TracePro Grid Source in the stray light analysis. Additional options are source irradiance, total rays, theta and phi angles, entrance pupil, Irradiance Map settings, Flux Threshold and Total Intercepts, and Path Sort table options.

🖳 Stray Light Analysis	Control Panel						
Mode : Auto-generate Scan Variables	d file source 🗸 🗸	Source Options Source Irradiance W/m2 : 1000 Total Rays : 100000					
File Sou	rce Setting	Irradiance Map Options					
Theta Deg	[0,10:6]	Irr. Map No. of Pixel : 101 Smoothing : None Rays to plot : Incident Symmetry : None					
Phi Deg	0	Analysis Options					
Wavelength	0.55	✓ Flux threshold : 0.002 ✓ Total Intercepts : 100 Path Sort Table Filter : Abosrbed Flux (Descending) ✓ Save Top 50					
Entrance pupil Set first lens surface Import surface as Add Del Object Lens_1 Apply clear apertu Source Previw Incident angle : Theta	entrance pupil Surface Lens_1_S1 re radius : 0	Path Soft Table Hitter: Abostbed Hux (Descending) ♥ Save Top 30 Paths Auto backup result after each raytrace at: C:\Users\djacobsen\AppData\Locz					

The Stray Light Analyzer will automatically define the sources, trace the rays, and populate the analysis table. At that point the individual paths can be sorted and analyzed.

🖁 Analysis Lis			0-			ন 🖸 Gamma	a: 0.	75						×
List : Light I			Exclude In	nage Path			1				91 -0.030 0.0305 0.091			
				nuge i uni							1 -0.050 0.0505 0.091			
Filter 1 : All Pa		~								.1526-		-0.152		
Filter 2 : All Par	ths	~								.0916-		-0.091		
Path	Max Irr.	Total Flux	No. Rays	No. Paths	No. Intercepts	^	il					0.001		
TO	225644	0.429163	156	3	2		1			.0305-		-0.030		
T2	591975	5.14753	2200	4	4		Ш.			<u>}</u>	. /			
T4R2TIR4K8	1612.51	0.037077	2401	1	12		Ш.			0.030-		0.03(
T802	9758.23	0.053765	115	2	10		Ш.							
T1002	23587.6	0.27725	433	2	12					0.091-		0.09:		
T8R203	695.973	0.019592	2745	1	12					0.152-		0.15;		
T8R201	729.323	0.050253	6248	3	12		н.							
T8R202	4005.566	0.117173	15439	4	12					-0.152 -0.09	81 -0.030 0.0305 0.091	6 0.1526		
T10R102	4807.96	0.037818	233	1	13		It.							
T10R101	5433.48	0.107365	734	2	13			<< < 1/1 >	>> Copy O	- Seq. T. O - Trans.	- Seq. R. O - Ref	1. O-TIR 🗖 - E	Exit Seq. 📕 - Return Se	q.
T1201	502753.5	88.0516	60158	6	14									
T12	532313000	425.3811	281649	6	14		Ш.	Lens_1-Lens_1_S1	Lens_1-Lens_1_52	Lens_2-Lens_2_S3	Lens_2-Lens_2_54	Lens_3-Lens_3_S5	Lens_3-Lens_3_56	
T12TIR102	93454.49	0.60938	489	5	15			1						
T14TIR204	131252	0.667153	493	5	18									
T12R201	684.837	0.0722	8636	3	16									
T12R201	1209.817	0.064711	8854	3	16									<
T12R2O2	3069.715	0.12651	15456	3	16									
T12R2O3	4322.16	0.022697	3632	2	16									>
T12R2O2	1148.132	0.097392	16334	6	16									
T12R2	634.2887	0.19771	30513	6	16			_						
T12R2	790.8454	0.236694	31354	6	16									
T12R201	4901.207	0.243689	37741	6	16		11							
T12R201	58124.81	0.965838	121853	6	16	~					× ×			
		1	2		3	4								
Object Nam	ne		Lens_6		Lens_6	Lens_7		2						
Surface Nar	me		Lens_6_S11	E. I	Lens_6_S12	Detector								
Sequence/Gro	up ID		11		12	13								
Intercept	Emitte	ed	SpecTran		SpecTran	At Surface								