



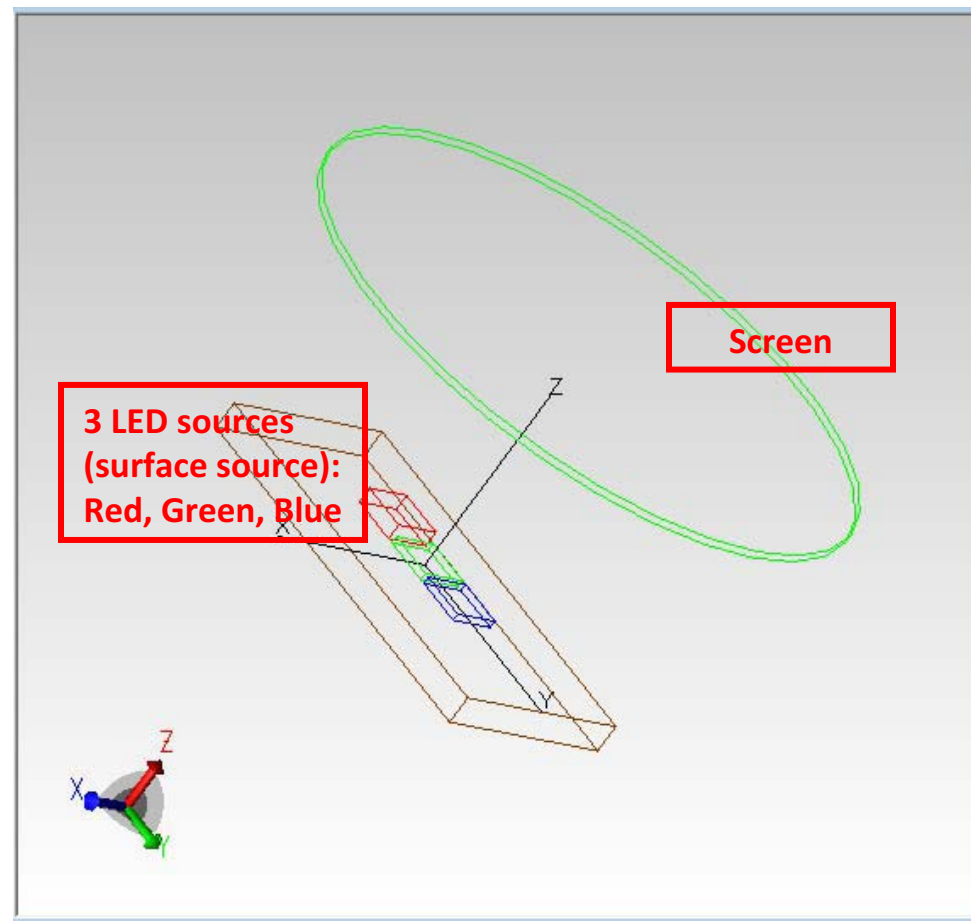
Trace**Pro**

# Biaxial Lens Optimization



# Biaxial lens optimization

**Model in TracePro (ex3.oml)**



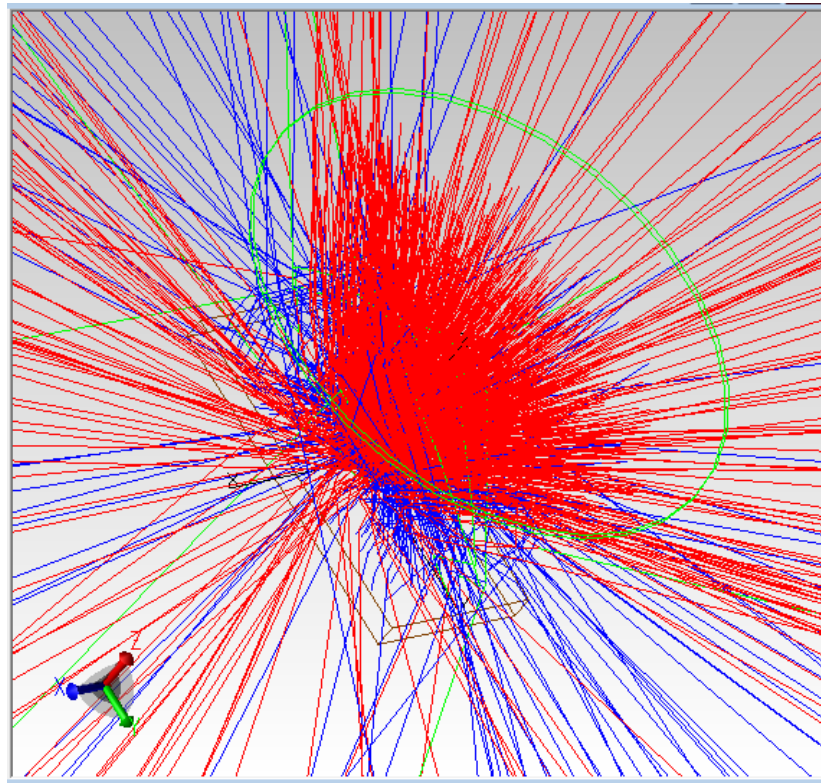
TracePro



# Biaxial lens optimization

## Target

- Maximize the total flux on the detector surface

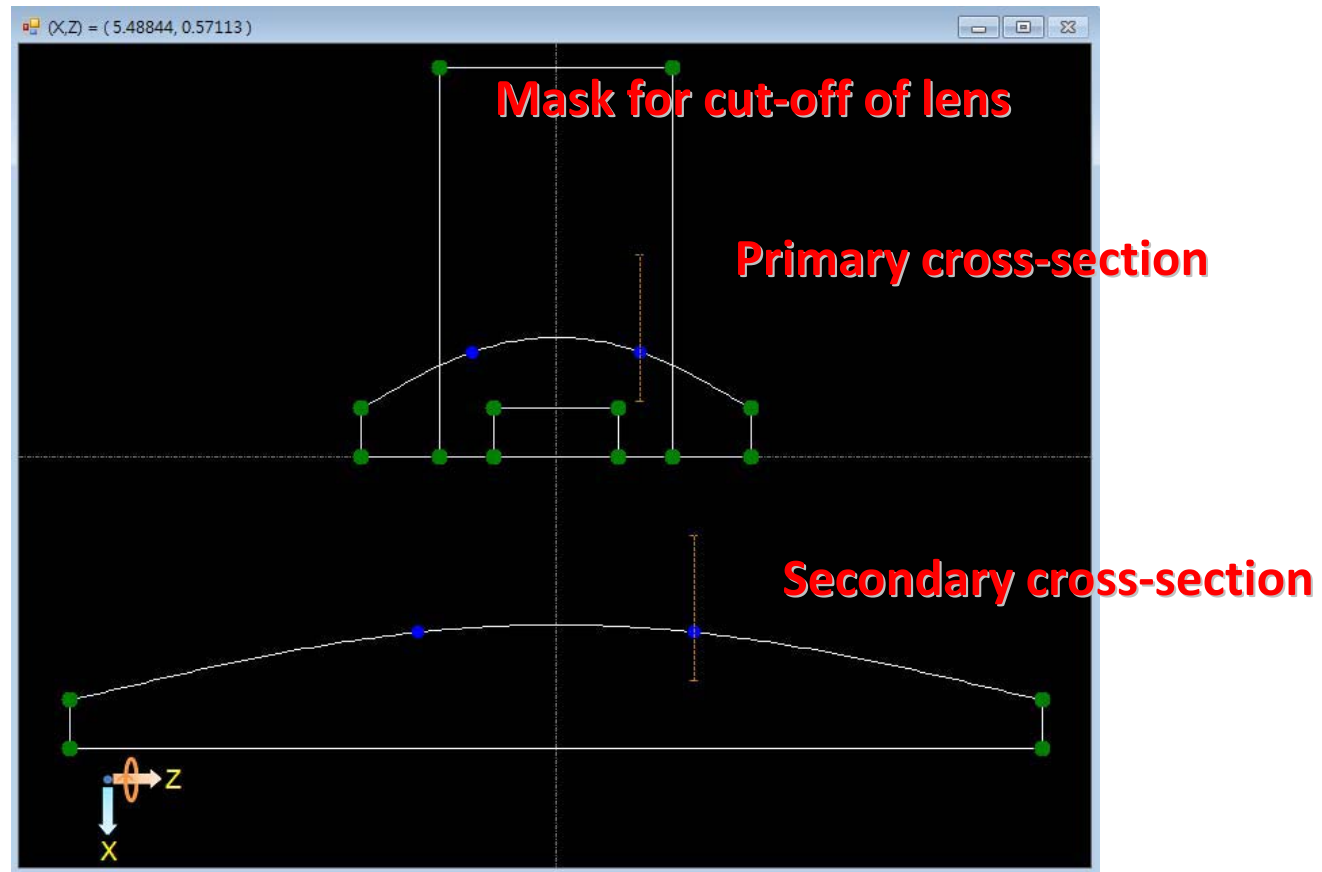


TracePro



# Biaxial lens optimization

TracePro





# Biaxial lens optimization

TracePro

The screenshot displays the TracePro software interface. On the left, a 3D model of a lens is shown with a coordinate system (X, Y, Z) at the bottom left. The lens profile is defined by several control points (green dots) and a central axis. Two red arrows point to the two control points on the left side of the lens profile, indicating they are the variables being optimized. The top of the window shows the coordinates  $(X,Z) = (3.77504, -4.19295)$ .

On the right, the 'Optimization' dialog box is open. It contains the following information:

- Save path: D:\ProjectLED\_Lens\3Led\opt
- File prefix: opt
- Variables table:

Object / Var name	ID	Type	Value	Low limit	Hi limit
Obj 0/ Crv 1	0	Pos-Z	1.073368	0.5	1
Obj 1/ Crv 5	0	Pos-Z	-1.8016...	0.5	1

Below the variables table is the 'Operands' section with a table:

Type	Opt	Wgt	Surface	Location	Target
Flux	Sum	1.0	detector		1

At the bottom of the dialog is the 'Objects' table:

Output?	Object ID	Name	Mat. Catalog	Mat. Property	Geo. type	Linked Obj / Length	After-scheme
<input checked="" type="checkbox"/>	0	Epoxy	Plastic	KER2500	Biaxial	Object 1	
<input type="checkbox"/>	1	Object 1			RadialSym...		
<input checked="" type="checkbox"/>	2	mask			Extrusion	5.4	remove("Epoxy", "LED_R")rem...

A 'Start' button is located at the bottom right of the dialog box.

We choose y shifts for the two control point as the variables, which is enough to vary the resultant profile of the bi-axial lens.



# Biaxial lens optimization

The only operand for the optimization target is the total flux on the detector surface.

Operands

	Type	Opt.	Wgt.	Surface	Location	Target
▶	Flux	Sum	1.0	detector		1

# Biaxial lens optimization



Output?	Object ID	Name	Mat. Catalog	Mat. Property	Geo. type	Linke Le
		Pre-processor				
<input checked="" type="checkbox"/>	0	Epoxy	Plastic	KER2500	Biaxial	Object
<input type="checkbox"/>	1	Object 1			RadialSym...	
<input checked="" type="checkbox"/>	2	mask			Extrusion	5.4 intersect("Epoxy","mask")
<input checked="" type="checkbox"/>	4	airgap			Extrusion	4.4 subtract("Epoxy","airgap")

```
intersect("Epoxy","mask")
```



1. Name the object#0 as "Epoxy" and check it to create it in TracePro.
2. Select the geometry type as "Biaxial" and its linked object should be selected as "object 1" since object 0 is the primary and object 1 is the secondary profile.
3. We don't want to really create object 1 in TracePro, so please remember to uncheck Object 1.
4. Rename Object 2 as "mask" which is to cut the unwanted portion of Epoxy, then we need an after scheme macro to perform the cut-off.
5. Rename Object 4 as "airgap", to make a hole in the bottom of the epoxy.

```
subtract("Epoxy","airgap")
```

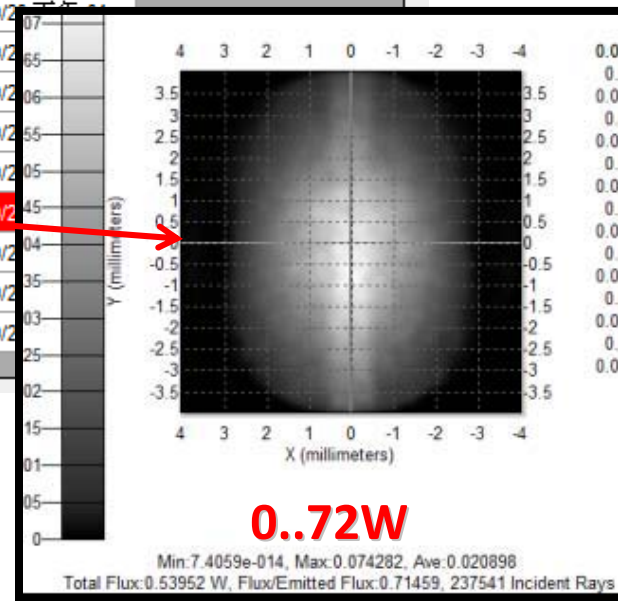
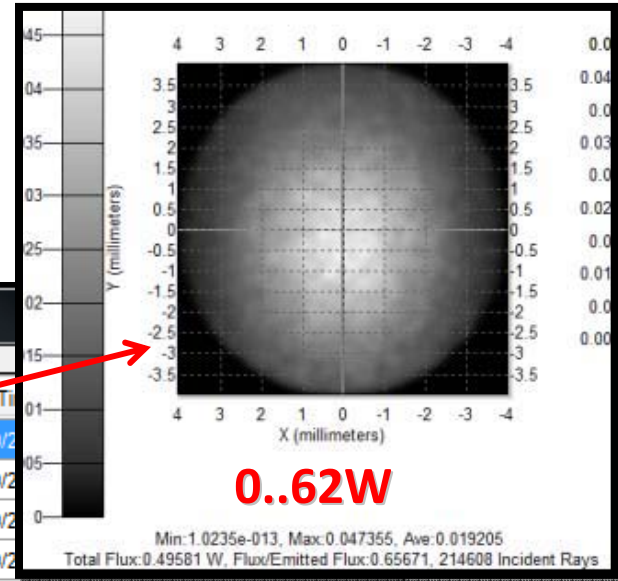


# Biaxial lens optimization

TracePro

Optimization Log

ID	Err	Var.	Ti
1	0.504185	{1.0733684,-1.8016971}	2010/9/2
2	0.469615	{1.4474017,-1.4630574}	2010/9/2
3	0.483537	{1.3447365,-2.179538}	2010/9/2
4	0.465994	{1.7187698,-1.8408983}	2010/9/2
5	0.473103	{2.0414705,-1.8604989}	2010/9/2
6	0.461831	{1.821435,-1.1244177}	2010/9/2
7	0.466985	{2.0597843,-0.8016971}	2010/9/2
8	0.47087	{2.0733684,-1.5022586}	2010/9/2
9	0.464147	{1.6087521,-1.4728577}	2010/9/2
10	0.460483	{1.7114173,-0.8016971}	2010/9/2
11	0.460506	{1.7077411,-0.8016971}	2010/9/2
12	Invalid	{1.9241003,-0.8016971}	2010/9/2
13	Evaluating.../	{2.0733684,-0.8016971}	2010/9/2







# Biaxial lens optimization

Example 4 demonstrates how to use the Interactive Optimizer for a non-radial symmetric lens. However the resultant lens created by bi-axial method is not a biconic lens which is popular in street light design and laser reshaping. **The biconic lens can be accomplished in the optimizer.**

Trace**Pro**