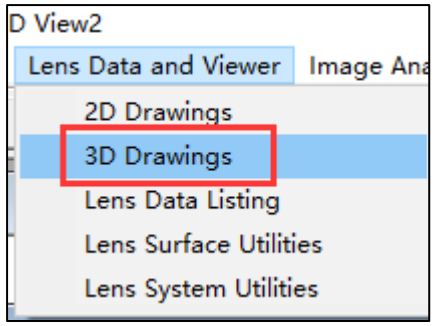
To make a solid drawing of the lens system with rays, you can Use the GUI in the UP version:

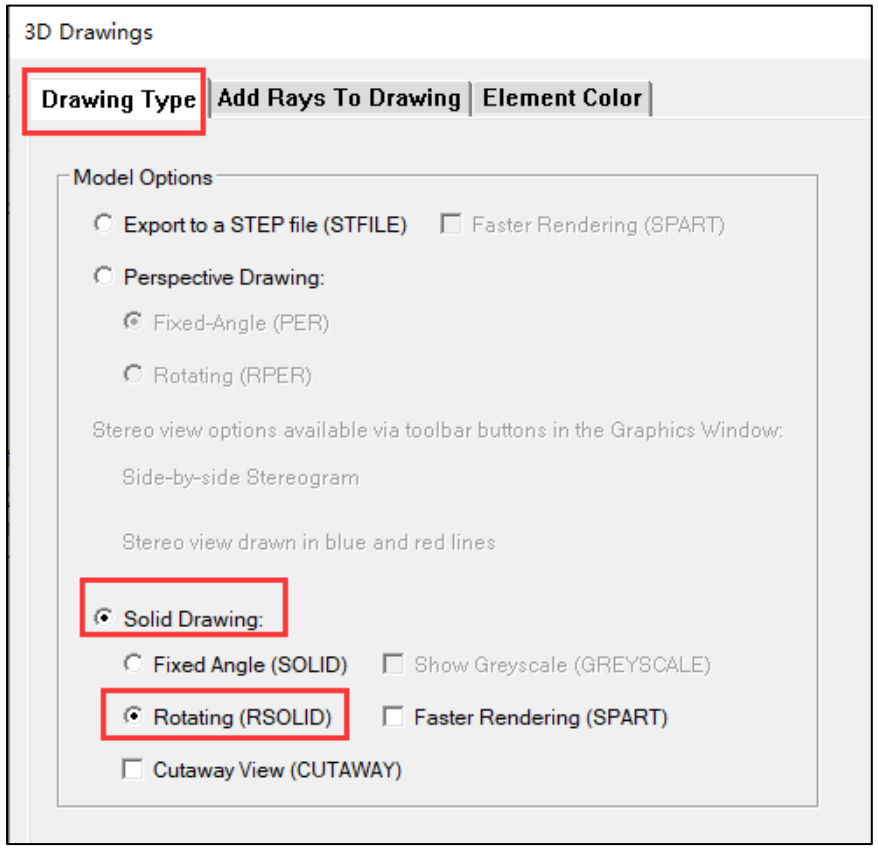
- In the menu bar, click open Lens Data and Viewer. Then select 3D Drawings.

- In the 3D Drawings dialog, select:

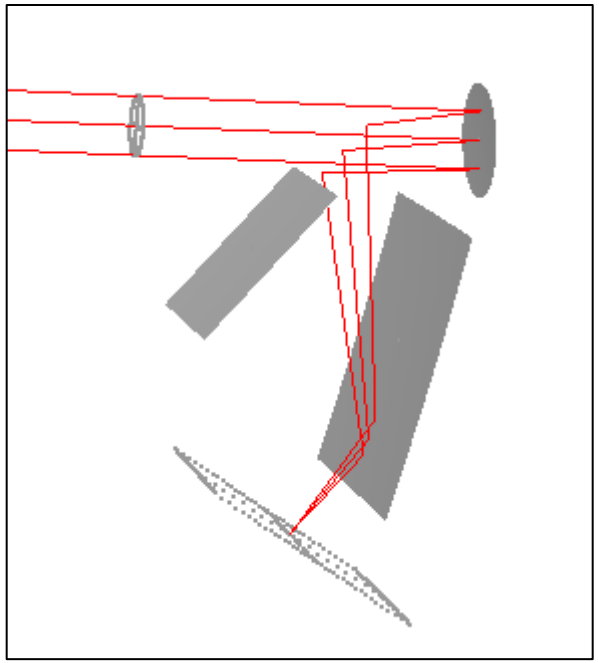
  Solid Drawing

  Rotating(RSOLID)





- Click at the ‘Add Rays To Drawing’ tab to specify the individual rays or raygrids to be displayed in the plot



3D Drawings

Drawing Type | Add Rays To Drawing | Element Color

Quick Ray Sets

Include Tangential Rayfan(s) from: An On-Axis Field Point | The Full Field | Field Points: 0.0, 1.0 and -1.0

Individual Rays

	Color Number	Fractional Y-Field (HBAR)	Fractional X-Field (GBAR)	Fractional X-Pupil (XEN)	Fractional Y-Pupil (YEN)	Ray Color
Show this Ray	P	0	0	0	0	Red
Show this Ray	P	0	0	0	1	Red
Show this Ray	P	0	0	0	-1	Red
Show this Ray	P	0	0	0	0	Yellow
Show this Ray	P	0	0	0	0	Yellow

Note:
Yellow and White are drawn on a black background,
and will be black on a white background.

Ray Grids

Pupil Pattern (1 - 4)	Color Number	Fractional Y-Field (HBAR)	Fractional X-Field (GBAR)	Number of Rays	Ray Color
1	P	0	0	20	Yellow
1	P	0	0	20	Yellow
1	P	0	0	20	Yellow
1	P	0	0	20	Yellow
1	P	0	0	20	Yellow

Pupil Pattern Options (1 - 4)

1: Circular Raygrid (PUPIL 1)

2: Sagittal X-Rayfan (PUPIL 2)

3: Tangential Y-Rayfan (PUPIL 2)

4: Rim Rays (PUPIL 3)

Command Line:

```
RSOLID 0 0 0 0 0
PLOT
RED
RAY P 0 0 0 0
RED
RAY P 0 0 1 0
RED
RAY P 0 0 -1 0
END
```

Execute | Close

You can use scripting languages in a macro to add rays to the solid model of the system:

- Specify any individual ray to be displayed by adding commands in the macro (see attached macro, solid_model with rays.mac)

```
RSOL 0 0 0 1 99
PLOT
RED
RAY P 0 0 0 0
RED
RAY P 0 0 1 0
RED
RAY P 0 0 -1 0

GREEN
RAY P -1 0 0 0
GREEN
RAY P -1 0 1 0
GREEN
RAY P -1 0 -1 0

BLUE
RAY P 1 0 0 0
BLUE
RAY P 1 0 1 0
BLUE
RAY P 1 0 -1 0

END
```