

System/Prescription Data

File : U:\alpi's designs\1.0 Meter\1.0 meter optical design\Old Lenses- Design Stuff\LCOGT 1.0meter Telescope Design for UCSB.zmx
Title: LCOGT 1.0 Meter Telescope
Date : THU NOV 19 2009

LENS NOTES:

GENERAL LENS DATA:

Surfaces : 12
Stop : 2
System Aperture : Float By Stop Size = 500
Glass Catalogs : SCHOTT BIREFRINGENT MISC CORNING
Ray Aiming : Off
Apodization : Uniform, factor = 0.00000E+000
Temperature (C) : 2.00000E+001
Pressure (ATM) : 1.00000E+000
Adjust Index Data To Environment : Off
Effective Focal Length : 7954.554 (in air at system temperature and pressure)
Effective Focal Length : 7954.554 (in image space)
Back Focal Length : 10.03642
Total Track : 2513
Image Space F/# : 7.954554
Paraxial Working F/# : 7.954554
Working F/# : 7.953982
Image Space NA : 0.06273327
Object Space NA : 4.999999e-008
Stop Radius : 500
Paraxial Image Height : 58
Paraxial Magnification : 0
Entrance Pupil Diameter : 1000
Entrance Pupil Position : 1900
Exit Pupil Diameter : 117.6256
Exit Pupil Position : -935.6225
Field Type : Real Image height in Millimeters

Maximum Radial Field : 58
Primary Wavelength : 0.4 μm
Lens Units : Millimeters
Angular Magnification : 8.501553

Fields : 6

Field Type: Real Image height in Millimeters

#	X-Value	Y-Value	Weight
1	0.000000	0.000000	1.000000
2	0.000000	25.900000	1.000000
3	0.000000	36.700000	1.000000
4	0.000000	44.900000	1.000000
5	0.000000	51.900000	2.000000
6	0.000000	58.000000	2.000000

Vignetting Factors

#	VDX	VDY	VCX	VCY	VAN
1	0.000000	0.000000	0.000000	0.000000	0.000000
2	0.000000	0.000000	0.000000	0.000000	0.000000
3	0.000000	0.000000	0.000000	0.000000	0.000000
4	0.000000	0.000000	0.000000	0.000000	0.000000
5	0.000000	0.000000	0.000000	0.000000	0.000000
6	0.000000	0.000000	0.000000	0.000000	0.000000

Wavelengths : 5

Units: μm

#	Value	Weight
1	0.400000	1.000000
2	0.486000	1.000000
3	0.587000	1.000000
4	0.656000	1.000000
5	1.000000	1.000000

SURFACE DATA SUMMARY:

Surf	Type	Radius	Thickness	Glass	Diameter	Conic	Comment
OBJ	STANDARD	Infinity	Infinity		0	0	STAR AT INFINITY
1	STANDARD	Infinity	1900		1027.668	0	
STO	STANDARD	-5000	-1755.958	MIRROR	1000	-1.1367	PRIMARY MIRROR
3	STANDARD	-2170.96	1931.958	MIRROR	325	-5.1389	SECONDARY MIRROR
4	STANDARD	846.49	22	C79-80	240	0	LENS 1
5	STANDARD	3955.63	36		240	0	
6	STANDARD	-1256.84	18	C79-80	240	0	LENS 2
7	STANDARD	4000.67	295		240	0	
8	STANDARD	Infinity	8	BK7	130	0	FILTER
9	STANDARD	Infinity	40		130	0	
10	STANDARD	-665.93	8	C79-80	130	0	LENS 3
11	STANDARD	Infinity	10		130	0	
IMA	STANDARD	Infinity			116	0	IMAGE

SURFACE DATA DETAIL:

Surface OBJ : STANDARD STAR AT INFINITY
 Surface 1 : STANDARD
 Surface STO : STANDARD PRIMARY MIRROR
 Mirror Substrate : Curved, Thickness = 1.71000E+002
 Aperture : Circular Aperture
 Minimum Radius : 175
 Maximum Radius : 500
 Surface 3 : STANDARD SECONDARY MIRROR
 Mirror Substrate : Curved, Thickness = 5.50000E+001
 Aperture : Circular Aperture
 Minimum Radius : 41
 Maximum Radius : 162.5
 Surface 4 : STANDARD LENS 1
 Aperture : Floating Aperture
 Maximum Radius : 120
 Surface 5 : STANDARD
 Aperture : Floating Aperture
 Maximum Radius : 120
 Surface 6 : STANDARD LENS 2
 Aperture : Floating Aperture
 Maximum Radius : 120
 Surface 7 : STANDARD

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Aperture      : Floating Aperture
Maximum Radius :          120
Surface  8    : STANDARD FILTER
Aperture      : Floating Aperture
Maximum Radius :          65
Surface  9    : STANDARD
Aperture      : Floating Aperture
Maximum Radius :          65
Surface 10    : STANDARD LENS 3
Aperture      : Floating Aperture
Maximum Radius :          65
Surface 11    : STANDARD
Aperture      : Floating Aperture
Maximum Radius :          65
Surface IMA   : STANDARD IMAGE

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COATING DEFINITIONS:

EDGE THICKNESS DATA:

Surf	Edge
1	1875.008538
STO	-1737.012966
3	1946.553309
4	15.271729
5	28.437622
6	25.541872
7	293.199896
8	8.000000
9	36.820153
10	11.179847
11	10.000000
IMA	0.000000

SOLVE AND VARIABLE DATA:

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Thickness of  2      : Variable
Semi Diameter  2     : Fixed
Thickness of  3      : Solve, Pickup from surface 2 scaled by -1, offset by 176
Semi Diameter  3     : Fixed

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Semi Diameter 4 : Fixed
 Semi Diameter 5 : Fixed
 Semi Diameter 6 : Fixed
 Semi Diameter 7 : Fixed
 Semi Diameter 8 : Fixed
 Semi Diameter 9 : Fixed
 Semi Diameter 10 : Fixed
 Semi Diameter 11 : Fixed
 Semi Diameter 12 : Fixed

INDEX OF REFRACTION DATA:

System Temperature: 20.0000 Celsius
 System Pressure : 1.0000 Atmospheres
 Absolute air index: 1.000278 at wavelength 0.400000 μm
 Index data is relative to air at the system temperature and pressure.
 Wavelengths are measured in air at the system temperature and pressure.

Surf	Glass	Temp	Pres	0.400000	0.486000	0.587000	0.656000	1.000000
0		20.00	1.00	1.000000000	1.000000000	1.000000000	1.000000000	1.000000000
1		20.00	1.00	1.000000000	1.000000000	1.000000000	1.000000000	1.000000000
2	MIRROR	20.00	1.00	1.000000000	1.000000000	1.000000000	1.000000000	1.000000000
3	MIRROR	20.00	1.00	1.000000000	1.000000000	1.000000000	1.000000000	1.000000000
4	C79-80	22.00	1.00	1.47012739	1.46314007	1.45848677	1.45637677	1.45042055 Corning
7980 KrF Grade glass								
5		20.00	1.00	1.000000000	1.000000000	1.000000000	1.000000000	1.000000000
6	C79-80	22.00	1.00	1.47012739	1.46314007	1.45848677	1.45637677	1.45042055 Corning
7980 KrF Grade glass								
7		20.00	1.00	1.000000000	1.000000000	1.000000000	1.000000000	1.000000000
8	BK7	20.00	1.00	1.53084854	1.52238589	1.51682355	1.51433085	1.50750220
9		20.00	1.00	1.000000000	1.000000000	1.000000000	1.000000000	1.000000000
10	C79-80	22.00	1.00	1.47012739	1.46314007	1.45848677	1.45637677	1.45042055 Corning
7980 KrF Grade glass								
11		20.00	1.00	1.000000000	1.000000000	1.000000000	1.000000000	1.000000000
12		20.00	1.00	1.000000000	1.000000000	1.000000000	1.000000000	1.000000000

THERMAL COEFFICIENT OF EXPANSION DATA:

Surf	Glass	TCE *10E-6
0		0.00000000
1		0.00000000

2	MIRROR	0.00000000	
3	MIRROR	0.00000000	
4	C79-80	0.52000000	Corning 7980 KrF Grade glass
5		0.00000000	
6	C79-80	0.52000000	Corning 7980 KrF Grade glass
7		0.00000000	
8	BK7	7.10000000	
9		0.00000000	
10	C79-80	0.52000000	Corning 7980 KrF Grade glass
11		0.00000000	
12		0.00000000	

GLOBAL VERTEX COORDINATES, ORIENTATIONS, AND ROTATION/OFFSET MATRICES:

Reference Surface: 2

Surf	R11	R12	R13	X
	R21	R22	R23	Y
	R31	R32	R33	Z
1	1.0000000000	0.0000000000	0.0000000000	0.000000000E+000
	0.0000000000	1.0000000000	0.0000000000	0.000000000E+000
	0.0000000000	0.0000000000	1.0000000000	-1.900000000E+003
2	1.0000000000	0.0000000000	0.0000000000	0.000000000E+000 PRIMARY MIRROR
	0.0000000000	1.0000000000	0.0000000000	0.000000000E+000
	0.0000000000	0.0000000000	1.0000000000	0.000000000E+000
3	1.0000000000	0.0000000000	0.0000000000	0.000000000E+000 SECONDARY MIRROR
	0.0000000000	1.0000000000	0.0000000000	0.000000000E+000
	0.0000000000	0.0000000000	1.0000000000	-1.755957584E+003
4	1.0000000000	0.0000000000	0.0000000000	0.000000000E+000 LENS 1
	0.0000000000	1.0000000000	0.0000000000	0.000000000E+000
	0.0000000000	0.0000000000	1.0000000000	1.760000000E+002
5	1.0000000000	0.0000000000	0.0000000000	0.000000000E+000
	0.0000000000	1.0000000000	0.0000000000	0.000000000E+000
	0.0000000000	0.0000000000	1.0000000000	1.980000000E+002
6	1.0000000000	0.0000000000	0.0000000000	0.000000000E+000 LENS 2

	0.0000000000	1.0000000000	0.0000000000	0.000000000E+000	
	0.0000000000	0.0000000000	1.0000000000	2.340000000E+002	
7	1.0000000000	0.0000000000	0.0000000000	0.000000000E+000	
	0.0000000000	1.0000000000	0.0000000000	0.000000000E+000	
	0.0000000000	0.0000000000	1.0000000000	2.520000000E+002	
8	1.0000000000	0.0000000000	0.0000000000	0.000000000E+000	FILTER
	0.0000000000	1.0000000000	0.0000000000	0.000000000E+000	
	0.0000000000	0.0000000000	1.0000000000	5.470000000E+002	
9	1.0000000000	0.0000000000	0.0000000000	0.000000000E+000	
	0.0000000000	1.0000000000	0.0000000000	0.000000000E+000	
	0.0000000000	0.0000000000	1.0000000000	5.550000000E+002	
10	1.0000000000	0.0000000000	0.0000000000	0.000000000E+000	LENS 3
	0.0000000000	1.0000000000	0.0000000000	0.000000000E+000	
	0.0000000000	0.0000000000	1.0000000000	5.950000000E+002	
11	1.0000000000	0.0000000000	0.0000000000	0.000000000E+000	
	0.0000000000	1.0000000000	0.0000000000	0.000000000E+000	
	0.0000000000	0.0000000000	1.0000000000	6.030000000E+002	
12	1.0000000000	0.0000000000	0.0000000000	0.000000000E+000	IMAGE
	0.0000000000	1.0000000000	0.0000000000	0.000000000E+000	
	0.0000000000	0.0000000000	1.0000000000	6.130000000E+002	

GLOBAL SURFACE CENTER OF CURVATURE POINTS:

Reference Surface: 2

Surf	X	Y	Z	
1	-	-	-	
2	0.0000000000	0.0000000000	-5000.0000000000	PRIMARY MIRROR
3	0.0000000000	0.0000000000	-3926.9175840150	SECONDARY MIRROR
4	0.0000000000	0.0000000000	1022.4900000000	LENS 1
5	0.0000000000	0.0000000000	4153.6300000000	
6	0.0000000000	0.0000000000	-1022.8400000000	LENS 2
7	0.0000000000	0.0000000000	4252.6700000000	
8	-	-	-	FILTER

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9          -          -          -
10 0.0000000000 0.0000000000 -70.9299999998 LENS 3
11          -          -          -
12          -          -          - IMAGE

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ELEMENT VOLUME DATA:

For centered elements with plane or spherical circular faces, exact volumes are computed by assuming edges are squared up to the larger of the front and back radial aperture.

For all other elements, approximate volumes are numerically integrated to 0.1% accuracy. Zero volume means the volume cannot be accurately computed.

Single elements that are duplicated in the Lens Data Editor for ray tracing purposes may be listed more than once yielding incorrect total mass estimates.

			Volume cc	Density g/cc	Mass g
Element surf	4 to	5	843.390626	2.201000	1856.302768
Element surf	6 to	7	984.791767	2.201000	2167.526679
Element surf	8 to	9	106.185832	2.510000	266.526438
Element surf	10 to	11	127.272417	2.201000	280.126590
Total Mass:					4570.482475

F/# DATA:

F/# calculations consider vignetting factors and ignore surface apertures.

#	Field	Wavelength: 0.400000		0.486000		0.587000	
		Tan	Sag	Tan	Sag	Tan	Sag
1	0.00 mm:	7.9540	7.9540	7.9542	7.9542	7.9544	7.9544
2	25.90 mm:	7.9581	7.9564	7.9582	7.9565	7.9583	7.9566
3	36.70 mm:	7.9622	7.9588	7.9622	7.9589	7.9623	7.9589
4	44.90 mm:	7.9663	7.9612	7.9663	7.9612	7.9662	7.9612
5	51.90 mm:	7.9705	7.9636	7.9703	7.9635	7.9702	7.9635
6	58.00 mm:	7.9747	7.9660	7.9744	7.9659	7.9742	7.9658

#	Field	Wavelength: 0.656000		1.000000	
		Tan	Sag	Tan	Sag
1	0.00 mm:	7.9544	7.9544	7.9546	7.9546

2	25.90 mm:	7.9583	7.9567	7.9584	7.9568
3	36.70 mm:	7.9623	7.9590	7.9623	7.9590
4	44.90 mm:	7.9662	7.9612	7.9661	7.9612
5	51.90 mm:	7.9702	7.9635	7.9700	7.9635
6	58.00 mm:	7.9741	7.9658	7.9739	7.9657

CARDINAL POINTS:

Object space positions are measured with respect to surface 1.
Image space positions are measured with respect to the image surface.
The index in both the object space and image space is considered.

	Object Space	Image Space
W = 0.400000 (Primary)		
Focal Length :	-7954.553932	7954.553932
Focal Planes :	-65726.060508	0.036422
Principal Planes :	-57771.506576	-7954.517511
Anti-Principal Planes :	-73680.614440	7954.590354
Nodal Planes :	-57771.506576	-7954.517511
Anti-Nodal Planes :	-73680.614440	7954.590354
W = 0.486000		
Focal Length :	-7954.883285	7954.883285
Focal Planes :	-65050.205159	0.056107
Principal Planes :	-57095.321874	-7954.827178
Anti-Principal Planes :	-73005.088444	7954.939392
Nodal Planes :	-57095.321874	-7954.827178
Anti-Nodal Planes :	-73005.088444	7954.939392
W = 0.587000		
Focal Length :	-7955.091268	7955.091268
Focal Planes :	-64599.709664	0.068500
Principal Planes :	-56644.618396	-7955.022768
Anti-Principal Planes :	-72554.800932	7955.159768
Nodal Planes :	-56644.618396	-7955.022768
Anti-Nodal Planes :	-72554.800932	7955.159768
W = 0.656000		
Focal Length :	-7955.182809	7955.182809
Focal Planes :	-64395.333276	0.073966
Principal Planes :	-56440.150467	-7955.108843

Anti-Principal Planes :	-72350.516085	7955.256775
Nodal Planes :	-56440.150467	-7955.108843
Anti-Nodal Planes :	-72350.516085	7955.256775
W = 1.000000		
Focal Length :	-7955.434072	7955.434072
Focal Planes :	-63818.072147	0.089273
Principal Planes :	-55862.638075	-7955.344800
Anti-Principal Planes :	-71773.506219	7955.523345
Nodal Planes :	-55862.638075	-7955.344800
Anti-Nodal Planes :	-71773.506219	7955.523345

PHYSICAL OPTICS PROPAGATION SETTINGS SUMMARY:

OBJ STANDARD	STAR AT INFINITY
Use Rays To Propagate To Next Surface :	Off
Recompute Pilot Beam :	Off
Do Not Rescale Beam Size Using Ray Data:	Off
Use Angular Spectrum Propagator :	Off
Output Pilot Radius :	Best Fit
1 STANDARD	
Use Rays To Propagate To Next Surface :	Off
Recompute Pilot Beam :	Off
Do Not Rescale Beam Size Using Ray Data:	Off
Use Angular Spectrum Propagator :	Off
Output Pilot Radius :	Best Fit
STO STANDARD	PRIMARY MIRROR
Use Rays To Propagate To Next Surface :	Off
Recompute Pilot Beam :	Off
Do Not Rescale Beam Size Using Ray Data:	Off
Use Angular Spectrum Propagator :	Off
Output Pilot Radius :	Best Fit
3 STANDARD	SECONDARY MIRROR
Use Rays To Propagate To Next Surface :	Off
Recompute Pilot Beam :	Off
Do Not Rescale Beam Size Using Ray Data:	Off
Use Angular Spectrum Propagator :	Off
Output Pilot Radius :	Best Fit
4 STANDARD	LENS 1
Use Rays To Propagate To Next Surface :	Off
Recompute Pilot Beam :	Off

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Do Not Rescale Beam Size Using Ray Data: Off
Use Angular Spectrum Propagator      : Off
Output Pilot Radius                   : Best Fit
5 STANDARD
Use Rays To Propagate To Next Surface : Off
Recompute Pilot Beam                  : Off
Do Not Rescale Beam Size Using Ray Data: Off
Use Angular Spectrum Propagator      : Off
Output Pilot Radius                   : Best Fit
6 STANDARD          LENS 2
Use Rays To Propagate To Next Surface : Off
Recompute Pilot Beam                  : Off
Do Not Rescale Beam Size Using Ray Data: Off
Use Angular Spectrum Propagator      : Off
Output Pilot Radius                   : Best Fit
7 STANDARD
Use Rays To Propagate To Next Surface : Off
Recompute Pilot Beam                  : Off
Do Not Rescale Beam Size Using Ray Data: Off
Use Angular Spectrum Propagator      : Off
Output Pilot Radius                   : Best Fit
8 STANDARD          FILTER
Use Rays To Propagate To Next Surface : Off
Recompute Pilot Beam                  : Off
Do Not Rescale Beam Size Using Ray Data: Off
Use Angular Spectrum Propagator      : Off
Output Pilot Radius                   : Best Fit
9 STANDARD
Use Rays To Propagate To Next Surface : Off
Recompute Pilot Beam                  : Off
Do Not Rescale Beam Size Using Ray Data: Off
Use Angular Spectrum Propagator      : Off
Output Pilot Radius                   : Best Fit
10 STANDARD         LENS 3
Use Rays To Propagate To Next Surface : Off
Recompute Pilot Beam                  : Off
Do Not Rescale Beam Size Using Ray Data: Off
Use Angular Spectrum Propagator      : Off
Output Pilot Radius                   : Best Fit
11 STANDARD
Use Rays To Propagate To Next Surface : Off

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Recompute Pilot Beam           : Off
Do Not Rescale Beam Size Using Ray Data: Off
Use Angular Spectrum Propagator : Off
Output Pilot Radius             : Best Fit
IMA STANDARD                    IMAGE
Use Rays To Propagate To Next Surface : Off
Recompute Pilot Beam           : Off
Do Not Rescale Beam Size Using Ray Data: Off
Use Angular Spectrum Propagator : Off
Output Pilot Radius             : Best Fit
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FILES USED:

ZEMAX File

U:\ALPI'S DESIGNS\1.0 METER\1.0 METER OPTICAL DESIGN\OLD LENSES- DESIGN STUFF\LCOGT 1.0METER TELESCOPE DESIGN FOR UCSB.ZMX

Session File

U:\ALPI'S DESIGNS\1.0 METER\1.0 METER OPTICAL DESIGN\OLD LENSES- DESIGN STUFF\LCOGT 1.0METER TELESCOPE DESIGN FOR UCSB.SES

Glass Catalogs

C:\DOCUMENTS AND SETTINGS\RHAYNES\MY DOCUMENTS\ZEMAX\GLASSCAT\SCHOTT.AGF
C:\DOCUMENTS AND SETTINGS\RHAYNES\MY DOCUMENTS\ZEMAX\GLASSCAT\BIREFRINGENT.AGF
C:\DOCUMENTS AND SETTINGS\RHAYNES\MY DOCUMENTS\ZEMAX\GLASSCAT\MISC.AGF
C:\DOCUMENTS AND SETTINGS\RHAYNES\MY DOCUMENTS\ZEMAX\GLASSCAT\CORNING.AGF

Coating Data

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