UNIVERSITY OF CALIFORNIA OBSERVATORIES

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DEIMOS COLLIMATOR NULL LENS

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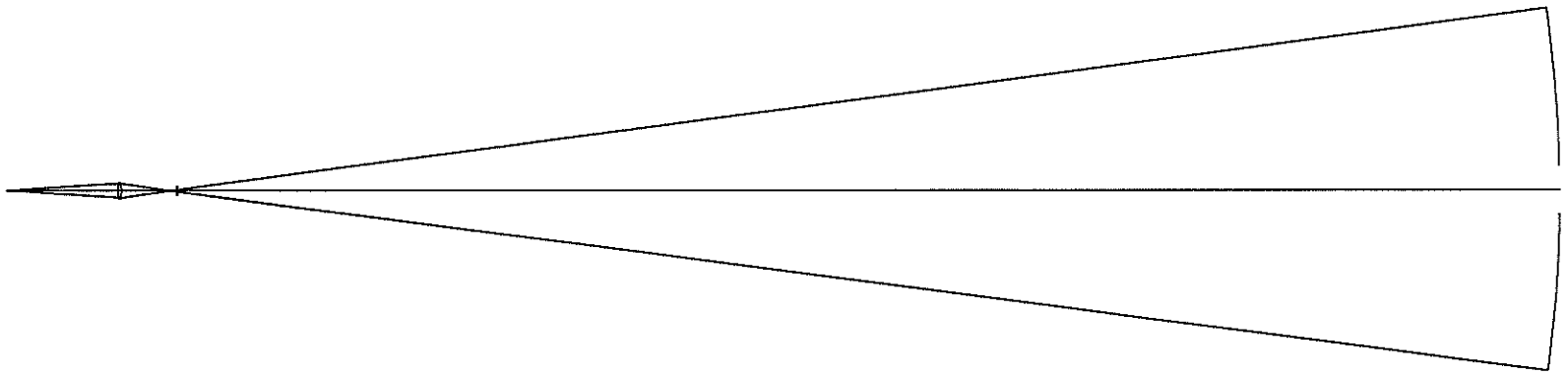
This technical report gives a design for a null lens for the DEIMOS collimator mirror. The DEIMOS collimator is 46.0 inches in diameter and has a 7.0 inch central hole. The radius of curvature is 173.0 inches, and the conic constant is -0.75. The lens was designed to be used with an interferometer using a wavelength of 0.6328 microns, corresponding to the He-Ne line.

The null lens consists of two plano-convex elements, both made from BK7 glass. The first element is 2.0 inches in diameter, with a radius of curvature of 2.434578 inches and a center thickness of 0.4 inches. The second element is 1.0 inches in diameter, with a radius of curvature of -7.528607 inches and a center thickness of 0.2 inches. Figure-1 shows the null lens and mirror together, and figure-2 shows an enlargement of the null lens alone.

The overall performance of the null lens far exceeds the required tolerances. Figure-3 shows the path length errors for the null lens in use. The total scale is 0.01 waves, which is a factor of ten better than the required 0.1 waves. Figure-4 shows a spot diagram of the system, with an RMS spot diameter of 1.0 microns. Figure-5 is a list of the spacings and curvatures of the system.



LAYOUT

DEIMOS COLLIMATOR NULL LENS
WED FEB 28 1996
TOTAL TRACK: 194.36206 IN

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SANTA CRUZ, CA 95064

Figure 1

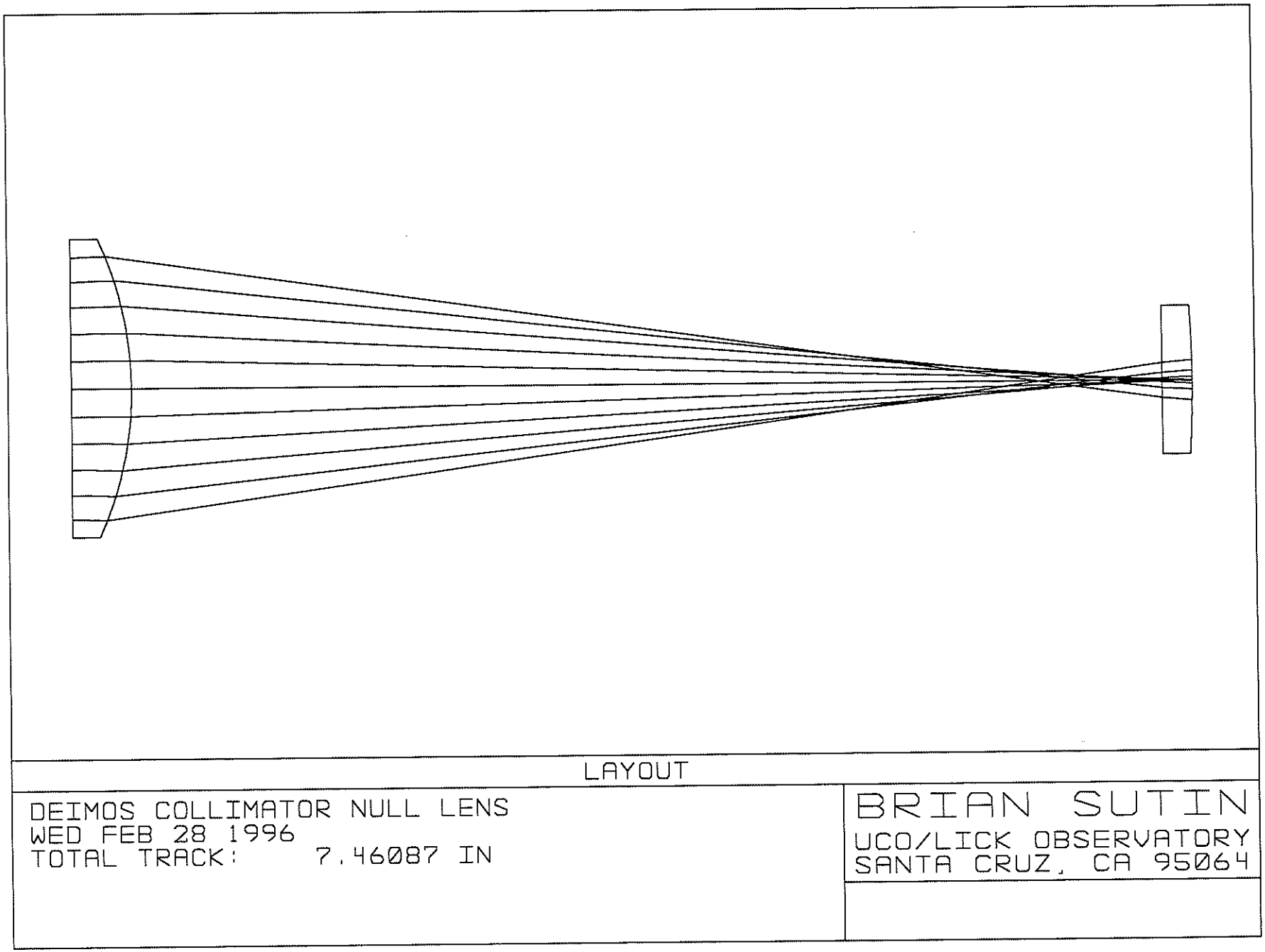
LAYOUT
DEIMOS COLLIMATOR NULL LENS
WED FEB 28 1996
TOTAL TRACK: 7.46087 IN
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Figure 2

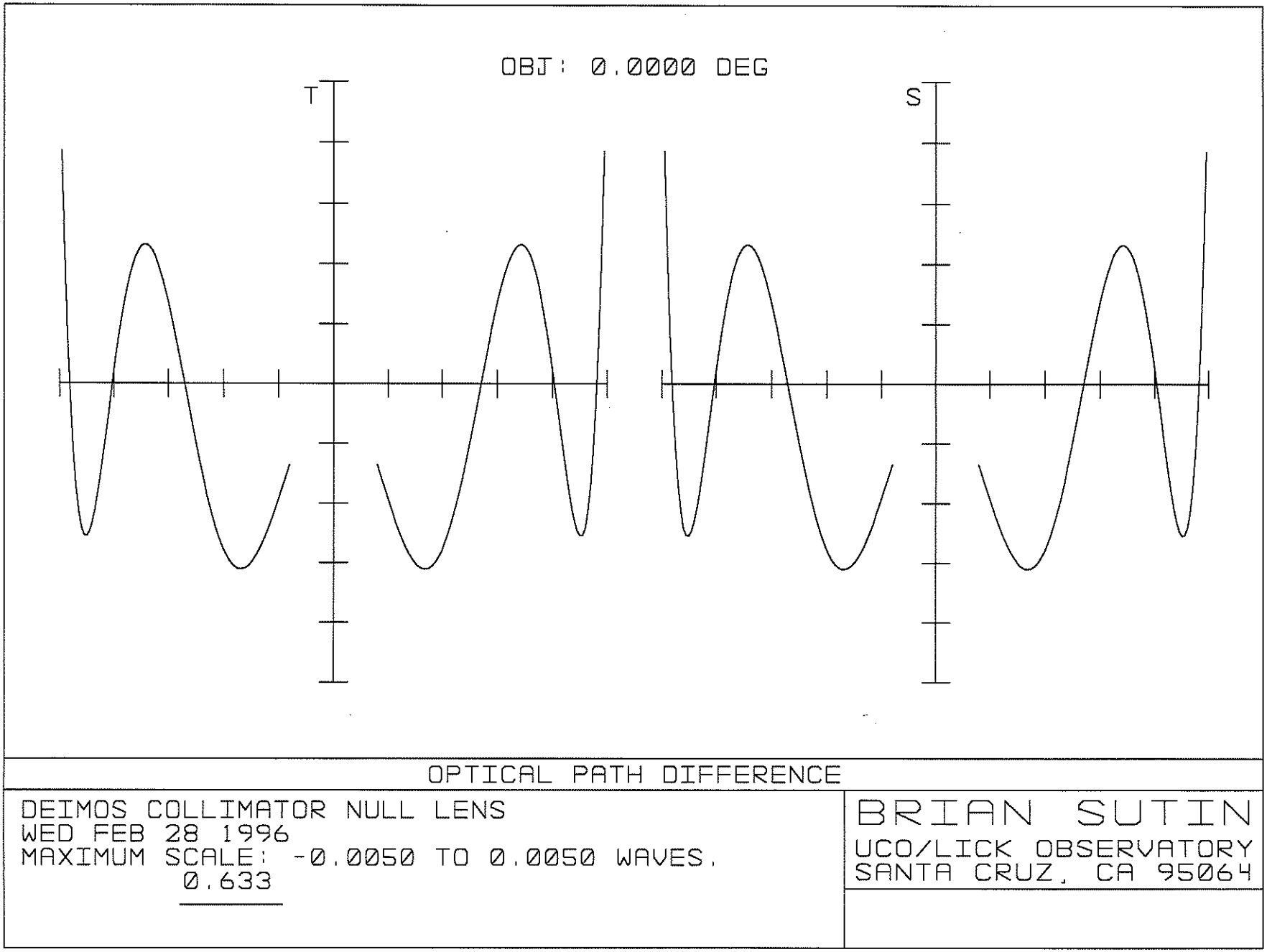
OBJ: 0.0000 DEG
T
S
OPTICAL PATH DIFFERENCE
DEIMOS COLLIMATOR NULL LENS
WED FEB 28 1996
MAXIMUM SCALE: -0.0050 TO 0.0050 WAVES.
0.633
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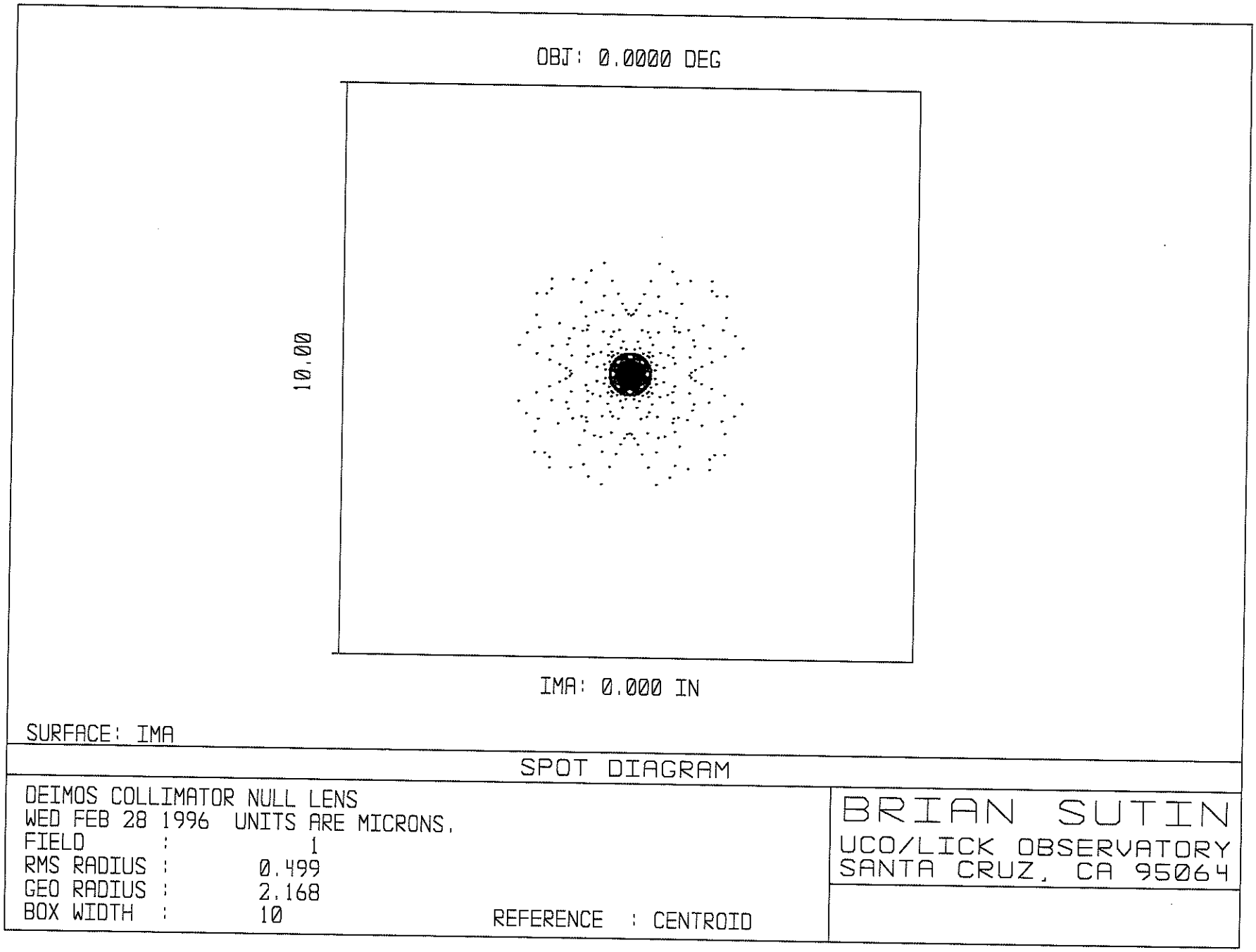
Figure 3


OBJ: 0.0000 DEG
10.00
IMA: 0.000 IN
SURFACE: IMA
SPOT DIAGRAM
DEIMOS COLLIMATOR NULL LENS
WED FEB 28 1996 UNITS ARE MICRONS.
FIELD : 1
RMS RADIUS : 0.499
GEO RADIUS : 2.168
BOX WIDTH : 10
REFERENCE : CENTROID
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SANTA CRUZ, CA 95064

Figure 4

System/Prescription Data

File : C:\ZMX\KECK\DEIMOS\NULL2.ZMX
Title: DEIMOS Collimator Null Lens
Date : WED FEB 28 1996

SURFACE DATA SUMMARY:

Surf	Type	Radius	Thickness	Glass	Diameter	Conic
OBJ	STANDARD	Infinity	13.76817		0	0
1	STANDARD	Infinity	0.4	BK7	2	0
2	STANDARD	-2.434578	6.860874		2	0
3	STANDARD	Infinity	0.2	BK7	1	0
4	STANDARD	-7.528607	0		1	0
5	STANDARD	Infinity	173.133		0.2705072	0
STO	STANDARD	-173	-173.133	MIRROR	46	-0.75
7	STANDARD	Infinity	0		0.2704245	0
8	STANDARD	-7.528607	-0.2	BK7	1	0
9	STANDARD	Infinity	-6.860874		1	0
10	STANDARD	-2.434578	-0.4	BK7	2	0
11	STANDARD	Infinity	-13.76817		2	0
IMA	STANDARD	Infinity	0		0.0001922305	0

Figure 5