
New Folder Name Optic Rotation Test

Graphs / stats

T950064



Research Electro-Optics Inc.

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LIGO-T950064-00-D

TO:

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PAGE: _____

FROM:

NAME: Dale C Ness

DATE: 29 Aug 95

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MESSAGES:

29 Aug 95

Bill,I hope this helps,
DCPage 1: overlay of scans used for first
test of the first physical MarkPage 2: Data and CalculationsPage 3: Plot of Data (Error bars $\pm 0.37\%$)
(Spatial Resolution 1 cm)Page 4: Example Scan used for 2nd test
- e. i. a. first physical MarkPage 5: Data + CalculationsPage 6: Plot of Data. (Error bars $\pm 0.01\%$)
(Spatial Resolution 0.3 cm)To follow - uniformity Data gathered with improved
tooling in spectrophotometer sample cavity(predicted Error bars ± 30 ppm)
(Spatial resolution 0.15 cm)Preliminary scans using improved method
are quite promising.

Bill Kellus

6290

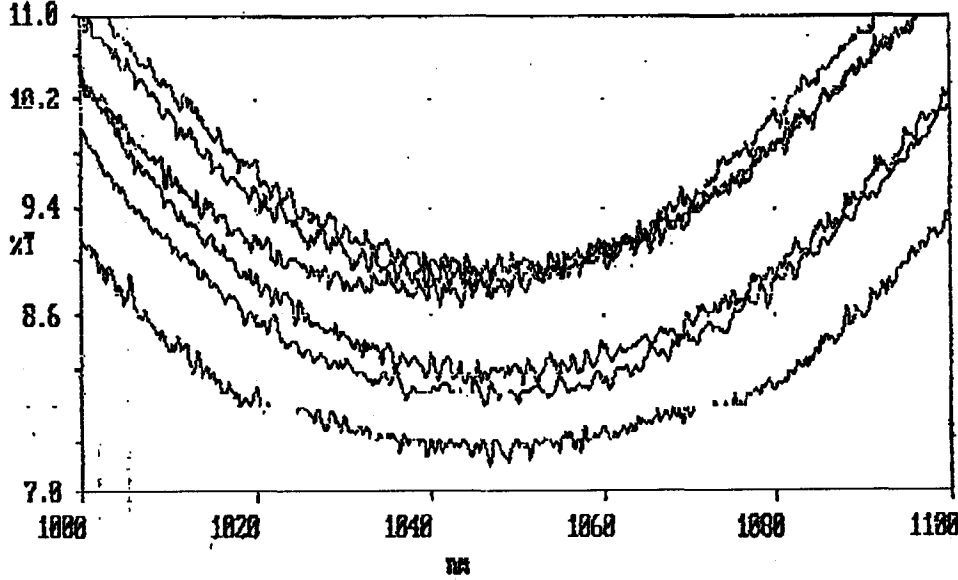
818-395-2053

Fax 818-304-9834

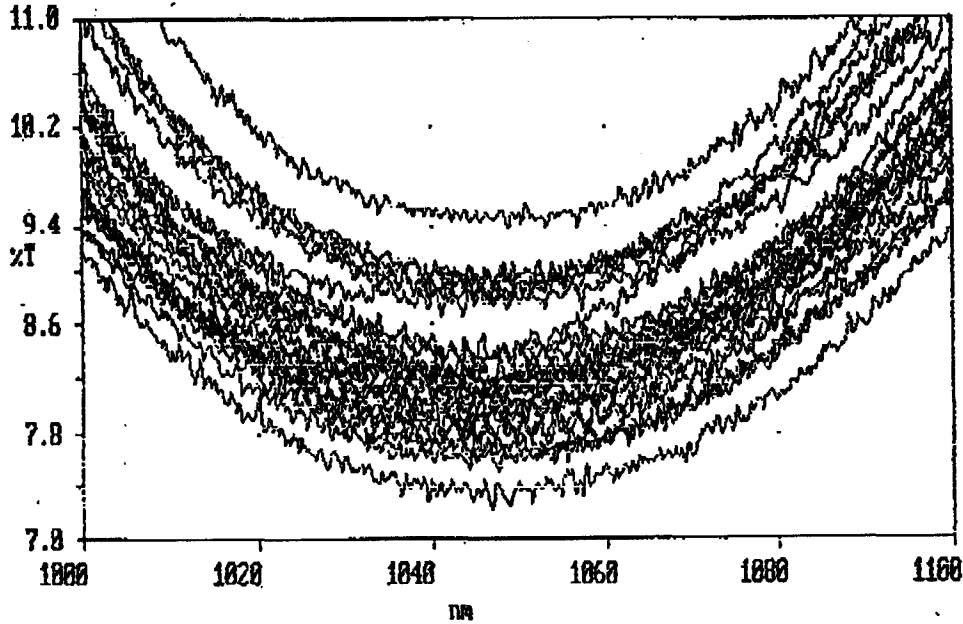
50 SHEETS
100 SHEETS
200 SHEETS2141
2142
2144

OX62

X: user022; 1158.8 - 950.8 nm; pts 881; int 0.25; ord 8.6788 - 23.898 xT
Inf: Double rotation test, Mask32



X: user041; 1188.8 - 1088.8 nm; pts 481; int 0.25; ord 8.8488 - 11.415 xT
Inf: Double rotation work, Mask32, OX62



Plot of data from OX62
Double rotation test with mask32

rotmsk32.mcd
28 July 1995

$j := 0, 1..14$

$i := 0, 1..11$

$r_j :=$

0
1
2
3
4
5
6
7
8
9
9.5
10
10.5
11
11.5

$Min_j :=$

1048
1050
1046
1048
1050
1050
1050
1049
1050
1050
1048
1046
1043
1040
1038

$$Avmin := \frac{1}{\text{length}(r) - 3} \sum_i Min_i$$

$$Avmin = 1.049 \cdot 10^3$$

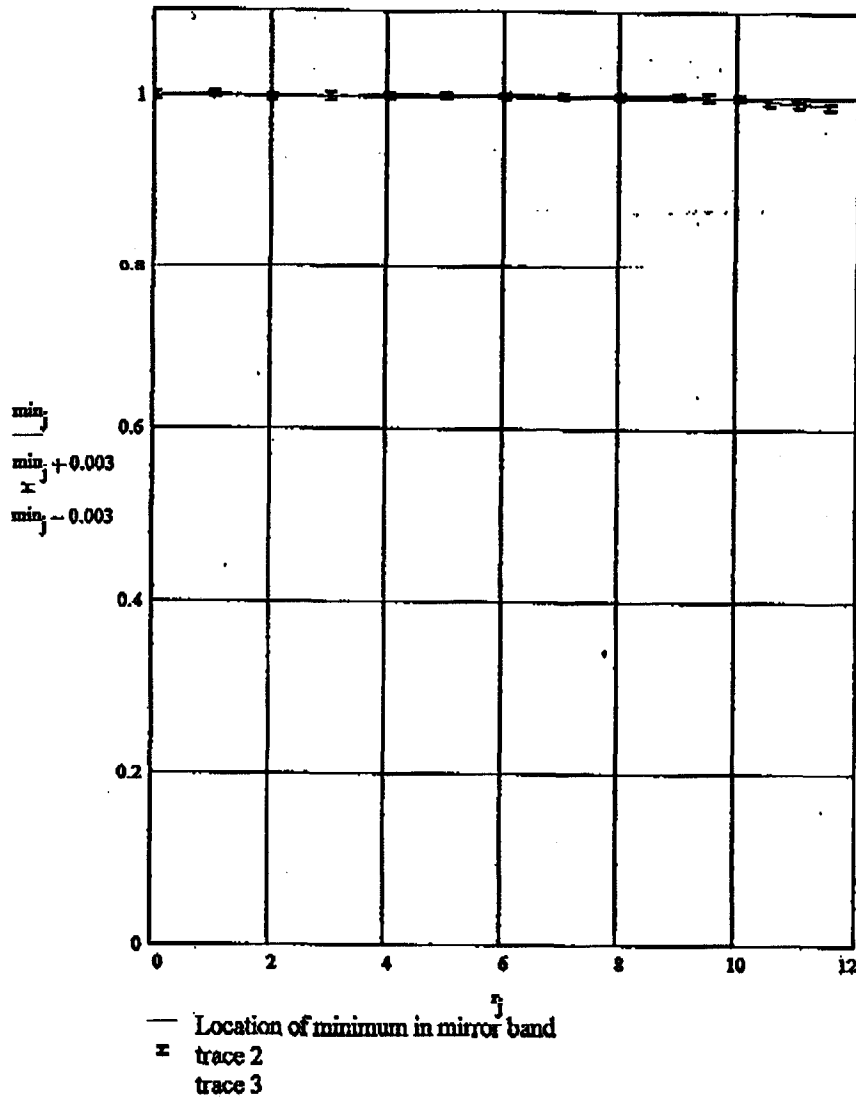
$$min_j := \frac{Min_j}{Avmin}$$

$$RMSerror := \left[\frac{1}{\text{length}(r)} \sum_i (Min_i - Avmin)^2 \right]^{\frac{1}{2}}$$

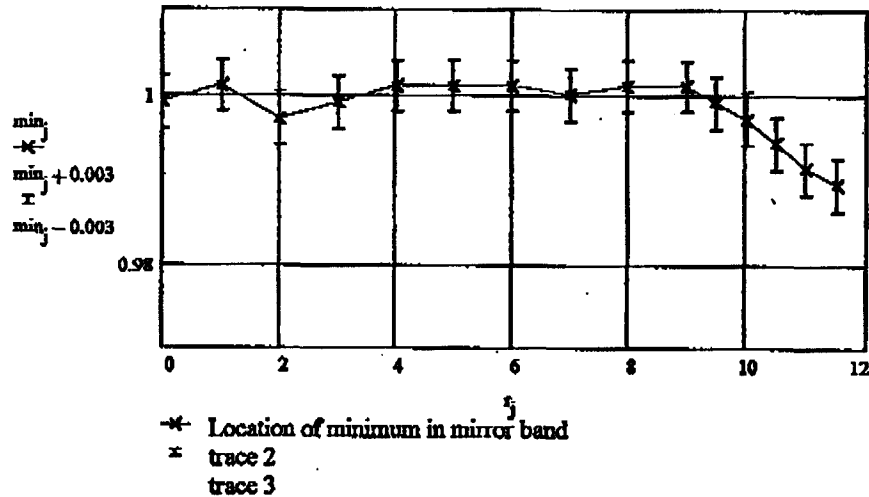
$$100 \cdot \frac{RMSerror}{Avmin} = 0.126 \quad \% \text{ rms error for } r < 10.5 \text{ cm}$$

Plot of mirror band minimum vs R_2 radius in cm

rotmsk32.mcd
28 July 1995

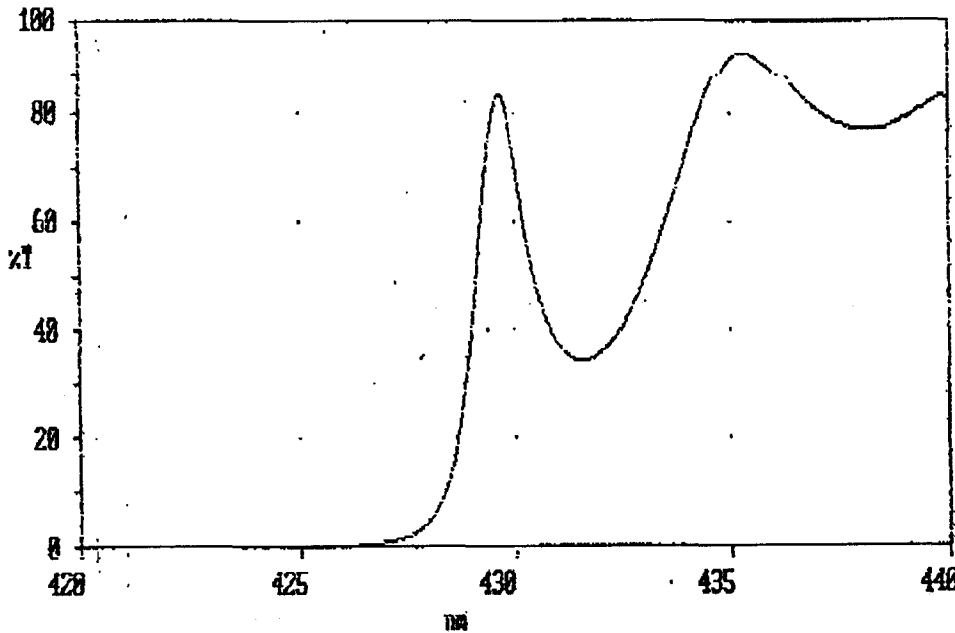


Detail of above graph



4 August 13

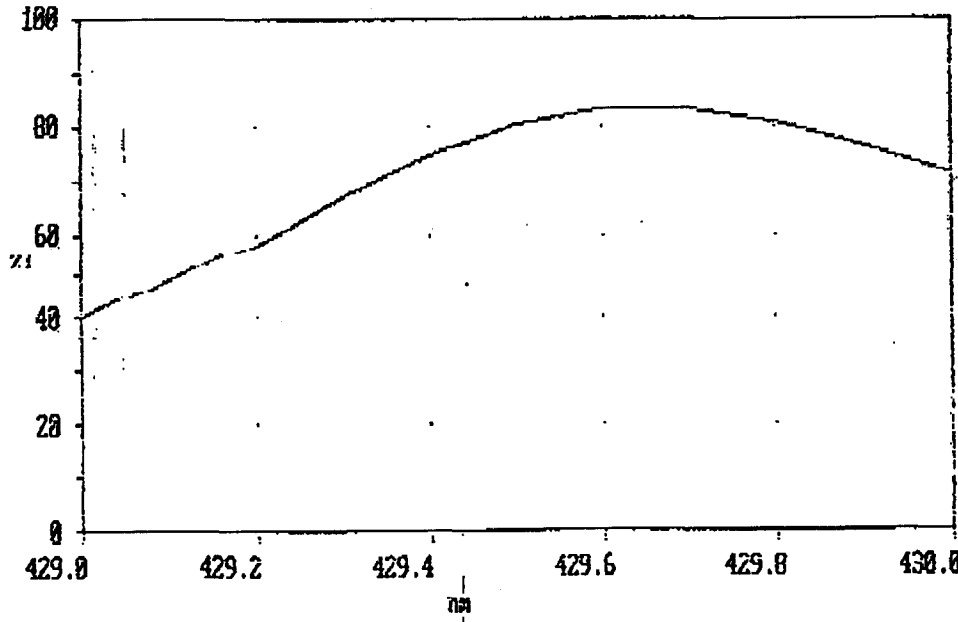
X: user002; 440.0 - 420.0 nm; pts 201; int 0.10; ord 0.0050 - 94.250 %T
Inf: Run #0X65, double rotation slides, mask32.



1st slide

R ₂ cm	Peak n.
✓ 0.3	429.65
✓ 0.8	429.60
✓ 1.3	429.70
✓ 1.8	429.60
✓ 2.3	429.60
✓ 2.8	429.5
✓ 3.3	429.5
✓ 3.8	429.4
✓ 4.0	429.35
✓ 3.0	429.50
✓ 5.0	429.00
✓ 6.0	428.40

X: user002; 440.0 - 420.0 nm; pts 201; int 0.10; ord 0.0050 - 94.250 %T
Inf: Run #0X65, double rotation slides, mask32.



2nd slide

✓ 3.0	429.50
✓ 3.3	429.50
✓ 3.8	429.60
✓ 4.0	429.70
✓ 5.0	429.80
✓ 6.0	429.70
✓ 7.0	429.50
✓ 8.0 8.3	429.05
✓ 9.0	428.75
✓ 10.0	427.4
✓ 9.5	428.2

Double rotation slides, Zr coating,
uniformity test, mask32

ox65.mcd
4 August 1995

j := 0, 1..20

k := 0, 1..10

Data from first slide

Data from second slide

$ra_j :=$	$amax_j :=$
0.0	429.70
0.3	429.65
0.5	429.70
0.8	429.60
1	429.70
1.3	429.70
1.5	429.60
1.8	429.60
2.0	429.60
2.3	429.60
2.5	429.55
2.8	429.50
3.0	429.50
3.0	429.50
3.3	429.50
3.5	429.50
3.8	429.40
4.0	429.35
4.0	429.40
5.0	429.00
5.0	429.40

$rb_k :=$	$bmax_k :=$
3.0	429.70
3.3	429.50
3.8	429.60
4.0	429.70
5.0	429.80
6.0	429.70
7.0	429.50
8.3	429.05
9.0	428.75
9.5	428.20
10.0	427.40

p := 0, 1..17

$$AV_{max} := \sum_p \frac{amax_p}{18} \quad AV_{max} = 429.569$$

$$A_{max_j} := \left(\frac{amax_j}{429.7} \right)$$

q := 0, 1..6

$$AV_{bmax} := \sum_q \frac{bmax_q}{7} \quad AV_{bmax} = 429.614$$

$$B_{max_k} := \left(\frac{bmax_k}{429.7} \right)$$

$$error = \frac{0.05}{AV_{max}}$$

$$error = 1.164 \cdot 10^{-4}$$

if the error is to a value of 1 unit
for data from slide 1

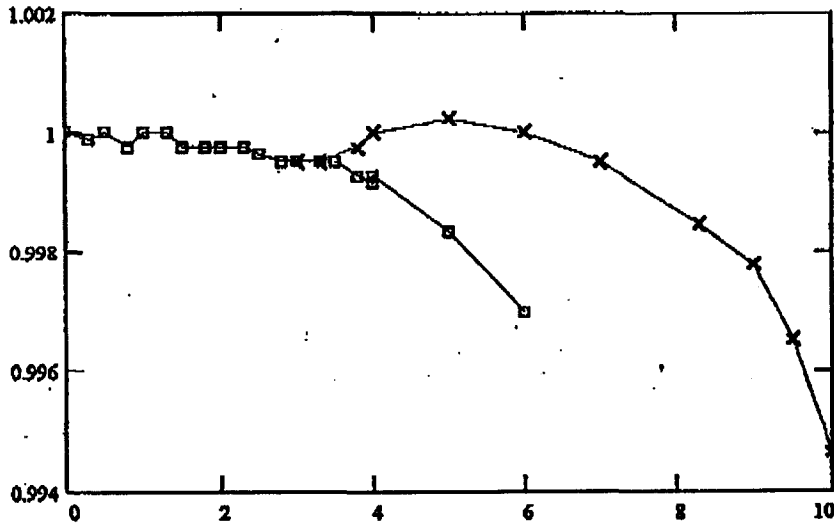
$$\%RMS_{error} = 0.129 \%$$

$$\%RMS_{error} := \sum_p \left[\frac{1}{18} (A_{max_p} - 1)^2 \right]^{\frac{1}{2}}$$

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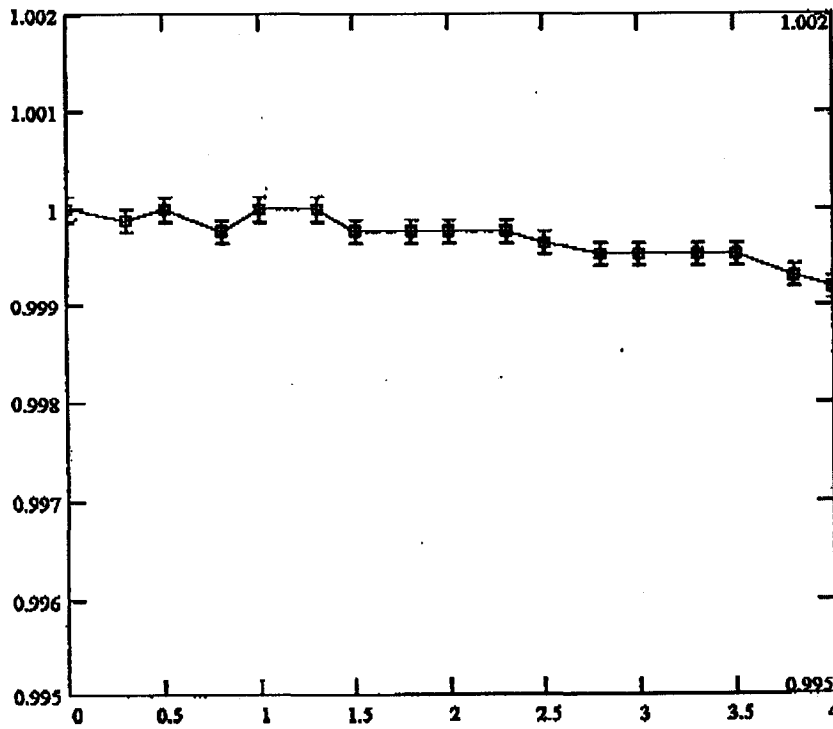
Double rotation slides, Zr coating,
uniformity test, mask32

ox65.mcd
4 August 1995



□ First slide
× Second slide

Slide #1, central 4 cm radius



□ First slide
± error bars
note: horizontal error is ± 0.2 cm

**% rms error out to a radius of 4 cm
for data from slide 1**

%RMSerror = 0.129%

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