LASER INTERFEROMETER GRAVITATIONAL WAVE OBSERVATORY
- LIGO -
CALIFORNIA INSTITUTE OF TECHNOLOGY
MASSACHUSETTS INSTITUTE OF TECHNOLOGY

Document Type	**LIGO-T980065-00 - D**	01/11/98

Compilation of Metrology Data for the LIGO Large Optics

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Tables intervening the above are the Laguerre-Gauss transforms projected on to a TE00 mode with spot radius on the mirror: 2.5, 3.0 3.5, 4.0, 4.5 cm

Table 53 Simple statistics for the recycling mirrors and the end test masses

Notes:

1) Broadly the mirrors are about 1/3 in power as rough as the Calflat between 0.1 to 1 cm^{-1} and about 1/10 in power as rough as the Calflat above 10 cm^{-1} . The Calflat mirror has been used as the basis for the Fourier transform propagation code modeling of the full interferometer.

2) The Laguerre-Gauss transforms of the mirrors projected onto a TE00 mode are a means of estimating the excitation of radial modes in a single cavity. The excitation amplitude of the mode is given by $4\ \pi$ times the tabulated amplitude and then multiplied by the cavity field resonance factor for the mode. To change wavelengths, multiply the tabulated amplitude by the ratio of the measurement wavelength to the operational wavelength. The amplitudes are defined by

$$b_{p,\ ,\ ,} = \int_0^{2\pi}\int_0^{\infty} LG_{p,m}(\quad)\frac{z(\quad)}{\pi} LG_{0.0}(\ )\,r\,dr\,d\theta$$

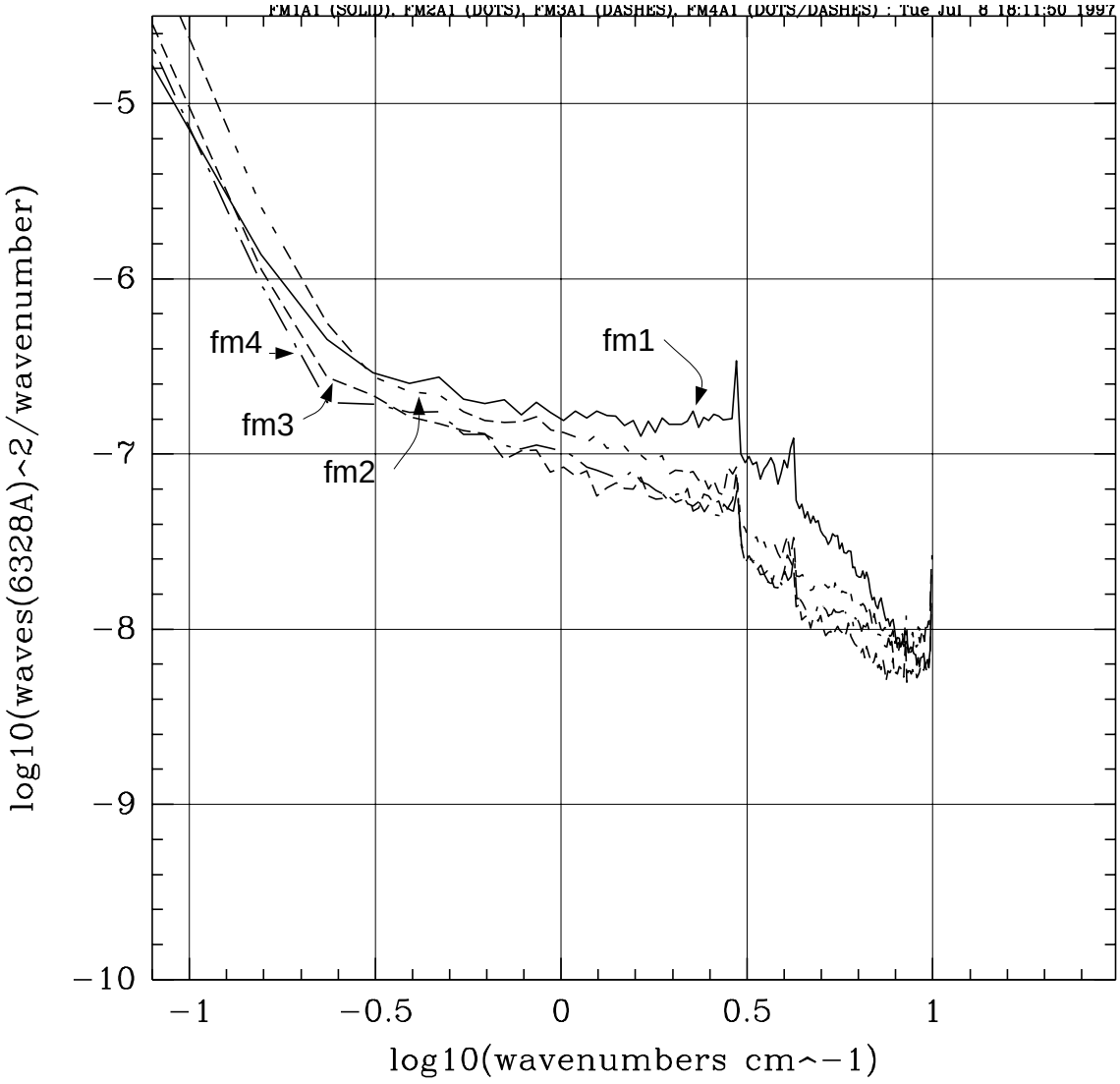

Figure 1: One dimensional FFT of phase maps for folding mirrors fma1,fma2,fma3,fma4. The amplitude of the phase map has been adjusted from 6907A to 6328A to be compatible with all prior measurenments. The phase maps have Z(1,1),Z(2,0),Z(2,2) removed before Fourier transformation. The sharp spectral features repeat in all the phase maps so are most likely in the interferometer. fma1 looks too flat. fm3 has two dust particles in the map and also the piece shows a pronounced hollow in the middle and down turn at the edges. This feature will show up as a negative amplitude in the Z(n,0) transforms as can be seen in the table of Zernike amplitudes and is highlighted in Figure 3.

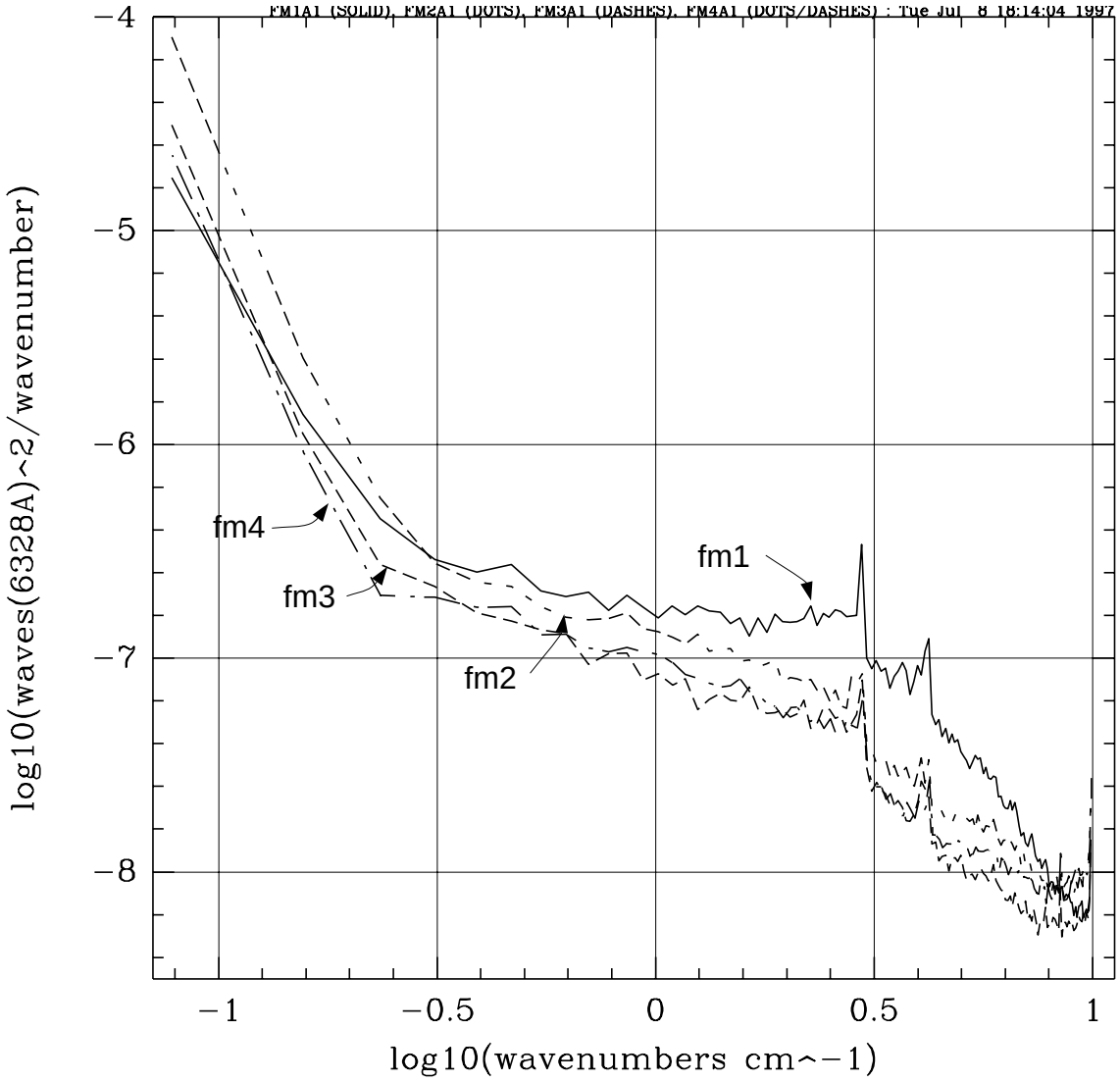

Figure 2: Enlarged version of figure 1 therefore not directly comparable to prior figures.

Table 1: Zernike amplitudes fm1a1 23.4 cm aperture

map file: fm1a1.fix transform file: zernfm1a1a.dat

oper. wavel (mu) = 0.6328 meas. wavel (mu) = 0.6907

max radial = 6 # transf(n,l) = 16 x pts = 560 y pts = 560

p	l	amplitude	sine	cosine
0	0	-1.430715E-07	0.000000E+00	0.000000E+00
1	1	1.535137E-04	-2.984662E-05	1.505844E-04
2	0	-4.691779E-04	0.000000E+00	0.000000E+00
2	2	1.668858E-03	1.630502E-03	3.557389E-04
3	1	7.605861E-04	4.329745E-04	-6.253194E-04
3	3	6.945791E-04	6.848036E-04	1.161210E-04
4	0	-2.527080E-03	0.000000E+00	0.000000E+00
4	2	2.040873E-04	-1.680844E-04	1.157552E-04
4	4	4.048862E-04	1.623534E-04	3.709100E-04
5	1	2.877680E-04	2.022914E-04	-2.046671E-04
5	3	5.618999E-05	-5.454006E-05	1.351652E-05
5	5	2.039227E-04	-1.992542E-04	4.338463E-05
6	0	-3.156667E-04	0.000000E+00	0.000000E+00
6	2	2.643414E-04	-2.561315E-04	-6.536837E-05
6	4	2.204800E-04	7.867980E-05	2.059634E-04
6	6	8.651580E-05	-3.387865E-06	8.644944E-05

Table 2: Zernike amplitudes fm2a1 23.4 cm aperture

map file: fm2a1.fix transform file: zernfm2a1a.dat

oper. wavel (mu) = 0.6328 meas. wavel (mu) = 0.6907

max radial = 6 # transf(n,l) = 16 x pts = 560 y pts = 560

p	l	amplitude	sine	cosine
0	0	3.664668E-08	0.000000E+00	0.000000E+00
1	1	1.426231E-04	1.169998E-04	8.156223E-05
2	0	2.302344E-03	0.000000E+00	0.000000E+00
2	2	8.037091E-04	4.602822E-04	6.588540E-04
3	1	8.634037E-04	5.250933E-04	-6.853779E-04
3	3	1.567457E-04	1.421902E-04	6.596329E-05
4	0	-3.784684E-03	0.000000E+00	0.000000E+00
4	2	2.852590E-04	-1.574261E-04	2.378860E-04
4	4	3.191189E-04	1.219656E-04	2.948919E-04
5	1	2.607084E-04	1.365676E-05	-2.603504E-04
5	3	4.277954E-05	5.925194E-07	-4.277543E-05
5	5	9.031987E-05	-7.710484E-05	4.703747E-05
6	0	-5.468017E-04	0.000000E+00	0.000000E+00
6	2	1.235739E-04	-1.008894E-04	-7.135707E-05
6	4	1.115016E-04	1.948588E-05	1.097857E-04
6	6	3.002884E-05	2.837143E-05	-9.838353E-06

Table 3: Zernike amplitudes fm3a1 23.4 cm aperture

map file: fm3a1.fix transform file: zernfm3a1a.dat

oper. wavel (mu) = 0.6328 meas. wavel (mu) = 0.6907

max radial = 6 # transf(n,l) = 16 x pts = 560 y pts = 560

p	l	amplitude	sine	cosine
0	0	3.782143E-07	0.000000E+00	0.000000E+00
1	1	2.991750E-04	1.838973E-04	2.359819E-04
2	0	5.738993E-03	0.000000E+00	0.000000E+00
2	2	1.547228E-03	6.552151E-04	1.401644E-03
3	1	1.085462E-03	-2.564725E-04	-1.054727E-03
3	3	5.630030E-04	4.038238E-04	3.922993E-04
4	0	-7.968427E-03	0.000000E+00	0.000000E+00
4	2	8.021463E-04	-1.771760E-04	7.823345E-04
4	4	9.224627E-04	1.005405E-04	9.169673E-04
5	1	5.000252E-04	-2.128404E-04	-4.524645E-04
5	3	9.261059E-05	9.492046E-06	-9.212286E-05
5	5	4.790077E-05	-2.687739E-05	3.964959E-05
6	0	-2.773192E-03	0.000000E+00	0.000000E+00
6	2	1.356091E-04	-1.192046E-04	6.465366E-05
6	4	4.416051E-04	7.517930E-05	4.351587E-04
6	6	1.122577E-04	-1.659662E-06	-1.122454E-04

Table 4: Zernike amplitude fm4a1 23.4 cm aperture

map file: fm4a1.fix transform file: zernfm4a1a.dat

oper. wavel (mu) = 0.6328 meas. wavel (mu) = 0.6907

max radial = 6 # transf(n,l) = 16 x pts = 560 y pts = 560

p	l	amplitude	sine	cosine
0	0	-3.608079E-07	0.000000E+00	0.000000E+00
1	1	1.943074E-04	1.260716E-04	1.478557E-04
2	0	7.272835E-03	0.000000E+00	0.000000E+00
2	2	4.365990E-04	4.208518E-04	-1.162001E-04
3	1	6.770210E-04	2.744004E-04	-6.189200E-04
3	3	4.068161E-04	3.885907E-04	1.204016E-04
4	0	-3.134031E-03	0.000000E+00	0.000000E+00
4	2	8.267297E-04	-2.514056E-04	7.875768E-04
4	4	2.312623E-04	1.282118E-04	1.924681E-04
5	1	1.293338E-04	6.556797E-05	-1.114813E-04
5	3	1.057557E-04	-9.103536E-05	-5.382223E-05
5	5	5.490946E-05	4.171240E-05	3.570889E-05
6	0	-7.068200E-04	0.000000E+00	0.000000E+00
6	2	2.864183E-04	-6.464017E-05	2.790289E-04
6	4	4.917906E-05	-2.282165E-05	-4.356320E-05
6	6	8.721102E-05	4.400869E-05	7.529274E-05

Table 5: Statistics over 23.4 cm aperture

surface	sigma	p-p	sigma Z removed	p-p Z removed
	waves 6328A	waves 6328A	waves 6328A	waves 6328A
fm1a1	0.00216	0.020	0.0019	0.017
fm2a1	0.00276	0.017	0.00239	0.018
fm3a1	0.00624	0.051	0,00526	0.055
fm4a1	0.00461	0.022	0.0021	0.016

Z removed implies Z(1,1), Z(2,0) and Z(2,2) removed from the phase map

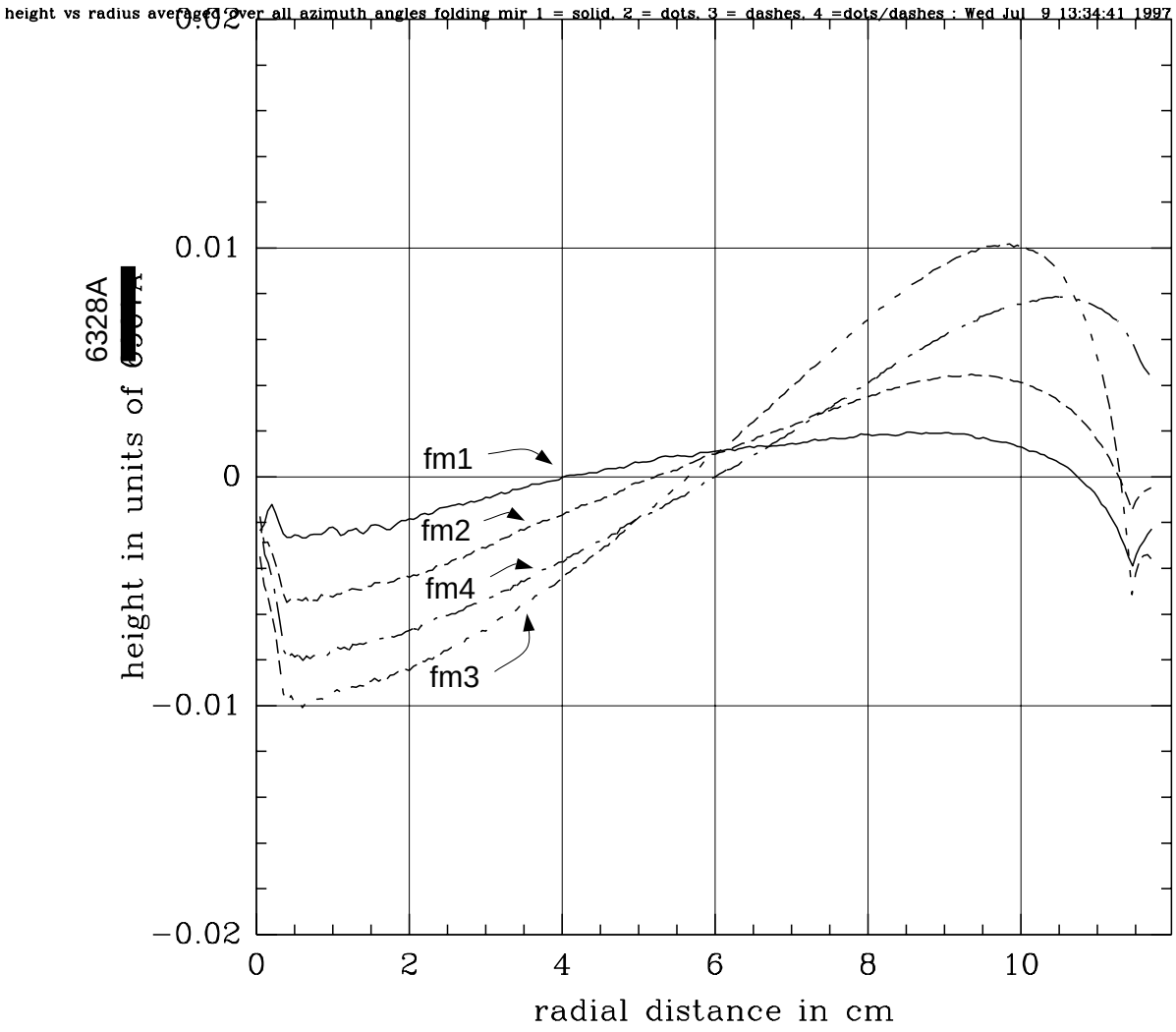

Figure 3: A plot of the optical surface height variation of the folding mirrors as a function of radial distance from the center of the aperture. The one dimensional presentation averages all heights at the same radius - averages over azimuth angle. The figure shows ,also indicated by the Zernike coefficients, that the major errors in the folding mirrors are Z(n,0) terms. The tit in the middle and the cusp near the aperture edge may be artifacts of the interferometry or systematics in the polishing. It is worth finding out why this could be happening.

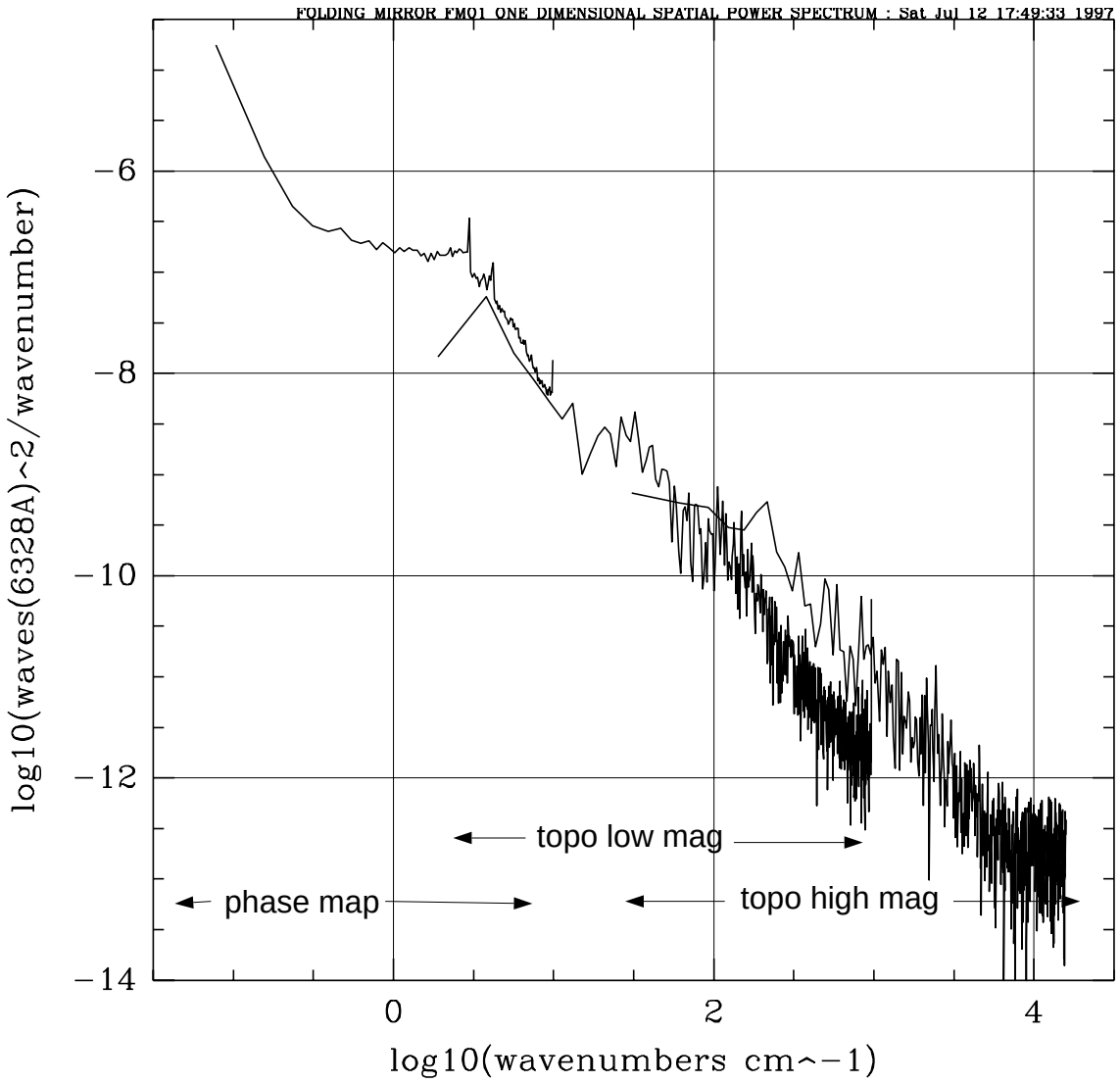

Figure 4: Composite one dimensional frequency spectrum of the surface fm01 using the data from the phase map as well as the average of the topo scans taken at each magnification. I consider the agreement between the different measurement methods reasonable. The surface microroughness is about 4 A if the integral is taken to as low as 1 cm^{-1} and 2 A if the integral is taken to 10 cm^{-1} . The power spectrum is varying as $\frac{1}{\upsilon^{1.7}}$ between 10 to 10000 cm^{-1} .

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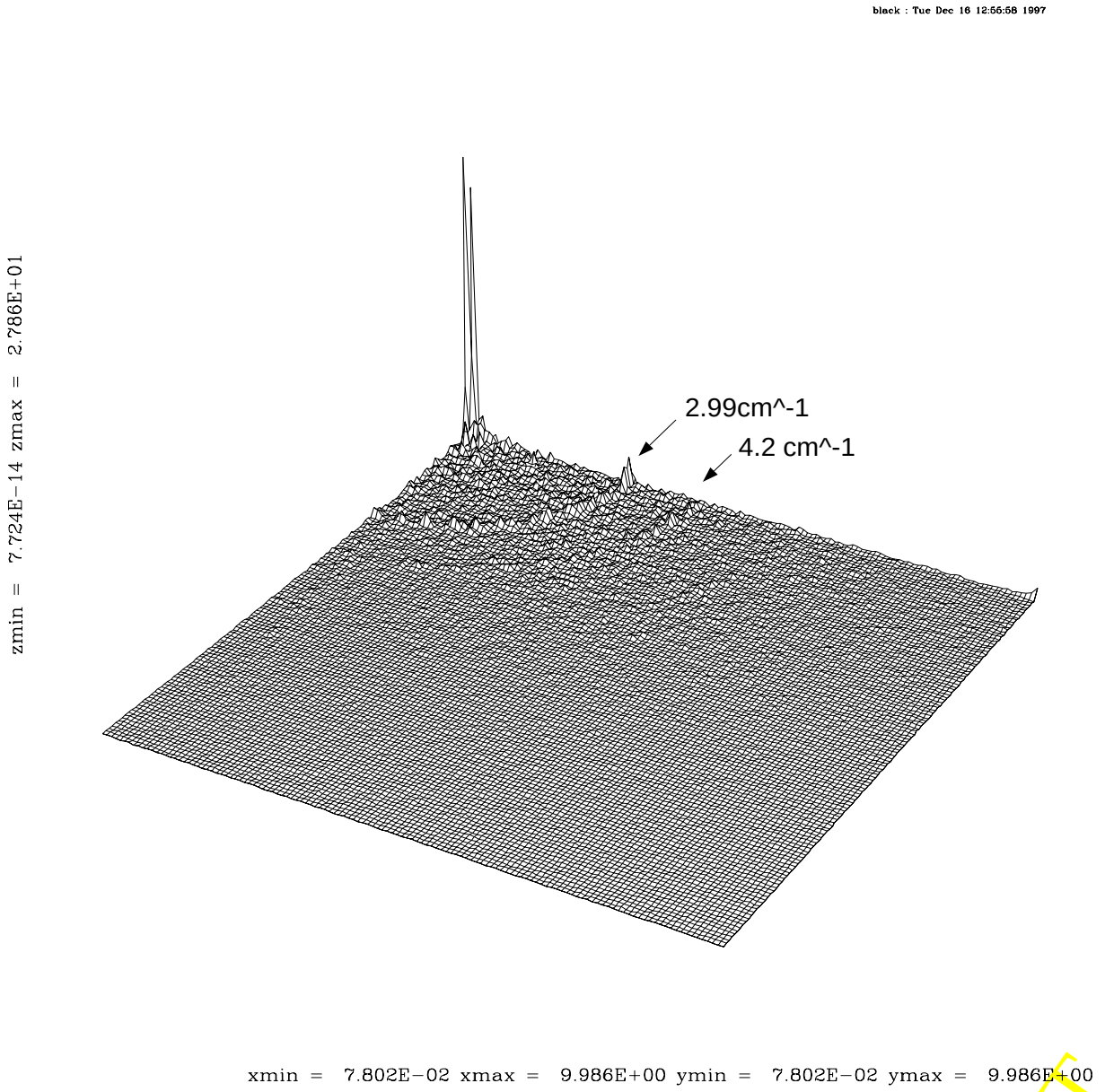

Figure 5: Two dimensional Fourier transform of the fm1a1 phase map showing the spectral features at 2.99 cm^{-1} and 4.2 cm^{-1} which would transform back into geometric space as a J_0 Bessel function. One source for this would be a reflection or diffraction from a circular sub-aperture. The features show up in both the phase maps of the folding flat as well as the spherical surface mirrors.

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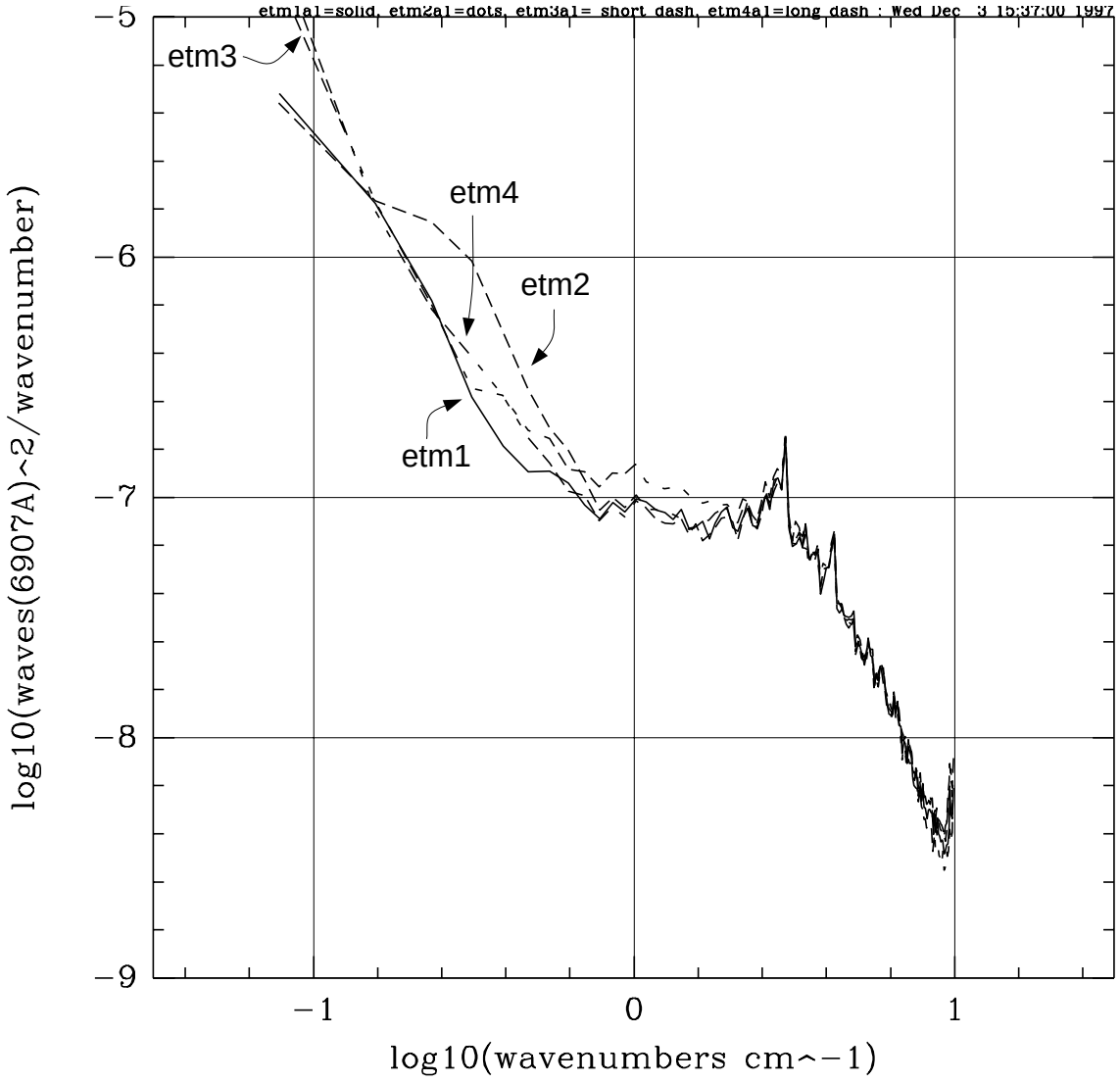

Figure 6: Composite of the one dimensional Fourier transforms for the four end test masses. Note the identity of the spectral features at spatial frequencies above 2 cm^{-1} . This seems to be due to the instrument since the features are the same for the flat, etm and rm mirrors. All of the phase maps have had Z(1,1), Z(2,0) and Z(2,2) removed and have had the "BAD" points replaced by the average of the surrounding points. The phase maps have, furthemore, been midpoint averaged removing points greater than 3 σ .

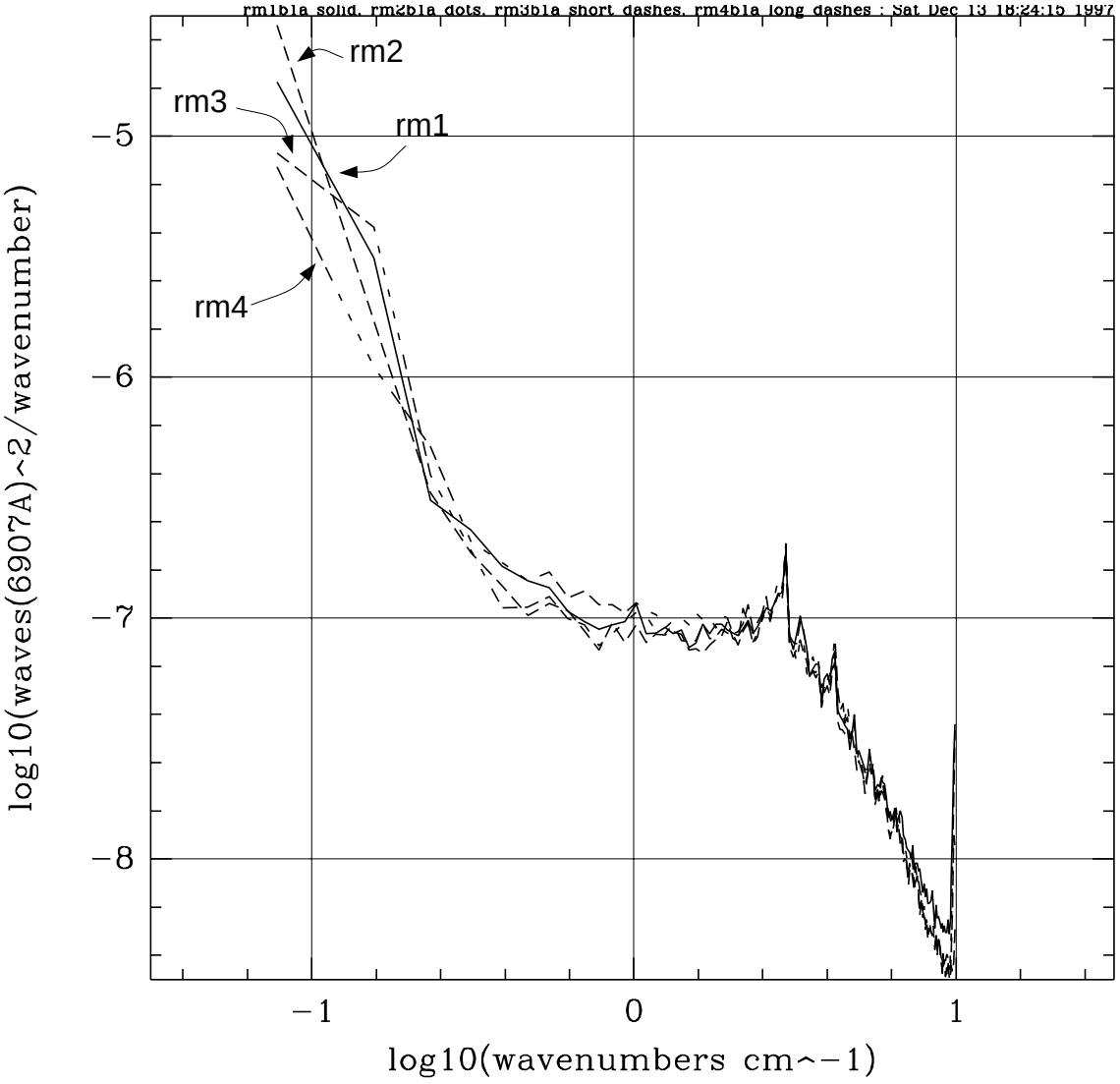

Figure 7: Composite one dimensional spectrum of the one dimensional fft of the 4 recycling mirrors. The same notes apply as to Figure 6.

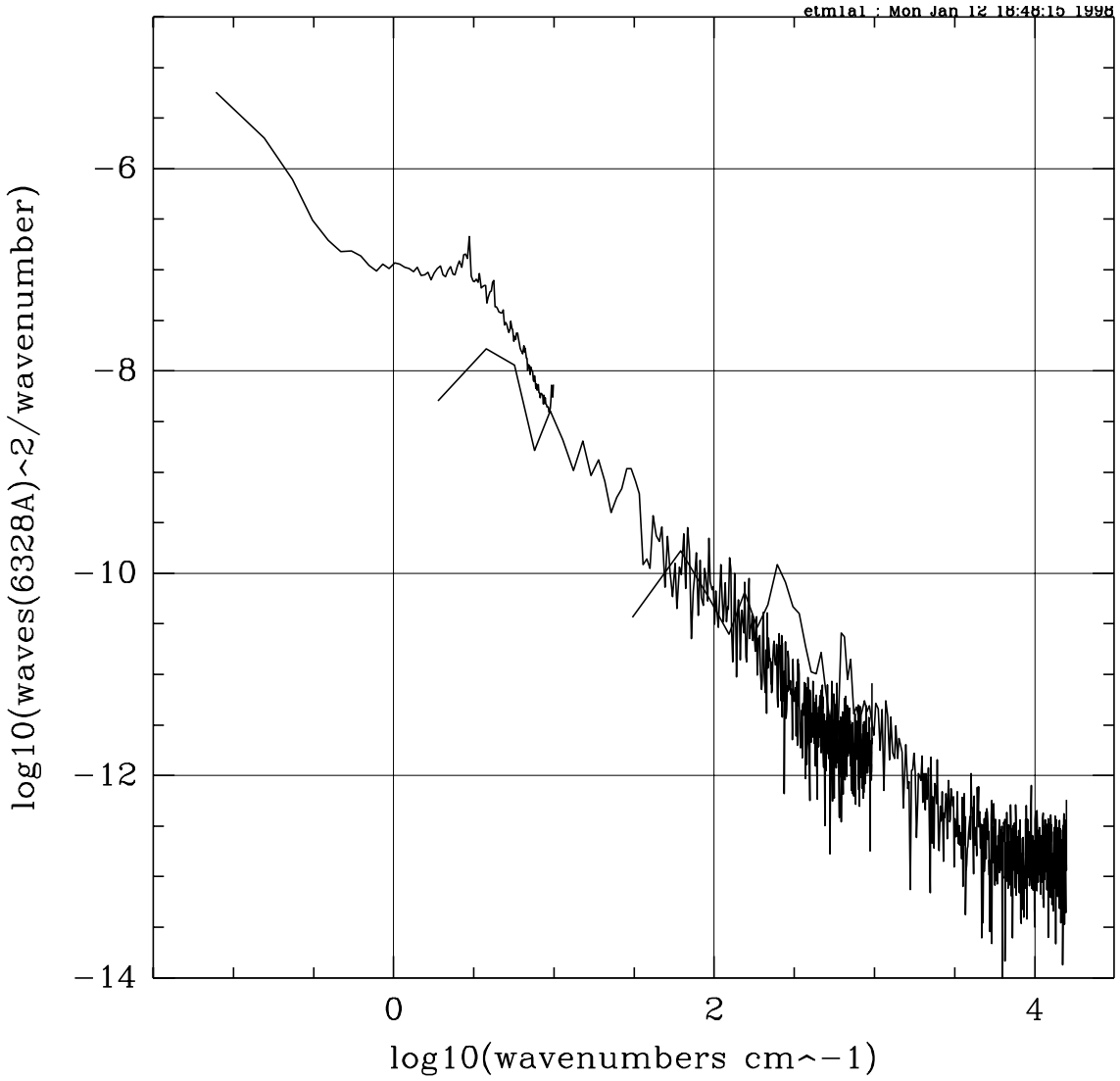

Figure 8: One dimensional fft of the phasemap and average of the three toposcans of etm1. The spectrum varies as $\frac{1}{\upsilon^{1.8}}$ between 10 to 1000 cm^{-1} . The rms roughness integrated above 10 cm^{-1} is approximately 1.3 A. The phasemaps have had Z(1,1), Z(2,0), Z(2,2) removed. The points labeled “BAD” have been replaced by the average around the point and the phasemap has been mid averaged eliminating points with values larger than 3σ .

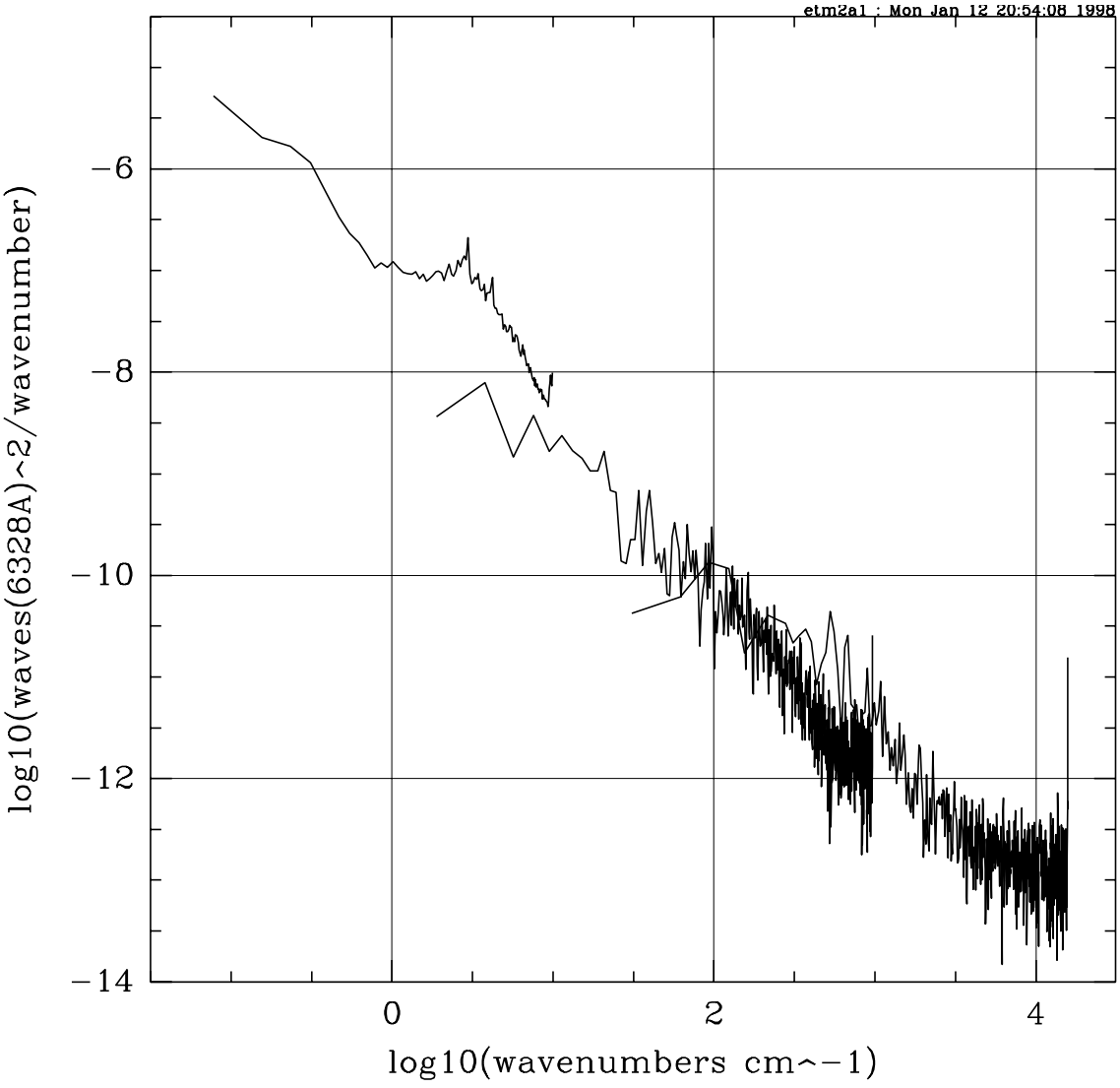

Figure 9: One dimensional fft of the phasemap and average of the three toposcans of etm2.

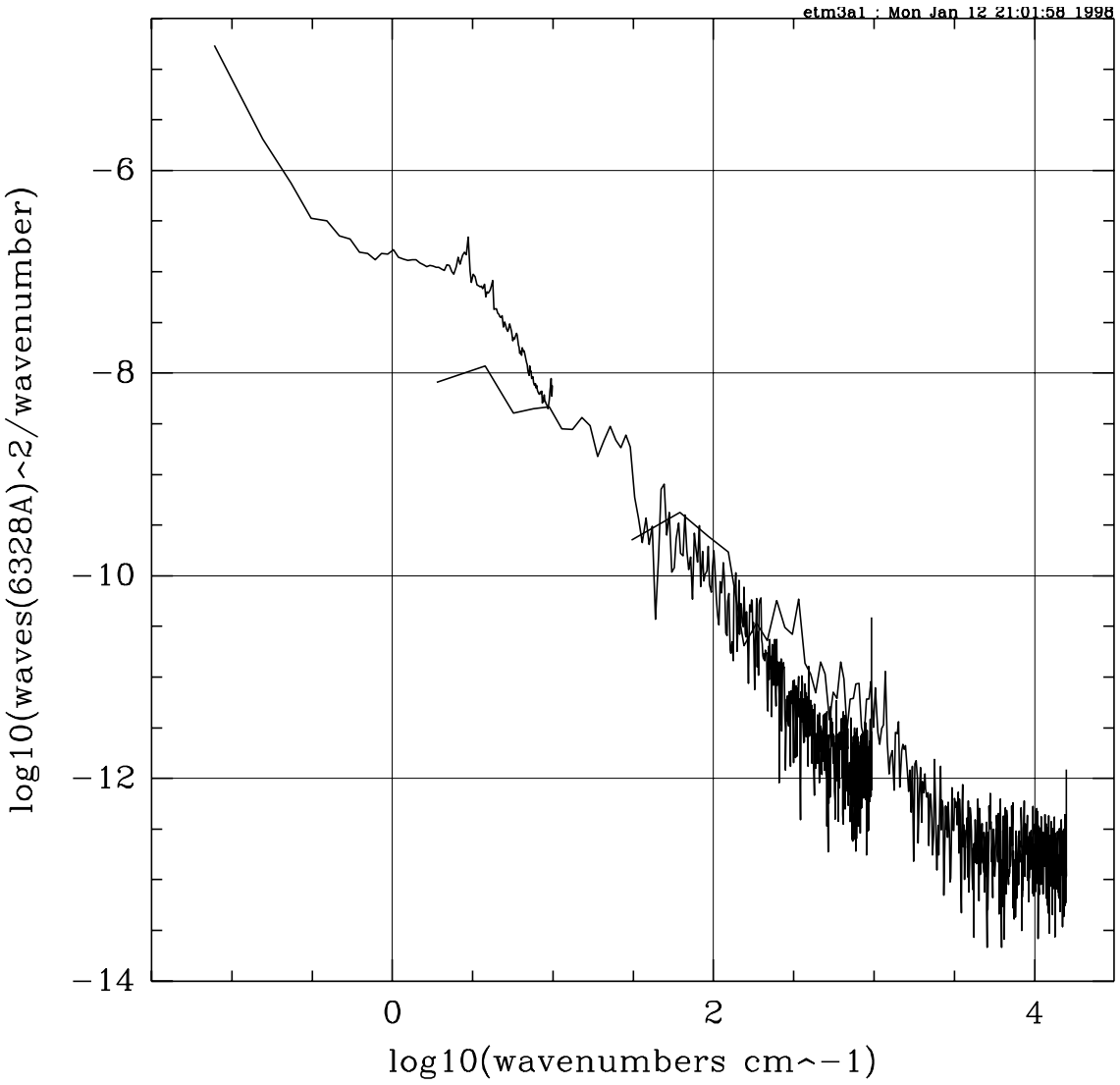

Figure 10: One dimensional fft of the phasemap and average of the three toposcans of etm3.

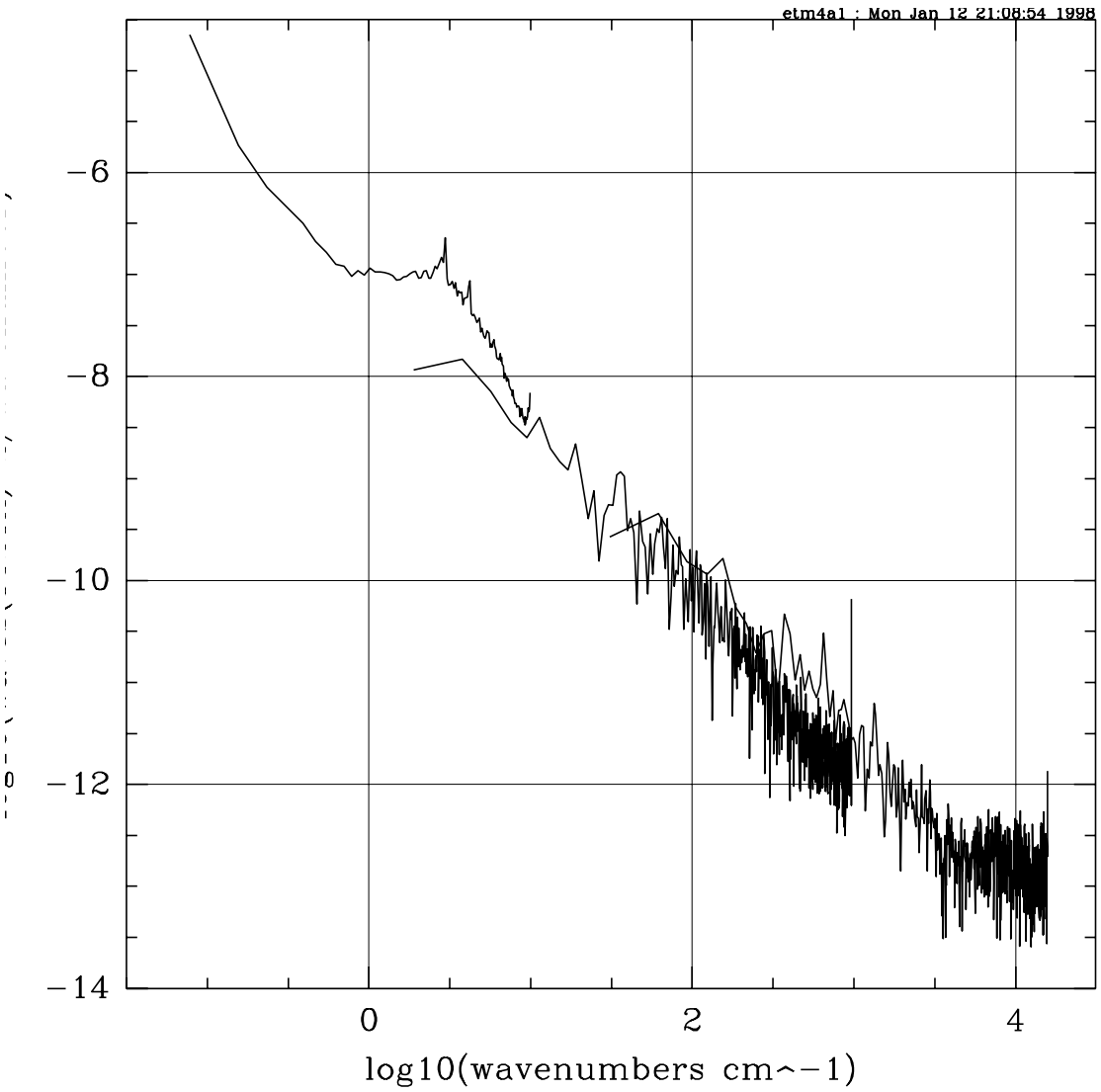

Figure 11: One dimensional fft of the phasemap and average of the three toposcans of etm4.

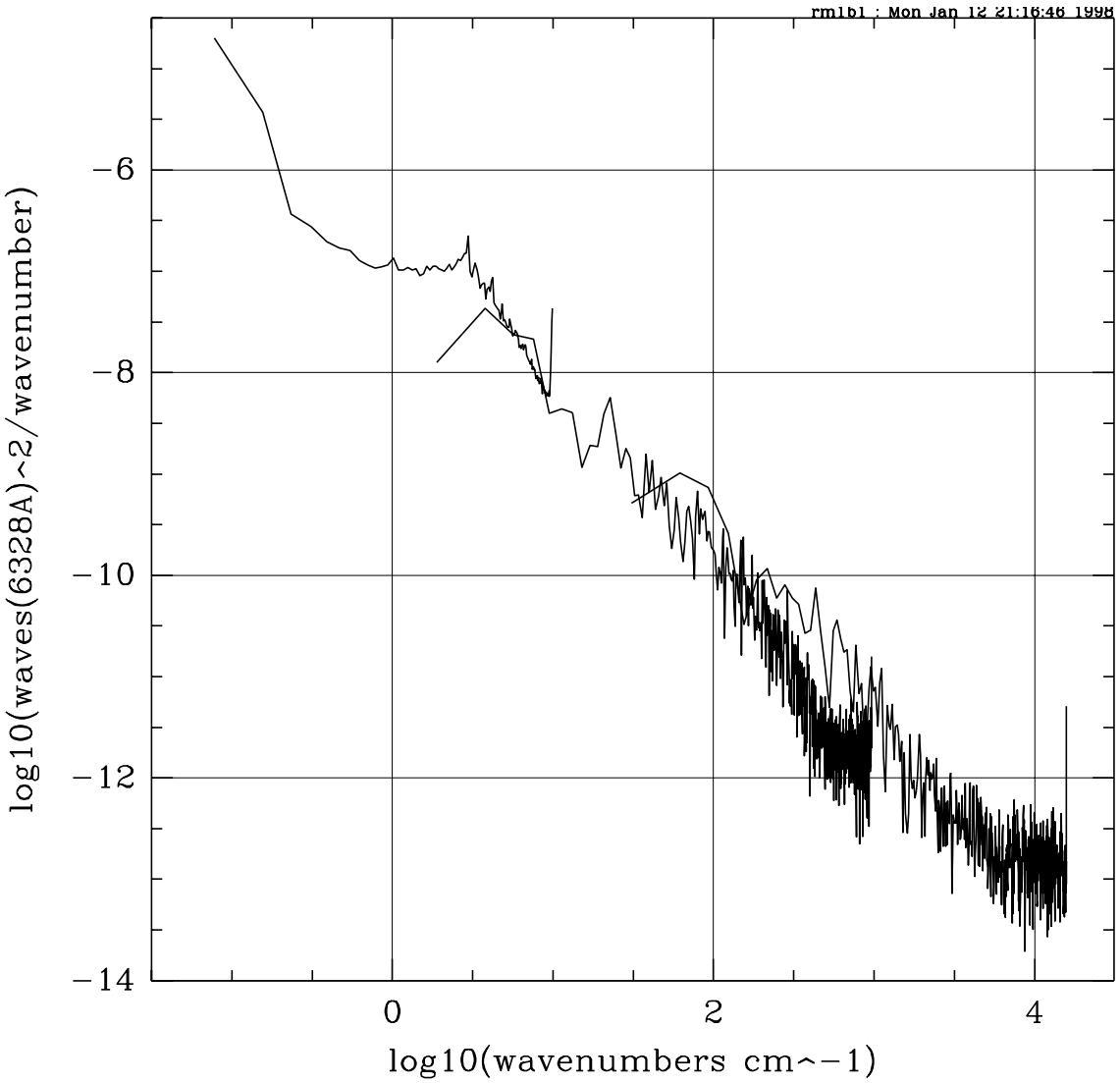

Figure 12: One dimensional fft of the phasemap and average of the three toposcans of rm1.

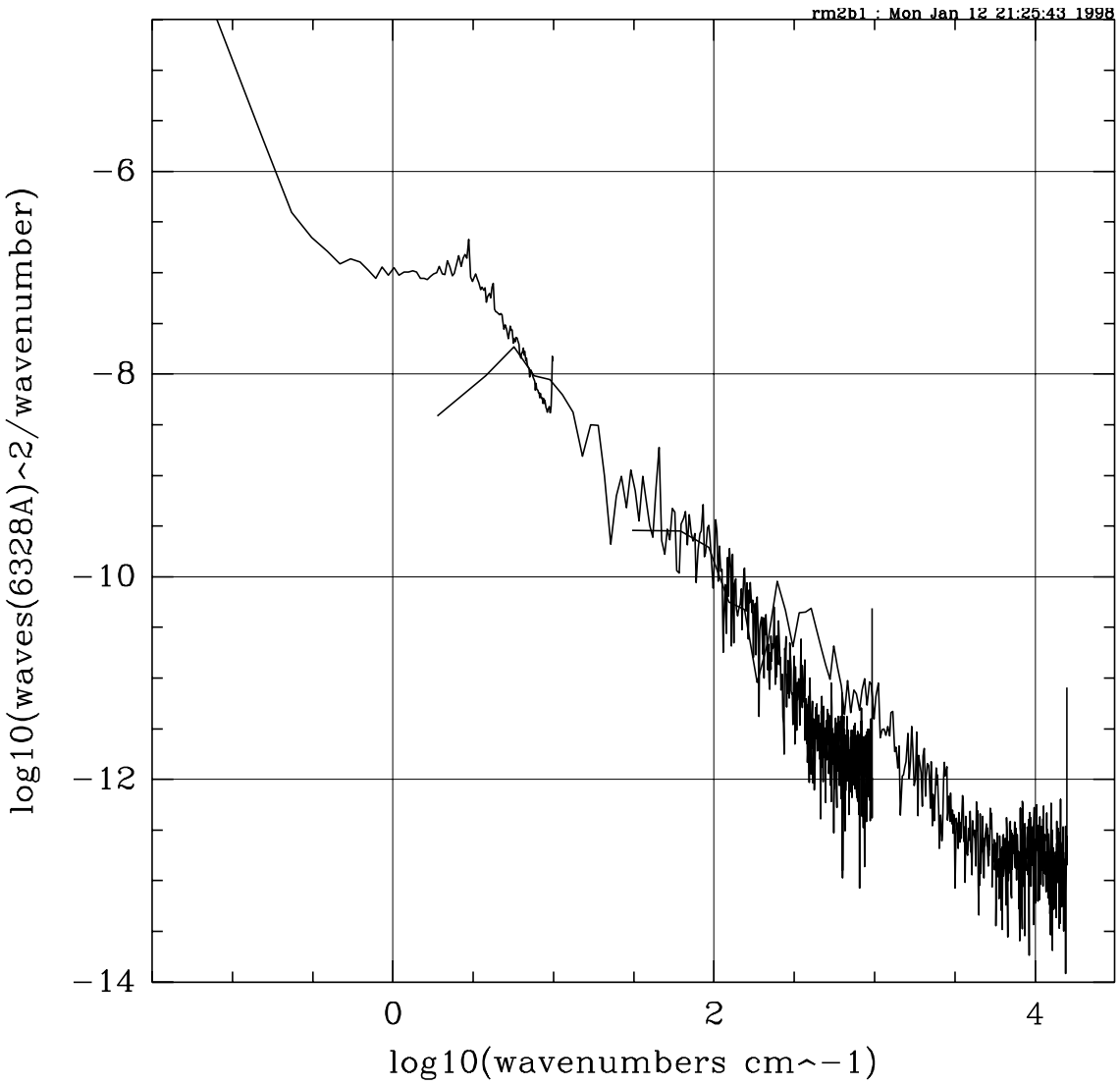

Figure 13: One dimensional fft of the phasemap and average of the three toposcans of rm2.

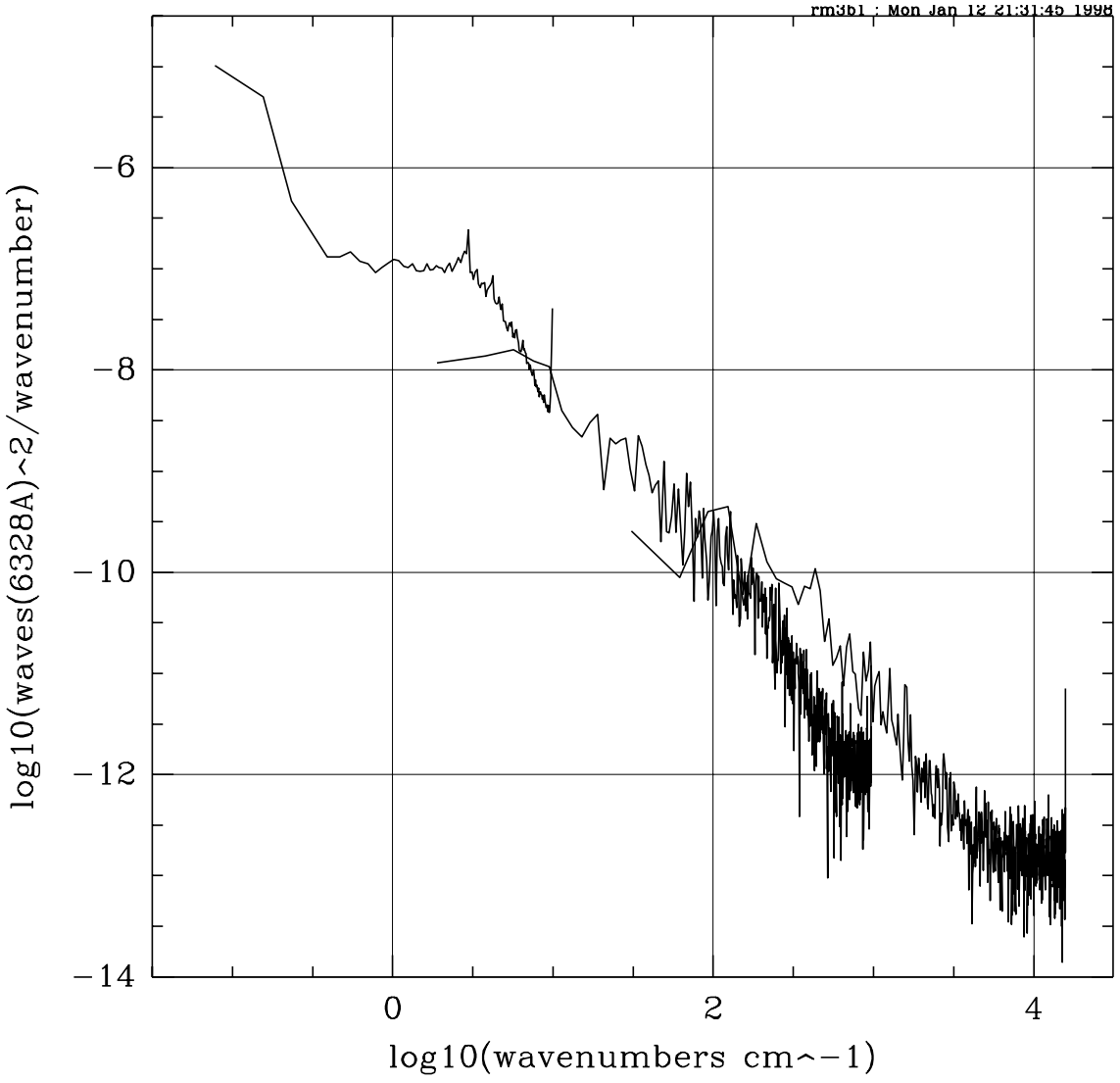

Figure 14: One dimensional fft of the phasemap and average of the three toposcans of rm3.

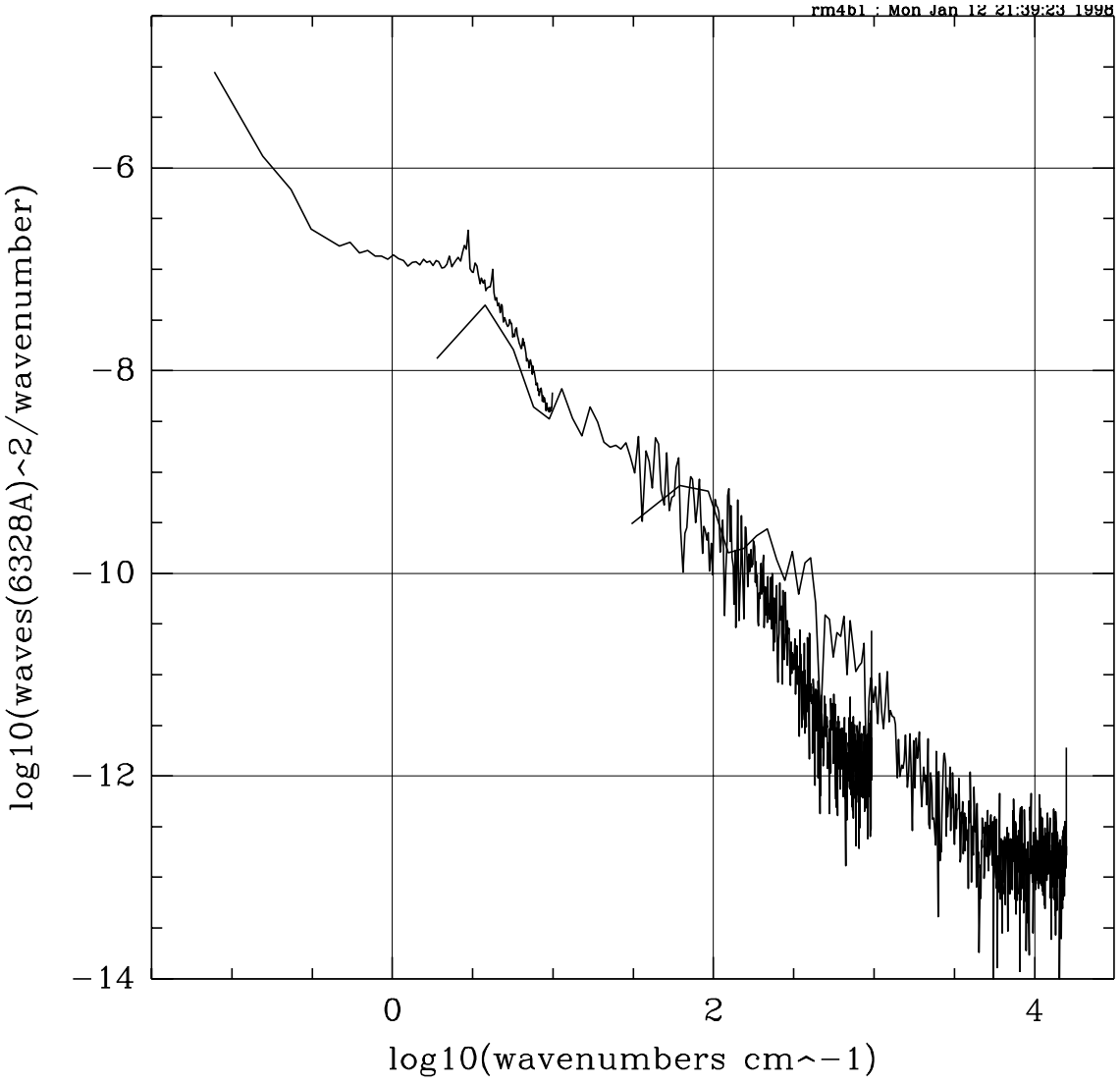

Figure 15: Figure 15 One dimensional fft of the phasemap and average of the three toposcans of rm4.

Table 6: etm1a Zernike amplitudes in units of 6907A over 22 cm aperture

map file: etm1a1a.fix		transform file: etm1a1azern.dat		
n	l	amplitude	sine	cosine
0	0	-1.336110E-04	0.000000E+00	0.000000E+00
1	1	4.852845E-03	-4.136534E-03	2.537556E-03
2	0	6.463434E-01	0.000000E+00	0.000000E+00
2	2	3.922018E-02	-1.667105E-04	-3.921982E-02
3	1	5.319441E-04	4.731567E-04	2.430786E-04
3	3	5.839354E-04	5.758500E-04	9.683661E-05
4	0	-4.028467E-04	0.000000E+00	0.000000E+00
4	2	3.431228E-04	-9.798651E-05	3.288342E-04
4	4	2.278492E-04	6.462525E-05	2.184922E-04
5	1	1.604022E-04	-4.959912E-05	1.525411E-04
5	3	2.000456E-04	-1.679991E-04	-1.086027E-04
5	5	4.920621E-05	-3.931595E-05	2.958897E-05
6	0	-2.558853E-04	0.000000E+00	0.000000E+00
6	2	1.622316E-04	-1.034802E-04	1.249438E-04
6	4	2.814195E-05	5.701657E-06	-2.755831E-05
6	6	1.554717E-05	1.935622E-06	1.542621E-05

Table 7: etm1 Laguerre-Gauss transforms for $\omega = 2.5$ cm in units of 6907A, Z(2,0) removed, 22cm aperture

map file: etm1a1a.fix		lagguerre-gauss transform file	etm1a1alg2.5c.dat	
p	m	amplitude	sine	cosine
0	0	-1.301560E-04	0.000000E+00	0.000000E+00
1	0	-2.245979E-05	0.000000E+00	0.000000E+00
1	1	6.133915E-05	-3.694236E-06	6.122781E-05
2	0	-2.144666E-05	0.000000E+00	0.000000E+00
2	1	2.210230E-05	-2.074603E-06	2.200472E-05
2	2	8.506449E-06	4.147216E-06	7.426997E-06
3	0	-1.312764E-05	0.000000E+00	0.000000E+00
3	1	7.259480E-06	2.573966E-06	6.787839E-06
3	2	6.802620E-06	6.551167E-06	1.832445E-06
3	3	6.703822E-06	-1.465823E-06	6.541604E-06
4	0	-2.081376E-06	0.000000E+00	0.000000E+00
4	1	7.006637E-06	7.003167E-06	2.204877E-07
4	2	8.470281E-06	8.258751E-06	-1.881141E-06
4	3	4.694510E-06	7.952605E-07	4.626660E-06
4	4	8.002167E-06	7.866396E-06	-1.467818E-06

Table 8: etm1 Laguerre-Gauss transforms for ω = 3.0 cm in units of 6970A, Z(2,0) removed, 22 cm aperture

map file: etm1a1a.fix		lagguerre-gauss transform file: etm1a1alg3.0c.dat		
p	m	amplitude	sine	cosine
0	0	-2.558767E-04	0.000000E+00	0.000000E+00
1	0	-3.094122E-05	0.000000E+00	0.000000E+00
1	1	1.526628E-04	-4.878694E-06	1.525849E-04
2	0	-3.090872E-05	0.000000E+00	0.000000E+00
2	1	6.867852E-05	-7.226375E-06	6.829728E-05
2	2	2.426018E-05	3.148254E-06	2.405504E-05
3	0	-4.964507E-05	0.000000E+00	0.000000E+00
3	1	3.423040E-05	-9.875855E-06	3.277481E-05
3	2	1.483091E-05	2.491241E-06	1.462017E-05
3	3	2.059340E-05	-1.325068E-05	1.576413E-05
4	0	-3.037104E-05	0.000000E+00	0.000000E+00
4	1	1.470107E-05	-1.748271E-06	1.459674E-05
4	2	9.389273E-06	6.212222E-06	7.040366E-06
4	3	1.527094E-05	-7.743186E-06	1.316224E-05
4	4	1.972566E-05	1.909344E-05	-4.954003E-06

Table 9: etm1 Laguerre-Gauss transforms for ω = 3.5 cm in units of 6970A, Z(2,0) removed, 22cm aperture

map file: etm1a1a.fix		lagguerre-gauss transform file: etm1a1alg3.5c.dat		
p	m	amplitude	sine	cosine
0	0	-4.573839E-04	0.000000E+00	0.000000E+00
1	0	-5.736036E-05	0.000000E+00	0.000000E+00
1	1	3.134873E-04	-8.463332E-06	3.133730E-04
2	0	6.019390E-06	0.000000E+00	0.000000E+00
2	1	1.581584E-04	5.184258E-06	1.580735E-04
2	2	5.022519E-05	1.002789E-05	4.921394E-05
3	0	-6.596789E-05	0.000000E+00	0.000000E+00
3	1	8.598199E-05	-1.928684E-05	8.379093E-05
3	2	3.813780E-05	3.462066E-06	3.798033E-05
3	3	3.368172E-05	-2.068434E-05	2.658226E-05
4	0	-1.068513E-04	0.000000E+00	0.000000E+00
4	1	5.873202E-05	-2.538267E-05	5.296386E-05
4	2	2.574055E-05	-2.989276E-06	2.556638E-05
4	3	3.919541E-05	-2.883935E-05	2.654378E-05
4	4	3.221363E-05	3.142870E-05	-7.067882E-06

Table 10: etm1 Laguerre-Gauss transforms for $\omega = 4.0$ cm in units of 6970A, Z(2,0) removed, 22cm aperture

map file: etm1a1a.fix		lagguerre-gauss transform file: etm1a1alg4.0c.dat		
p	m	amplitude	sine	cosine
0	0	-7.474097E-04	0.000000E+00	0.000000E+00
1	0	-1.567382E-04	0.000000E+00	0.000000E+00
1	1	5.631860E-04	-4.196864E-05	5.616200E-04
2	0	7.430217E-05	0.000000E+00	0.000000E+00
2	1	3.268737E-04	4.237741E-05	3.241150E-04
2	2	7.960994E-05	1.720393E-05	7.772881E-05
3	0	2.473420E-05	0.000000E+00	0.000000E+00
3	1	1.658298E-04	2.846520E-06	1.658054E-04
3	2	7.618863E-05	2.345140E-05	7.248958E-05
3	3	3.147506E-05	7.633233E-07	3.146581E-05
4	0	-1.176657E-04	0.000000E+00	0.000000E+00
4	1	1.145919E-04	-3.596001E-05	1.088034E-04
4	2	5.813096E-05	6.625841E-06	5.775211E-05
4	3	4.719546E-05	-2.666782E-05	3.893891E-05
4	4	3.940213E-05	3.900523E-05	-5.578467E-06

Table 11: etm1 Laguerre-Gauss transforms for $\omega = 4.5$ cm in units of 6970A, Z(2,0) removed, 22cm aperture

map file: etm1a1a.fix		lagguerre-gauss transform file: etm1a1alg4.5c.dat		
p	m	amplitude	sine	cosine
0	0	-1.123460E-03	0.000000E+00	0.000000E+00
1	0	-3.770330E-04	0.000000E+00	0.000000E+00
1	1	9.030382E-04	-1.506237E-04	8.903878E-04
2	0	8.121292E-05	0.000000E+00	0.000000E+00
2	1	6.234308E-04	8.485822E-05	6.176286E-04
2	2	1.005028E-04	-2.825099E-06	1.004631E-04
3	0	1.940916E-04	0.000000E+00	0.000000E+00
3	1	3.258438E-04	6.753004E-05	3.187693E-04
3	2	1.184743E-04	4.660506E-05	1.089226E-04
3	3	5.398964E-05	4.762338E-05	2.543411E-05
4	0	5.889929E-05	0.000000E+00	0.000000E+00
4	1	1.758808E-04	2.390277E-07	1.758806E-04
4	2	1.131397E-04	4.613151E-05	1.033077E-04
4	3	4.248170E-05	1.196287E-05	4.076254E-05
4	4	3.593265E-05	3.591438E-05	-1.145850E-06

Table 12: etm2 Zernike amplitudes in units of 6970A over 22 cm aperture

map file: etm2a1a.fix		transform file: etm2a1azern.dat		
n	l	amplitude	sine	cosine
0	0	-4.135297E-05	0.000000E+00	0.000000E+00
1	1	4.452493E-03	-3.752179E-03	2.397050E-03
2	0	6.457519E-01	0.000000E+00	0.000000E+00
2	2	3.943315E-02	-2.920727E-04	-3.943207E-02
3	1	5.818187E-04	3.134547E-04	4.901623E-04
3	3	5.016491E-04	4.525309E-04	2.164892E-04
4	0	5.823464E-04	0.000000E+00	0.000000E+00
4	2	1.939290E-04	-1.479701E-04	1.253527E-04
4	4	2.783810E-04	1.258805E-04	2.482943E-04
5	1	1.180301E-04	-3.591152E-05	1.124342E-04
5	3	2.342654E-05	6.480474E-06	-2.251235E-05
5	5	5.600456E-05	1.806489E-05	5.301105E-05
6	0	-6.200658E-04	0.000000E+00	0.000000E+00
6	2	1.983115E-04	-1.122005E-04	1.635192E-04
6	4	1.322066E-05	-1.270165E-05	3.667970E-06
6	6	9.294759E-05	9.102205E-05	1.882130E-05

Table 13: etm2 Laguerre-Gauss transforms for $\omega = 2.5$ cm in units of 6970A, Z(2,0) removed, 22 cm aperture

map file: etm2a1a.fix		lagguerre-gauss transform file: etm2a1alg2.5c.dat		
p	m	amplitude	sine	cosine
0	0	2.598775E-04	0.000000E+00	0.000000E+00
1	0	6.903734E-05	0.000000E+00	0.000000E+00
1	1	4.024322E-05	-3.055213E-06	4.012708E-05
2	0	4.190735E-05	0.000000E+00	0.000000E+00
2	1	1.214149E-05	-8.292291E-06	8.868694E-06
2	2	9.893719E-06	-9.115769E-06	3.845571E-06
3	0	3.396848E-05	0.000000E+00	0.000000E+00
3	1	8.045020E-06	-7.855936E-06	-1.733958E-06
3	2	3.430199E-06	-3.287022E-06	9.806891E-07
3	3	9.529703E-06	-8.958902E-06	3.248587E-06
4	0	1.789849E-05	0.000000E+00	0.000000E+00
4	1	7.376438E-06	-5.219642E-06	-5.212214E-06
4	2	1.682320E-06	1.584312E-06	-5.658234E-07
4	3	7.301296E-06	-6.382894E-06	3.545079E-06
4	4	2.382028E-06	2.346800E-06	4.081513E-07

Table 14: etm2 Laguerre-Gauss transforms for $\omega = 3.0$ cm in units of 6970A, Z(2,0) removed, 22 cm aperture

map file: etm2a1a.fix		lagguerre-gauss transform file: etm2a1alg3.0c.dat		
p	m	amplitude	sine	cosine
0	0	4.880004E-04	0.000000E+00	0.000000E+00
1	0	1.386679E-04	0.000000E+00	0.000000E+00
1	1	1.102596E-04	5.117607E-06	1.101408E-04
2	0	6.266104E-05	0.000000E+00	0.000000E+00
2	1	4.086893E-05	-7.066064E-06	4.025345E-05
2	2	2.743147E-05	-2.367552E-05	1.385478E-05
3	0	6.694100E-05	0.000000E+00	0.000000E+00
3	1	2.116422E-05	-1.758235E-05	1.178072E-05
3	2	2.060843E-05	-1.961042E-05	6.335543E-06
3	3	2.141600E-05	-2.099831E-05	4.209046E-06
4	0	6.655496E-05	0.000000E+00	0.000000E+00
4	1	1.572469E-05	-1.571352E-05	-5.926290E-07
4	2	1.244821E-05	-1.215385E-05	2.691051E-06
4	3	2.001995E-05	-1.944868E-05	4.748420E-06
4	4	7.653669E-06	7.650807E-06	-2.092944E-07

Table 15: etm2 Laguerre-Gauss transforms for $\omega = 3.5$ cm in units of 6970A, Z(2,0) removed, 22 cm aperture

map file: etm2a1a.fix		lagguerre-gauss transform file: etm2a1alg3.5c.dat		
p	m	amplitude	sine	cosine
0	0	8.221908E-04	0.000000E+00	0.000000E+00
1	0	2.792889E-04	0.000000E+00	0.000000E+00
1	1	2.375824E-04	1.528133E-05	2.370904E-04
2	0	7.907643E-05	0.000000E+00	0.000000E+00
2	1	1.109690E-04	1.561472E-05	1.098649E-04
2	2	4.986604E-05	-3.607658E-05	3.442530E-05
3	0	8.595967E-05	0.000000E+00	0.000000E+00
3	1	4.617375E-05	-1.585975E-05	4.336454E-05
3	2	4.181911E-05	-3.584632E-05	2.153786E-05
3	3	2.259090E-05	-2.247392E-05	2.296055E-06
4	0	9.052089E-05	0.000000E+00	0.000000E+00
4	1	3.934697E-05	-3.311459E-05	2.125108E-05
4	2	3.754456E-05	-3.627962E-05	9.663502E-06
4	3	3.621143E-05	-3.548682E-05	7.207827E-06
4	4	1.395258E-05	1.303652E-05	-4.972284E-06

Table 16: etm2 Laguerre-Gauss transforms for ω = 4.0 cm in units of 6970A, Z(2,0) removed, 22 cm aperture

map file: etm2a1a.fix		lagguerre-gauss transform file: etm2a1alg4.0c.dat		
p	m	amplitude	sine	cosine
0	0	1.266241E-03	0.000000E+00	0.000000E+00
1	0	5.515547E-04	0.000000E+00	0.000000E+00
1	1	4.295818E-04	3.507382E-06	4.295675E-04
2	0	9.793032E-05	0.000000E+00	0.000000E+00
2	1	2.601192E-04	5.963677E-05	2.531906E-04
2	2	8.188676E-05	-5.360024E-05	6.190683E-05
3	0	9.511930E-05	0.000000E+00	0.000000E+00
3	1	1.031096E-04	2.211525E-05	1.007101E-04
3	2	6.425175E-05	-4.071404E-05	4.970568E-05
3	3	1.346934E-05	4.542263E-06	-1.268034E-05
4	0	1.353268E-04	0.000000E+00	0.000000E+00
4	1	5.601994E-05	-2.419833E-05	5.052399E-05
4	2	6.128679E-05	-4.852195E-05	3.743917E-05
4	3	2.498784E-05	-2.485385E-05	2.584184E-06
4	4	2.009593E-05	1.664522E-05	-1.125980E-05

Table 17: etm2 Laguerre-Gauss transforms for ω = 4.5 cm in units of 6970A, Z(2,0) removed, 22cm aperture

map file: etm2a1a.fix		lagguerre-gauss transform file: etm2a1alg4.5c.dat		
p	m	amplitude	sine	cosine
0	0	1.802697E-03	0.000000E+00	0.000000E+00
1	0	1.037382E-03	0.000000E+00	0.000000E+00
1	1	6.651411E-04	-6.255354E-05	6.621931E-04
2	0	1.631843E-04	0.000000E+00	0.000000E+00
2	1	5.301309E-04	1.016170E-04	5.203006E-04
2	2	1.395146E-04	-1.001326E-04	9.714826E-05
3	0	2.280648E-05	0.000000E+00	0.000000E+00
3	1	2.511502E-04	9.161882E-05	2.338427E-04
3	2	8.737786E-05	-4.905089E-05	7.231114E-05
3	3	6.761019E-05	5.151724E-05	-4.378484E-05
4	0	1.780806E-04	0.000000E+00	0.000000E+00
4	1	9.257621E-05	3.552675E-05	8.548803E-05
4	2	8.351999E-05	-4.012291E-05	7.325122E-05
4	3	3.142526E-05	2.100632E-05	-2.337267E-05
4	4	2.573351E-05	1.502079E-05	-2.089473E-05

Table 18: etm3a Zernike amplitudes in units of 6970A over 22 cm aperture

map file: etm3a1a.fix		transform file: etm3a1azern.dat		
n	l	amplitude	sine	cosine
0	0	-1.512319E-01	0.000000E+00	0.000000E+00
1	1	6.942606E-03	-6.940810E-03	-1.579105E-04
2	0	6.486059E-01	0.000000E+00	0.000000E+00
2	2	3.947102E-02	1.743057E-04	-3.947063E-02
3	1	7.382267E-04	2.442905E-05	7.378224E-04
3	3	9.528427E-04	9.521619E-04	-3.601423E-05
4	0	-1.507021E-03	0.000000E+00	0.000000E+00
4	2	2.132705E-04	-2.556150E-05	2.117331E-04
4	4	3.066196E-04	1.045240E-04	2.882539E-04
5	1	7.592227E-05	6.086481E-05	-4.538355E-05
5	3	8.110111E-05	-7.951190E-05	1.597646E-05
5	5	1.143186E-04	1.621937E-05	1.131621E-04
6	0	2.758343E-06	0.000000E+00	0.000000E+00
6	2	1.696453E-04	-1.345585E-04	1.033128E-04
6	4	9.195012E-06	8.619554E-06	3.201801E-06
6	6	3.803165E-05	-7.962782E-06	-3.718872E-05

Table 19: etm3a Laguerre-Gauss transforms for $\omega = 2.5$ cm in units of 6970A, Z(2,0) removed, 22 cm aperture

map file: etm3a1a.fix		lagguerre-gauss transform file: etm3a1alg2.5c.dat		
p	m	amplitude	sine	cosine
0	0	-7.199453E-04	0.000000E+00	0.000000E+00
1	0	-1.769566E-04	0.000000E+00	0.000000E+00
1	1	2.976312E-05	2.466868E-05	1.665230E-05
2	0	-2.557083E-05	0.000000E+00	0.000000E+00
2	1	1.665145E-05	7.492224E-06	1.487068E-05
2	2	6.096213E-06	1.645099E-06	5.870048E-06
3	0	-2.060567E-06	0.000000E+00	0.000000E+00
3	1	1.074773E-05	1.540130E-06	1.063681E-05
3	2	1.333243E-06	8.112326E-07	-1.058035E-06
3	3	9.591694E-06	-8.334956E-06	4.746483E-06
4	0	1.553831E-07	0.000000E+00	0.000000E+00
4	1	5.120403E-06	-1.137958E-07	5.119138E-06
4	2	5.933580E-06	1.263999E-06	-5.797386E-06
4	3	4.920148E-06	-3.855072E-06	3.057168E-06
4	4	2.803719E-06	1.879281E-06	-2.080658E-06

Table 20: etm3a Laguerre-Gauss transforms for ω = 3.0 cm in units of 6970A, Z(2,0) removed, 22 cm aperture

map file: etm3a1a.fix		lagguerre-gauss transform file: etm3a1alg3.0c.dat		
p	m	amplitude	sine	cosine
0	0	-1.341267E-03	0.000000E+00	0.000000E+00
1	0	-4.655561E-04	0.000000E+00	0.000000E+00
1	1	6.840086E-05	6.359841E-05	2.517778E-05
2	0	-9.469027E-05	0.000000E+00	0.000000E+00
2	1	3.754832E-05	2.834512E-05	2.462581E-05
2	2	2.441955E-05	7.763940E-06	2.315244E-05
3	0	-1.827125E-05	0.000000E+00	0.000000E+00
3	1	2.779309E-05	7.746951E-06	2.669159E-05
3	2	1.483053E-05	1.050303E-06	1.479329E-05
3	3	3.070973E-05	-2.866488E-05	1.101873E-05
4	0	-2.730891E-06	0.000000E+00	0.000000E+00
4	1	2.355840E-05	2.083217E-06	2.346611E-05
4	2	4.640318E-06	-1.295655E-06	4.455764E-06
4	3	2.415669E-05	-2.197590E-05	1.003024E-05
4	4	9.922655E-06	8.612582E-06	-4.927730E-06

Table 21: etm3a Laguerre-Gauss transforms for ω = 3.5 cm in units of 6970A, Z(2,0) removed, 22 cm aperture

map file: etm3a1a.fix		lagguerre-gauss transform file: etm3a1alg3.5c.dat		
p	m	amplitude	sine	cosine
0	0	-2.194824E-03	0.000000E+00	0.000000E+00
1	0	-1.017384E-03	0.000000E+00	0.000000E+00
1	1	1.303691E-04	1.247000E-04	3.802638E-05
2	0	-2.697053E-04	0.000000E+00	0.000000E+00
2	1	8.521331E-05	7.990818E-05	2.959714E-05
2	2	4.681473E-05	2.306634E-05	4.073773E-05
3	0	-5.308727E-05	0.000000E+00	0.000000E+00
3	1	4.424862E-05	3.269024E-05	2.982094E-05
3	2	4.318215E-05	1.590699E-05	4.014556E-05
3	3	4.534756E-05	-4.306704E-05	1.419968E-05
4	0	-2.494311E-05	0.000000E+00	0.000000E+00
4	1	4.531822E-05	5.555865E-06	4.497637E-05
4	2	3.083401E-05	4.670542E-07	3.083047E-05
4	3	5.631460E-05	-5.313822E-05	1.864575E-05
4	4	1.607148E-05	1.506567E-05	-5.596253E-06

Table 22: etm3a Laguerre-Gauss transforms for ω = 4.0 cm in units of 6970A, Z(2,0) removed, 22 cm aperture

map file: etm3a1a.fix		lagguerre-gauss transform file: etm3a1alg4.0c.dat		
p	m	amplitude	sine	cosine
0	0	-3.253768E-03	0.000000E+00	0.000000E+00
1	0	-1.927687E-03	0.000000E+00	0.000000E+00
1	1	2.032819E-04	1.952633E-04	5.653097E-05
2	0	-6.689402E-04	0.000000E+00	0.000000E+00
2	1	1.752037E-04	1.655111E-04	5.746651E-05
2	2	5.613565E-05	2.735086E-05	4.902184E-05
3	0	-1.446574E-04	0.000000E+00	0.000000E+00
3	1	1.036238E-04	1.032231E-04	9.103438E-06
3	2	7.697507E-05	4.875183E-05	5.956862E-05
3	3	2.161989E-05	-2.099655E-05	5.154063E-06
4	0	-1.894754E-05	0.000000E+00	0.000000E+00
4	1	5.127455E-05	4.051694E-05	3.142382E-05
4	2	7.250173E-05	3.277176E-05	6.467235E-05
4	3	6.245266E-05	-5.970333E-05	1.832614E-05
4	4	1.440989E-05	1.398849E-05	-3.459343E-06

Table 23: etm3a Laguerre-Gauss transforms for ω = 4.5 cm in units of 6970A, Z(2,0) removed, 22 cm aperture

map file: etm3a1a.fix		lagguerre-gauss transform file: etm3a1alg4.5c.dat		
p	m	amplitude	sine	cosine
0	0	-4.463078E-03	0.000000E+00	0.000000E+00
1	0	-3.247750E-03	0.000000E+00	0.000000E+00
1	1	2.636507E-04	2.596047E-04	4.601189E-05
2	0	-1.432765E-03	0.000000E+00	0.000000E+00
2	1	3.080275E-04	2.642379E-04	1.583012E-04
2	2	5.493233E-05	-1.370081E-05	5.319632E-05
3	0	-4.347023E-04	0.000000E+00	0.000000E+00
3	1	2.182417E-04	2.178122E-04	1.368643E-05
3	2	8.911222E-05	6.709127E-05	5.864937E-05
3	3	4.738980E-05	4.521795E-05	-1.418202E-05
4	0	-4.321483E-05	0.000000E+00	0.000000E+00
4	1	1.453813E-04	1.413366E-04	-3.405438E-05
4	2	1.176343E-04	8.563202E-05	8.065352E-05
4	3	1.676669E-05	-1.676656E-05	6.729267E-08
4	4	1.171129E-05	-4.736084E-06	-1.071093E-05

Table 24: etm4a Zernike amplitudes in units of 6970A over 22 cm aperture

map file: etm4a1a.fix		lagguerre-gauss transform file: etm4a1azern.dat		
n	l	amplitude	sine	cosine
0	0	-2.221012E-01	0.000000E+00	0.000000E+00
1	0	-1.075858E-02	0.000000E+00	0.000000E+00
1	1	4.397566E-05	-3.949247E-06	4.379797E-05
2	0	-4.217650E-05	0.000000E+00	0.000000E+00
2	1	6.936983E-06	-1.781564E-06	6.704309E-06
2	2	4.223111E-06	1.921435E-06	3.760686E-06
3	0	-1.398422E-05	0.000000E+00	0.000000E+00
3	1	2.534270E-06	-2.033042E-07	-2.526102E-06
3	2	5.399412E-06	5.287722E-06	1.092542E-06
3	3	6.963486E-06	-6.818841E-06	1.411934E-06
4	0	-1.484332E-06	0.000000E+00	0.000000E+00
4	1	4.184634E-06	2.015937E-07	-4.179775E-06
4	2	7.627274E-06	7.605525E-06	5.755869E-07
4	3	2.458853E-06	-2.252888E-06	9.851152E-07
4	4	1.512045E-06	1.010793E-06	1.124535E-06

Table 25: etm4a Laguerre-Gauss transforms for $\omega = 2.5$ cm in units of 6970A, Z(2,0) removed, 22 cm aperture

map file: etm4a1a.fix		lagguerre-gauss transform file: etm4a1alg2.5c.dat		
p	m	amplitude	sine	cosine
0	0	-8.363589E-04	0.000000E+00	0.000000E+00
1	0	-2.001411E-04	0.000000E+00	0.000000E+00
1	1	4.397566E-05	-3.949247E-06	4.379797E-05
2	0	-4.217650E-05	0.000000E+00	0.000000E+00
2	1	6.936983E-06	-1.781564E-06	6.704309E-06
2	2	4.223111E-06	1.921435E-06	3.760686E-06
3	0	-1.398422E-05	0.000000E+00	0.000000E+00
3	1	2.534270E-06	-2.033042E-07	-2.526102E-06
3	2	5.399412E-06	5.287722E-06	1.092542E-06
3	3	6.963486E-06	-6.818841E-06	1.411934E-06
4	0	-1.484331E-06	0.000000E+00	0.000000E+00
4	1	4.184634E-06	2.015937E-07	-4.179775E-06
4	2	7.627274E-06	7.605525E-06	5.755868E-07
4	3	2.458853E-06	-2.252888E-06	9.851152E-07
4	4	1.512045E-06	1.010793E-06	1.124535E-06

Table 26: etm4a Laguerre-Gauss transforms for ω = 3.0 cm in units of 6970A, Z(2,0) removed, 22 cm aperture

map file: etm4a1a.fix		lagguerre-gauss transform file: etm4a1alg3.0c.dat		
p	m	amplitude	sine	cosine
0	0	-1.566325E-03	0.000000E+00	0.000000E+00
1	0	-5.083117E-04	0.000000E+00	0.000000E+00
1	1	1.289708E-04	-8.301313E-06	1.287033E-04
2	0	-1.166324E-04	0.000000E+00	0.000000E+00
2	1	3.731488E-05	-6.014908E-06	3.682691E-05
2	2	1.464047E-05	-2.414725E-06	1.443996E-05
3	0	-5.082575E-05	0.000000E+00	0.000000E+00
3	1	6.833321E-06	-3.742112E-06	5.717593E-06
3	2	6.680707E-06	-1.426651E-06	6.526601E-06
3	3	2.554430E-05	-2.507063E-05	4.896404E-06
4	0	-3.263625E-05	0.000000E+00	0.000000E+00
4	1	3.718507E-06	-2.802746E-07	-3.707930E-06
4	2	3.572598E-06	3.434083E-06	9.851544E-07
4	3	1.969430E-05	-1.948177E-05	2.885521E-06
4	4	2.427277E-06	1.332532E-06	-2.028801E-06

Table 27: etm4a Laguerre-Gauss transforms for ω = 3.5 cm in units of 6970A, Z(2,0) removed, 22 cm aperture

map file: etm4a1a.fix		lagguerre-gauss transform file: etm4a1alg3.5c.dat		
p	m	amplitude	sine	cosine
0	0	-2.586398E-03	0.000000E+00	0.000000E+00
1	0	-1.106320E-03	0.000000E+00	0.000000E+00
1	1	2.936113E-04	-1.408848E-05	2.932731E-04
2	0	-2.810829E-04	0.000000E+00	0.000000E+00
2	1	1.157105E-04	-9.298367E-06	1.153363E-04
2	2	3.270255E-05	-1.141065E-06	3.268263E-05
3	0	-8.594192E-05	0.000000E+00	0.000000E+00
3	1	3.415269E-05	-1.073391E-05	3.242205E-05
3	2	2.543067E-05	-4.297080E-06	2.506499E-05
3	3	3.813025E-05	-3.659428E-05	1.071330E-05
4	0	-7.879559E-05	0.000000E+00	0.000000E+00
4	1	1.202721E-05	-8.523058E-06	8.485949E-06
4	2	1.632926E-05	-9.064759E-06	1.358215E-05
4	3	4.669826E-05	-4.557967E-05	1.015979E-05
4	4	3.222308E-07	-2.247040E-07	-2.309562E-07

Table 28: etm4a Laguerre-Gauss transforms for ω = 4.0 cm in units of 6970A, Z(2,0) removed, 22 cm aperture

map file: etm4a1a.fix		lagguerre-gauss transform file: etm4a1alg4.0c.dat		
p	m	amplitude	sine	cosine
0	0	-3.876136E-03	0.000000E+00	0.000000E+00
1	0	-2.121481E-03	0.000000E+00	0.000000E+00
1	1	5.562878E-04	-2.580611E-05	5.556889E-04
2	0	-6.677590E-04	0.000000E+00	0.000000E+00
2	1	2.881576E-04	-8.447696E-06	2.880337E-04
2	2	4.994886E-05	-3.454396E-06	4.982926E-05
3	0	-1.507792E-04	0.000000E+00	0.000000E+00
3	1	9.935313E-05	-1.454452E-05	9.828276E-05
3	2	4.925210E-05	8.618267E-06	4.849221E-05
3	3	2.440548E-05	-2.154977E-05	1.145576E-05
4	0	-6.356837E-05	0.000000E+00	0.000000E+00
4	1	3.365920E-05	-1.600763E-05	2.960907E-05
4	2	4.309215E-05	-3.430715E-06	4.295537E-05
4	3	4.983799E-05	-4.698154E-05	1.663008E-05
4	4	1.771672E-05	-3.376696E-06	1.739195E-05

Table 29: etm4a Laguerre-Gauss transforms for ω = 4.5 cm in units of 6970A, Z(2,0) removed, 22 cm aperture

map file: etm4a1a.fix		lagguerre-gauss transform file: etm4a1alg4.5c.dat		
p	m	amplitude	sine	cosine
0	0	-5.377461E-03	0.000000E+00	0.000000E+00
1	0	-3.640320E-03	0.000000E+00	0.000000E+00
1	1	9.018128E-04	-5.311580E-05	9.002472E-04
2	0	-1.443043E-03	0.000000E+00	0.000000E+00
2	1	6.081510E-04	-2.317464E-06	6.081466E-04
2	2	7.466600E-05	-3.591639E-05	6.546010E-05
3	0	-3.950589E-04	0.000000E+00	0.000000E+00
3	1	2.645461E-04	-1.576369E-05	2.640761E-04
3	2	6.718568E-05	1.852427E-05	6.458148E-05
3	3	1.337021E-05	1.221377E-05	5.439324E-06
4	0	-5.519571E-05	0.000000E+00	0.000000E+00
4	1	8.071327E-05	-1.960673E-05	7.829565E-05
4	2	7.078318E-05	2.681703E-05	6.550653E-05
4	3	2.173438E-05	-1.751653E-05	1.286680E-05
4	4	4.667466E-05	-1.453091E-05	4.435512E-05

Table 30: rm1b Zernike amplitudes in units of 6970A over 22 cm aperture

map file: rm1b1a.fix			transform file: zern.dat	
n	l	amplitude	sine	cosine
0	0	-5.768606E-05	0.000000E+00	0.000000E+00
1	1	4.066137E-03	-2.907604E-03	2.842413E-03
2	0	3.090188E-01	0.000000E+00	0.000000E+00
2	2	1.750253E-02	-1.153118E-04	-1.750215E-02
3	1	6.737826E-04	6.314464E-04	-2.350712E-04
3	3	9.696604E-04	8.166525E-04	5.228000E-04
4	0	-8.108730E-04	0.000000E+00	0.000000E+00
4	2	5.402867E-05	2.534055E-05	-4.771743E-05
4	4	1.972156E-04	1.539110E-04	1.233103E-04
5	1	1.121278E-04	-7.958186E-05	7.898970E-05
5	3	5.756676E-05	-1.773010E-05	-5.476838E-05
5	5	1.477611E-04	3.925573E-05	1.424512E-04
6	0	7.661493E-04	0.000000E+00	0.000000E+00
6	2	2.064487E-04	-1.502725E-04	1.415601E-04
6	4	7.747209E-05	-3.605378E-05	-6.857150E-05
6	6	7.068666E-05	6.832178E-05	1.813112E-05

Table 31: rm1b Laguerre-Gauss transforms for $\omega = 2.5$ cm in units of 6970A, Z(2,0) removed, 22 cm aperture

map file: rm1b1a.fix			lagguerre-gauss transform file: rm1b1alg2.5c.dat	
p	m	amplitude	sine	cosine
0	0	-7.753641E-04	0.000000E+00	0.000000E+00
1	0	-2.813256E-04	0.000000E+00	0.000000E+00
1	1	5.964973E-05	2.220147E-05	5.536411E-05
2	0	-5.895768E-05	0.000000E+00	0.000000E+00
2	1	2.412835E-05	5.000332E-06	2.360454E-05
2	2	1.168977E-05	-9.233788E-06	7.168526E-06
3	0	-4.937181E-06	0.000000E+00	0.000000E+00
3	1	1.289413E-05	-5.986837E-06	1.141999E-05
3	2	8.264375E-06	-6.396882E-06	5.232571E-06
3	3	1.315448E-05	-1.305816E-05	1.588956E-06
4	0	2.171749E-06	0.000000E+00	0.000000E+00
4	1	7.869953E-06	-6.569491E-06	4.333354E-06
4	2	4.765922E-06	-2.868852E-06	3.805745E-06
4	3	7.952403E-06	-7.611376E-06	2.303835E-06
4	4	9.166347E-06	9.152943E-06	-4.955394E-07

Table 32: rm1b Laguerre-Gauss transforms for ω = 3.0 cm in units of 6970A, Z(2,0) removed, 22 cm aperture

map file: rm1b1a.fix		lagguerre-gauss transform file: rm1b1alg3.0c.dat		
p	m	amplitude	sine	cosine
0	0	-1.373782E-03	0.000000E+00	0.000000E+00
1	0	-6.952863E-04	0.000000E+00	0.000000E+00
1	1	1.430113E-04	5.146988E-05	1.334281E-04
2	0	-2.185087E-04	0.000000E+00	0.000000E+00
2	1	7.294606E-05	4.113223E-05	6.024340E-05
2	2	2.186328E-05	-1.610442E-05	1.478683E-05
3	0	-4.204189E-05	0.000000E+00	0.000000E+00
3	1	3.697692E-05	3.375680E-06	3.682251E-05
3	2	2.191171E-05	-1.794730E-05	1.257050E-05
3	3	3.723385E-05	-3.716649E-05	-2.238722E-06
4	0	1.664067E-06	0.000000E+00	0.000000E+00
4	1	2.755430E-05	-1.417496E-05	2.362859E-05
4	2	1.808200E-05	-1.546533E-05	9.369224E-06
4	3	3.051279E-05	-3.048704E-05	1.253338E-06
4	4	1.357770E-05	1.349823E-05	-1.466926E-06

Table 33: rm1b Laguerre-Gauss transforms for ω = 3.5 cm units of 6970A, Z(2,0) removed, 22 cm aperture

map file: rm1b1a.fix		lagguerre-gauss transform file: rm1b1alg3.5c.dat		
p	m	amplitude	sine	cosine
0	0	-2.129076E-03	0.000000E+00	0.000000E+00
1	0	-1.396581E-03	0.000000E+00	0.000000E+00
1	1	2.853619E-04	5.758723E-05	2.794908E-04
2	0	-5.961719E-04	0.000000E+00	0.000000E+00
2	1	1.722332E-04	1.176159E-04	1.258205E-04
2	2	2.780944E-05	-1.667152E-05	2.225815E-05
3	0	-1.839815E-04	0.000000E+00	0.000000E+00
3	1	9.713159E-05	6.367527E-05	7.334852E-05
3	2	3.210381E-05	-2.185328E-05	2.351784E-05
3	3	5.797491E-05	-5.709419E-05	-1.006697E-05
4	0	-2.537363E-05	0.000000E+00	0.000000E+00
4	1	5.837498E-05	1.864657E-06	5.834520E-05
4	2	3.683576E-05	-3.018787E-05	2.110844E-05
4	3	6.441417E-05	-6.385920E-05	-8.437344E-06
4	4	1.610110E-05	1.609938E-05	2.350325E-07

Table 34: rm1b Laguerre-Gauss transforms for ω = 4.0 cm in units of 6970A, Z(2,0) removed, 22 cm aperture

map file: rm1b1a.fix		lagguerre-gauss transform file: rm1b1alg4.0c.dat		
p	m	amplitude	sine	cosine
0	0	-2.989500E-03	0.000000E+00	0.000000E+00
1	0	-2.406412E-03	0.000000E+00	0.000000E+00
1	1	5.260373E-04	-1.812679E-05	5.257249E-04
2	0	-1.291908E-03	0.000000E+00	0.000000E+00
2	1	3.209716E-04	1.949984E-04	2.549478E-04
2	2	3.534936E-05	-2.420090E-05	2.576614E-05
3	0	-5.549419E-04	0.000000E+00	0.000000E+00
3	1	2.286635E-04	1.914642E-04	1.250138E-04
3	2	3.284996E-05	-8.819250E-06	3.164396E-05
3	3	5.572529E-05	-5.514969E-05	-7.988711E-06
4	0	-1.665184E-04	0.000000E+00	0.000000E+00
4	1	1.391260E-04	1.054048E-04	9.080677E-05
4	2	4.364406E-05	-2.576059E-05	3.523061E-05
4	3	7.849516E-05	-7.610806E-05	-1.921075E-05
4	4	1.889991E-05	1.760248E-05	6.881801E-06

Table 35: rm1b Laguerre-Gauss transforms for ω = 4.5 cm in units of 6970A, Z(2,0) removed, 22 cm aperture

map file: rm1b1a.fix		lagguerre-gauss transform file: rm1b1alg4.5c.dat		
p	m	amplitude	sine	cosine
0	0	-3.895379E-03	0.000000E+00	0.000000E+00
1	0	-3.700459E-03	0.000000E+00	0.000000E+00
1	1	9.164141E-04	-2.264659E-04	8.879910E-04
2	0	-2.355037E-03	0.000000E+00	0.000000E+00
2	1	5.396888E-04	2.035034E-04	4.998503E-04
2	2	7.925186E-05	-7.415446E-05	2.796378E-05
3	0	-1.262797E-03	0.000000E+00	0.000000E+00
3	1	3.987639E-04	3.204715E-04	2.372987E-04
3	2	3.005157E-05	2.979615E-06	2.990349E-05
3	3	4.389754E-05	-4.130886E-05	1.485165E-05
4	0	-5.722144E-04	0.000000E+00	0.000000E+00
4	1	3.216955E-04	2.973013E-04	1.228818E-04
4	2	4.492735E-05	6.557363E-06	4.444624E-05
4	3	6.277455E-05	-6.232091E-05	-7.533158E-06
4	4	2.225349E-05	1.431321E-05	1.703966E-05

Table 36: rm2b Zernike amplitudes in units of 6970A over 22 cm aperture

map file: rm2b1a.fix		transform file: rm2b1azern.dat		
n	l	amplitude	sine	cosine
0	0	-1.157662E-05	0.000000E+00	0.000000E+00
1	1	2.605362E-03	-2.579297E-03	-3.676141E-04
2	0	3.106442E-01	0.000000E+00	0.000000E+00
2	2	1.806972E-02	8.851534E-04	-1.804803E-02
3	1	3.256531E-04	3.254213E-04	1.228353E-05
3	3	3.357083E-04	3.245380E-04	-8.587866E-05
4	0	-2.285246E-03	0.000000E+00	0.000000E+00
4	2	6.168473E-04	-2.308193E-04	5.720341E-04
4	4	5.226667E-05	-2.409363E-05	4.638213E-05
5	1	1.901455E-04	1.158137E-04	1.508061E-04
5	3	1.308634E-04	-1.299564E-04	1.538075E-05
5	5	6.799230E-05	-3.874073E-05	5.587583E-05
6	0	3.921068E-04	0.000000E+00	0.000000E+00
6	2	1.688045E-04	-1.522417E-04	7.292077E-05
6	4	1.450646E-05	5.739669E-06	1.332267E-05
6	6	9.839252E-05	8.417041E-05	-5.095517E-05

Table 37: rm2b Laguerre-Gauss transforms for $\omega = 2.5$ cm in units of 6970A, Z(2,0) removed, 22 cm aperture

map file: rm2b1a.fix		lagguerre-gauss transform file: rm2b1alg2.5c.dat		
p	m	amplitude	sine	cosine
0	0	-9.503452E-04	0.000000E+00	0.000000E+00
1	0	-1.685324E-04	0.000000E+00	0.000000E+00
1	1	5.133064E-05	1.127947E-06	5.131825E-05
2	0	-1.418620E-05	0.000000E+00	0.000000E+00
2	1	2.004247E-05	-1.321127E-06	1.999888E-05
2	2	7.589641E-06	-5.484554E-06	5.246172E-06
3	0	-3.938206E-06	0.000000E+00	0.000000E+00
3	1	7.753770E-06	-5.519220E-07	7.734102E-06
3	2	2.458664E-06	-1.285625E-06	2.095757E-06
3	3	5.051306E-06	-5.042681E-06	-2.950463E-07
4	0	-1.267108E-06	0.000000E+00	0.000000E+00
4	1	1.207689E-06	9.647947E-07	7.264188E-07
4	2	2.072384E-06	2.070885E-06	-7.880682E-08
4	3	2.167367E-06	-1.157455E-06	-1.832424E-06
4	4	3.956533E-06	2.680424E-06	-2.910238E-06

Table 38: rm2b Laguerre-Gauss transforms for ω = 3.0 cm in units of 6970A, Z(2,0) removed, 22 cm aperture

map file: rm2b1a.fix		lagguerre-gauss transform file: rm2b1alg3.0c.dat		
oper. wavel (mu) =	0.633	meas. wavel (mu) =	0.633	
0	0	-1.821968E-03	0.000000E+00	0.000000E+00
1	0	-4.714985E-04	0.000000E+00	0.000000E+00
1	1	1.266014E-04	6.919425E-06	1.264121E-04
2	0	-4.496913E-05	0.000000E+00	0.000000E+00
2	1	5.521561E-05	-1.015886E-06	5.520626E-05
2	2	2.131188E-05	-1.585005E-05	1.424682E-05
3	0	-1.072133E-05	0.000000E+00	0.000000E+00
3	1	3.192021E-05	-4.211273E-06	3.164119E-05
3	2	1.638856E-05	-1.218879E-05	1.095529E-05
3	3	2.256831E-05	-2.116248E-05	7.840789E-06
4	0	-1.039307E-05	0.000000E+00	0.000000E+00
4	1	1.845209E-05	-3.116697E-06	1.818697E-05
4	2	8.966628E-06	-6.909442E-06	5.714895E-06
4	3	1.571187E-05	-1.561857E-05	1.709721E-06
4	4	8.475562E-06	7.272024E-06	-4.353485E-06

Table 39: rm2b Laguerre-Gauss transforms for ω = 3.5 cm in units of 6970A, Z(2,0) removed, 22 cm aperture

map file: rm2b1a.fix		lagguerre-gauss transform file: rm2b1alg3.5c.dat		
p	m	amplitude	sine	cosine
0	0	-3.070209E-03	0.000000E+00	0.000000E+00
1	0	-1.113328E-03	0.000000E+00	0.000000E+00
1	1	2.673068E-04	1.849213E-05	2.666664E-04
2	0	-1.374015E-04	0.000000E+00	0.000000E+00
2	1	1.189949E-04	6.937535E-06	1.187925E-04
2	2	3.387049E-05	-2.666333E-05	2.088724E-05
3	0	5.147930E-07	0.000000E+00	0.000000E+00
3	1	6.697336E-05	-4.245443E-06	6.683866E-05
3	2	3.461620E-05	-2.323574E-05	2.565895E-05
3	3	4.118756E-05	-3.149992E-05	2.653621E-05
4	0	-2.770423E-05	0.000000E+00	0.000000E+00
4	1	5.209240E-05	-7.963873E-06	5.148005E-05
4	2	3.088445E-05	-2.318677E-05	2.040154E-05
4	3	4.408099E-05	-4.008403E-05	1.834132E-05
4	4	9.664997E-06	9.572744E-06	-1.332191E-06

Table 40: rm2b Laguerre-Gauss transforms for ω = 4.0 cm in units of 6970A, Z(2,0) removed, 22cm aperture

map file: rm2b1a.fix		lagguerre-gauss transform file: rm2b1alg4.0c.dat		
p	m	amplitude	sine	cosine
0	0	-4.678515E-03	0.000000E+00	0.000000E+00
1	0	-2.288299E-03	0.000000E+00	0.000000E+00
1	1	5.030370E-04	3.199337E-05	5.020185E-04
2	0	-4.265229E-04	0.000000E+00	0.000000E+00
2	1	2.461881E-04	2.682399E-05	2.447224E-04
2	2	4.832119E-05	-4.681003E-05	1.198992E-05
3	0	5.098956E-05	0.000000E+00	0.000000E+00
3	1	1.156227E-04	2.616921E-06	1.155930E-04
3	2	4.683539E-05	-2.696670E-05	3.829296E-05
3	3	4.800400E-05	-1.412594E-05	4.587855E-05
4	0	8.894852E-06	0.000000E+00	0.000000E+00
4	1	8.425674E-05	-5.981462E-06	8.404416E-05
4	2	5.129755E-05	-3.126648E-05	4.066750E-05
4	3	6.109556E-05	-4.077715E-05	4.549607E-05
4	4	1.104244E-05	9.216065E-06	6.082725E-06

Table 41: rm2b Laguerre-Gauss transforms for ω = 4.5 cm in units of 6970A, Z(2,0) removed, 22cm aperture

map file: rm2b1a.fix		lagguerre-gauss transform file: rm2b1alg4.5c.dat		
p	m	amplitude	sine	cosine
0	0	-6.570010E-03	0.000000E+00	0.000000E+00
1	0	-4.161503E-03	0.000000E+00	0.000000E+00
1	1	8.447281E-04	3.590096E-05	8.439648E-04
2	0	-1.168426E-03	0.000000E+00	0.000000E+00
2	1	4.928344E-04	6.574271E-05	4.884297E-04
2	2	1.054703E-04	-1.013326E-04	-2.925213E-05
3	0	5.130154E-05	0.000000E+00	0.000000E+00
3	1	2.198774E-04	1.894976E-05	2.190593E-04
3	2	5.143063E-05	-3.664971E-05	3.608197E-05
3	3	5.564573E-05	2.392737E-05	5.023871E-05
4	0	1.755869E-04	0.000000E+00	0.000000E+00
4	1	1.118233E-04	-2.107130E-06	1.118034E-04
4	2	6.145065E-05	-2.263341E-05	5.713065E-05
4	3	6.841967E-05	-5.685379E-06	6.818305E-05
4	4	1.294611E-05	7.365290E-06	1.064679E-05

Table 42: rm3b Zernike amplitudes in units of 6970A over 22 cm aperture

map file: rm3b1a.fix		transform file: rm3b1azern.dat		
n	l	amplitude	sine	cosine
0	0	-4.590727E-06	0.000000E+00	0.000000E+00
1	1	4.005116E-03	-3.883001E-03	-9.814570E-04
2	0	3.043592E-01	0.000000E+00	0.000000E+00
2	2	1.705861E-02	5.661509E-04	-1.704921E-02
3	1	5.476053E-04	1.737157E-04	-5.193211E-04
3	3	8.192723E-04	8.069603E-04	1.414998E-04
4	0	8.972764E-04	0.000000E+00	0.000000E+00
4	2	8.501191E-05	-3.223114E-05	7.866498E-05
4	4	1.439705E-04	8.344808E-05	1.173198E-04
5	1	2.215874E-04	7.985416E-05	2.066985E-04
5	3	1.287581E-04	-1.286415E-04	-5.478155E-06
5	5	8.203160E-05	5.624019E-07	8.202968E-05
6	0	6.502946E-05	0.000000E+00	0.000000E+00
6	2	2.523730E-04	-1.763149E-04	1.805690E-04
6	4	7.974448E-05	7.794688E-05	-1.683645E-05
6	6	2.770906E-05	2.343613E-05	1.478309E-05

Table 43: rm3b Laguerre-Gauss amplitudes for $\omega = 2.5$ cm in units of 6970A, Z(2,0) removed, 22cm aperture

map file: rm3b1a.fix		lagguerre-gauss transform file: rm3b1alg2.5c.dat		
p	m	amplitude	sine	cosine
0	0	-1.145166E-04	0.000000E+00	0.000000E+00
1	0	-2.052482E-04	0.000000E+00	0.000000E+00
1	1	6.922140E-05	-1.114741E-05	6.831791E-05
2	0	-7.059481E-05	0.000000E+00	0.000000E+00
2	1	2.556649E-05	-8.835179E-06	2.399136E-05
2	2	5.221247E-06	-5.221111E-06	3.770478E-08
3	0	-1.095983E-05	0.000000E+00	0.000000E+00
3	1	1.055973E-05	-5.111518E-06	9.240149E-06
3	2	2.611306E-06	-2.558587E-06	-5.220659E-07
3	3	9.014400E-06	-8.350092E-06	-3.396377E-06
4	0	-1.513209E-06	0.000000E+00	0.000000E+00
4	1	2.315241E-06	-1.532385E-06	1.735551E-06
4	2	1.192803E-06	8.235536E-07	-8.628659E-07
4	3	6.178991E-06	-4.373206E-06	-4.365203E-06
4	4	4.980512E-06	4.945510E-06	5.894357E-07

Table 44: rm3b Laguerre-Gauss transforms for $\omega = 3.0$ cm in units of 6970A, Z(2,0) removed, 22 cm aperture

map file: rm3b1a.fix		lagguerre-gauss transform file: rm3b1alg3.0c.dat		
p	m	amplitude	sine	cosine
0	0	-7.667364E-05	0.000000E+00	0.000000E+00
1	0	-4.455082E-04	0.000000E+00	0.000000E+00
1	1	1.758517E-04	-1.763574E-05	1.749651E-04
2	0	-2.450093E-04	0.000000E+00	0.000000E+00
2	1	7.118751E-05	-1.804879E-05	6.886148E-05
2	2	9.226186E-06	-9.224744E-06	-1.630675E-07
3	0	-6.167490E-05	0.000000E+00	0.000000E+00
3	1	3.890481E-05	-1.571726E-05	3.558865E-05
3	2	1.259297E-05	-1.234722E-05	2.475679E-06
3	3	2.977022E-05	-2.976193E-05	7.027975E-07
4	0	-2.970280E-06	0.000000E+00	0.000000E+00
4	1	2.305960E-05	-1.143406E-05	2.002517E-05
4	2	9.696962E-06	-9.696499E-06	-9.471976E-08
4	3	2.106614E-05	-2.067225E-05	-4.054654E-06
4	4	7.662641E-06	7.651066E-06	-4.210058E-07

Table 45: rm3b Laguerre-Gauss transforms for $\omega = 3.5$ cm in units of 6970A, Z(2,0) removed, 22cm aperture

map file: rm3b1a.fix		lagguerre-gauss transform file: rm3b1alg3.5c.dat		
p	m	amplitude	sine	cosine
0	0	1.020722E-04	0.000000E+00	0.000000E+00
1	0	-7.361829E-04	0.000000E+00	0.000000E+00
1	1	3.800750E-04	-2.286323E-05	3.793868E-04
2	0	-6.230440E-04	0.000000E+00	0.000000E+00
2	1	1.598854E-04	-2.578709E-05	1.577922E-04
2	2	1.224573E-05	-2.914906E-06	-1.189374E-05
3	0	-2.547160E-04	0.000000E+00	0.000000E+00
3	1	8.576797E-05	-2.719934E-05	8.134089E-05
3	2	1.384584E-05	-1.318840E-05	4.215850E-06
3	3	5.606033E-05	-5.438304E-05	1.361046E-05
4	0	-4.387763E-05	0.000000E+00	0.000000E+00
4	1	5.985919E-05	-2.488436E-05	5.444164E-05
4	2	2.498632E-05	-2.317525E-05	9.339379E-06
4	3	5.670236E-05	-5.635796E-05	6.240026E-06
4	4	1.152496E-05	1.126788E-05	-2.420635E-06

Table 46: rm3b Laguerre-Gauss transforms for ω = 4.0 cm in units of 6970A, Z(2,0) removed, 22 cm aperture

map file: rm3b1a.fix		lagguerre-gauss transform file: rm3b1alg4.0c.dat		
p	m	amplitude	sine	cosine
0	0	4.707411E-04	0.000000E+00	0.000000E+00
1	0	-9.377023E-04	0.000000E+00	0.000000E+00
1	1	7.284649E-04	-2.812990E-05	7.279216E-04
2	0	-1.212303E-03	0.000000E+00	0.000000E+00
2	1	3.317276E-04	-2.961225E-05	3.304032E-04
2	2	4.309857E-05	3.779164E-06	-4.293256E-05
3	0	-7.350932E-04	0.000000E+00	0.000000E+00
3	1	1.651518E-04	-3.759963E-05	1.608148E-04
3	2	1.781675E-05	7.817367E-06	-1.601016E-05
3	3	6.095249E-05	-5.410490E-05	2.806896E-05
4	0	-2.576974E-04	0.000000E+00	0.000000E+00
4	1	1.082759E-04	-3.757963E-05	1.015453E-04
4	2	1.763593E-05	-1.465614E-05	9.809365E-06
4	3	8.453826E-05	-8.018772E-05	2.677027E-05
4	4	1.797089E-05	1.724041E-05	-5.071592E-06

Table 47: rm3b Laguerre-Gauss transforms for ω = 4.5 cm in units of 6970A, Z(2,0) removed, 22 cm aperture

map file: rm3b1a.fix		lagguerre-gauss transform file: rm3b1alg4.5c.dat		
p	m	amplitude	sine	cosine
0	0	1.036065E-03	0.000000E+00	0.000000E+00
1	0	-8.730148E-04	0.000000E+00	0.000000E+00
1	1	1.258929E-03	-3.833343E-05	1.258345E-03
2	0	-1.873021E-03	0.000000E+00	0.000000E+00
2	1	6.423015E-04	-2.585284E-05	6.417810E-04
2	2	8.376045E-05	-2.188991E-05	-8.084952E-05
3	0	-1.574728E-03	0.000000E+00	0.000000E+00
3	1	3.186739E-04	-4.502205E-05	3.154775E-04
3	2	7.502269E-05	3.577906E-05	-6.594136E-05
3	3	3.173071E-05	-1.654971E-05	2.707295E-05
4	0	-8.443816E-04	0.000000E+00	0.000000E+00
4	1	1.810021E-04	-5.161755E-05	1.734859E-04
4	2	3.649443E-05	2.664360E-05	-2.493917E-05
4	3	8.301391E-05	-6.847029E-05	4.693749E-05
4	4	2.596905E-05	2.339800E-05	-1.126611E-05

Table 48: rm4b Zernike amplitudes in units of 6970A over 22 cm aperture

map file: rm4b1a.fix		transform file: rm4b1azern.dat		
n	l	amplitude	sine	cosine
0	0	-6.436001E-05	0.000000E+00	0.000000E+00
1	1	2.751497E-03	-2.312000E-03	1.491775E-03
2	0	3.098268E-01	0.000000E+00	0.000000E+00
2	2	1.851168E-02	1.772640E-04	-1.851083E-02
3	1	3.569245E-04	3.559749E-04	2.601894E-05
3	3	4.913611E-04	4.870784E-04	6.473288E-05
4	0	-2.036130E-03	0.000000E+00	0.000000E+00
4	2	1.962799E-04	-2.342417E-05	1.948771E-04
4	4	1.358537E-04	1.191735E-04	6.522193E-05
5	1	4.980499E-04	4.975508E-04	2.229137E-05
5	3	2.387963E-04	-2.378811E-04	-2.088619E-05
5	5	1.763917E-04	-7.703535E-05	1.586807E-04
6	0	-9.343543E-04	0.000000E+00	0.000000E+00
6	2	1.123808E-04	-9.161318E-05	6.508812E-05
6	4	6.701124E-05	-6.560392E-05	1.366133E-05
6	6	4.367473E-05	3.438218E-05	2.693229E-05

Table 49: rm4b Laguerre-Gauss transforms for $\omega = 2.5$ cm in units of 6970A, Z(2,0) removed, 22 cm aperture

map file: rm4b1a.fix		lagguerre-gauss transform file: rm4b1alg2.5c.dat		
p	m	amplitude	sine	cosine
0	0	-5.736243E-04	0.000000E+00	0.000000E+00
1	0	-8.990360E-05	0.000000E+00	0.000000E+00
1	1	6.084329E-05	-1.189386E-05	5.966945E-05
2	0	3.131281E-06	0.000000E+00	0.000000E+00
2	1	2.694509E-05	-1.391243E-05	2.307557E-05
2	2	3.092742E-06	-1.005656E-07	-3.091107E-06
3	0	3.637099E-06	0.000000E+00	0.000000E+00
3	1	1.375218E-05	-1.002200E-05	9.417118E-06
3	2	3.816621E-06	-1.732314E-07	-3.812688E-06
3	3	1.171102E-05	-1.154050E-05	-1.991206E-06
4	0	-1.462834E-06	0.000000E+00	0.000000E+00
4	1	7.130461E-06	-6.530702E-06	2.862412E-06
4	2	4.279414E-06	1.835612E-06	-3.865735E-06
4	3	8.440590E-06	-7.745313E-06	-3.354652E-06
4	4	2.090919E-06	-8.216182E-07	-1.922728E-06

Table 50: rm4b Laguerre-Gauss transforms for ω = 3.0 cm in units of 6970A, Z(2,0) removed, 22cm aperture

map file: rm4b1a.fix			lagguerre-gauss transform file: rm4b1alg3.0c.dat	
p	m	amplitude	sine	cosine
0	0	-1.106883E-03	0.000000E+00	0.000000E+00
1	0	-2.697656E-04	0.000000E+00	0.000000E+00
1	1	1.473910E-04	-9.292629E-06	1.470978E-04
2	0	-9.092104E-06	0.000000E+00	0.000000E+00
2	1	7.057942E-05	-2.596239E-05	6.563086E-05
2	2	6.270693E-06	4.801088E-06	-4.033752E-06
3	0	2.273635E-05	0.000000E+00	0.000000E+00
3	1	4.116598E-05	-2.343633E-05	3.384341E-05
3	2	3.108821E-06	-2.352506E-06	-2.032359E-06
3	3	3.148219E-05	-3.124728E-05	3.838726E-06
4	0	7.161800E-06	0.000000E+00	0.000000E+00
4	1	2.631734E-05	-1.784984E-05	1.933870E-05
4	2	6.946022E-06	-4.158508E-06	-5.563634E-06
4	3	2.518136E-05	-2.516214E-05	-9.838338E-07
4	4	4.942222E-06	-3.170399E-06	-3.791323E-06

Note missing 3.5 cm

Table 51: rm4b Laguerre-Gauss transforms for ω = 4.0 cm in units of 6970A, Z(2,0) removed, 22 cm aperture

map file: rm4b1a.fix			lagguerre-gauss transform file: rm4b1alg4.0c.dat	
p	m	amplitude	sine	cosine
0	0	-1.874085E-03	0.000000E+00	0.000000E+00
1	0	-6.452248E-04	0.000000E+00	0.000000E+00
1	1	3.038431E-04	1.341870E-05	3.035466E-04
2	0	-9.289461E-05	0.000000E+00	0.000000E+00
2	1	1.548369E-04	-3.405743E-05	1.510448E-04
2	2	2.833585E-05	2.223119E-05	-1.756971E-05
3	0	4.779652E-05	0.000000E+00	0.000000E+00
3	1	8.795179E-05	-4.269410E-05	7.689428E-05
3	2	8.295077E-06	8.294329E-06	1.113939E-07
3	3	5.338054E-05	-5.045166E-05	1.743880E-05
4	0	5.297949E-05	0.000000E+00	0.000000E+00
4	1	6.250865E-05	-3.564160E-05	5.135180E-05
4	2	6.459589E-06	-4.391016E-06	4.737644E-06
4	3	5.501840E-05	-5.398359E-05	1.062057E-05
4	4	8.476883E-06	-7.001894E-06	-4.778183E-06

Table 52: rm4b Laguerre-Gauss transforms for $\omega = 4.5$ cm in units of 6970A, Z(2,0) removed, 22 cm aperture

map file: rm4b1a.fix		lagguerre-gauss transform file: rm4b1alg4.5c.dat		
p	m	amplitude	sine	cosine
0	0	-4.093897E-03	0.000000E+00	0.000000E+00
1	0	-2.282195E-03	0.000000E+00	0.000000E+00
1	1	8.724754E-04	1.598989E-04	8.576979E-04
2	0	-7.558401E-04	0.000000E+00	0.000000E+00
2	1	6.072616E-04	2.942791E-05	6.065481E-04
2	2	1.002182E-04	5.432295E-05	-8.421815E-05
3	0	-2.013250E-04	0.000000E+00	0.000000E+00
3	1	3.293652E-04	-6.232408E-05	3.234148E-04
3	2	1.195523E-04	7.602235E-05	-9.226788E-05
3	3	7.449189E-05	-5.642138E-05	4.863816E-05
4	0	5.977813E-05	0.000000E+00	0.000000E+00
4	1	1.839263E-04	-9.182675E-05	1.593635E-04
4	2	7.543258E-05	6.046081E-05	-4.510614E-05
4	3	8.107886E-05	-6.261091E-05	5.151364E-05
4	4	2.205943E-05	-8.660393E-06	-2.028832E-05

Table 53: RMS surface fluctuations and sagitta in units of 6328A

Mirror	phasemap 22 cm	profilometer 3 scans	profilometer 3 scans	Zernike Z(2,0) 22 cm
	0.1 to 10 cm^{-1}	2.0 to 2000 cm^{-1}	30 to 30000 cm^{-1}	
rm1b1	1.40×10^{-3}	5.11×10^{-4}	3.23×10^{-4}	0.3090
rm2b1	1.76×10^{-3}	4.06×10^{-4}	2.24×10^{-4}	0.3106
rm3b1	1.29×10^{-3}	4.40×10^{-4}	3.06×10^{-4}	0.3044
rm4b1	1.84×10^{-3}	5.48×10^{-4}	3.41×10^{-4}	0.3098
etm1a	1.16×10^{-3}	3.20×10^{-4}	1.91×10^{-4}	0.6463
etm2a	1.40×10^{-3}	2.65×10^{-4}	1.90×10^{-4}	0.6457
etm3a	1.56×10^{-3}	3.68×10^{-4}	2.23×10^{-4}	0.6486
etm4a	1.63×10^{-3}	3.68×10^{-4}	2.36×10^{-4}	0.6480