Parameters based on third order aberration calculations.

LBT F/15 GREGORIAN FOCUS (infrared, case D, new BFD)

**telescope input parameters**
- 2. number of mirrors in optical train
- 3. gregorian configuration
- 8.408 primary mirror diameter (m)
- 1.14177 primary focal ratio
- -14.7204 system focal ratio
- 3.05 vertex -- focus distance (m)
- INDEF secondary focal length (m)
- 4. field diameter (arcmin)
- 0.898 primary obstruction (m)
- 40. maximum infrared wavelength (microns)
- 3.7 tolerable diffraction radius
- 7.000000E-4 infrared centration allowance (m)

**other telescope parameters**
- 9.600002 primary focal length (m)
- -12.89261 magnification of secondary
- -123.7691 system focal length (m)
- 0.002445788 throughput (ubar1*y1)
- -0.03396647 telescope numerical aperture
- -0.03396315 half angle of telescope light cone (in air, rad)
- 10.66369 separation of m1 and m2 (m)
- 13.71369 pathlength from secondary to focus (m)
- 0.7775945 l = separation / back focal distance
- 0.3177083 beta = vertex distance / focal length of m1
- 0.3627498 eta = normalized vertex back focus
- 0.01140689 specified central obstruction (fractional area)
- 0.3164188 diameter of primary hole (m)
- 0.9871208 focal length of secondary (m)
- 96.24219 entrance pupil position relative to primary (m)
- -9.025225 entrance pupil magnification, paraxial
- 0.9442862 vertex diameter of secondary (m)
- 0.001416247 obscuration by cassegrain hole (fractional area)
- 0.8560386 secondary eccentricity

**normalized structural aberration coefficients**
- 0. sigmai
- -1. sigmaii
- -9.80282 sigmaiii
- 138.2766 sigmav
- -22.57252 sigmav

**primary mirror parameters**
- 0.4602503 sagitta of primary mirror (m)
- -5652.75 primary aspheric amplitude (microns)
- 0.4311129 half angle of primary light cone (rad)
- 0.4100033 primary numerical aperture
1.196163  ??primary focal ratio apparently

**secondary mirror parameters**

- 0.9404014  edge diameter of secondary mirror (m)
- 1.04968  secondary focal ratio
- 0.05620711  sagitta of secondary mirror (m)
- 0.9145526  *infrared vertex diameter of secondary mirror (m)
- 8.254044  *entrance pupil diameter, paraxial (m)
  (using chief rays through secondary vertex)
- -0.01240776  field correction to m2 diameter (m)
- -0.0014  centration correction to m2 diameter (m)
- 1.624639E-4  infrared diffraction angle (radians)
- -0.003515957  diffraction correction to m2 diameter (m)
- 0.9109714  infrared edge diameter of secondary mirror (m)
- 1.083591  infrared secondary focal ratio
- 8.251091  effective primary aperture (m)
- 15.00001  effective system focal ratio
- 8.362538  effective primary envelope (m)
- 100.7615  ??entrance pupil position relative to primary (m)
- -9.495984  ??entrance pupil magnification
- 8.65057  ??entrance pupil diameter, from edge (m)
- -530.295  secondary aspheric amplitude (microns)
- 0.0126131  fractional area of telescope obscuration
- 52.76998  net telescope collecting area (m**2)

**wavefront aberration coefficients**

- 0.  w040  (microns)  spherical aberration
- -0.7054392  w131  (microns)  coma
- 0.2368898  w222  (microns)  astigmatism
- -1.67076  w220p  (microns)  field curvature
- -0.01868577  w311  (microns)  distortion

**focal plane parameters**

- 0.6000496  platescale (mm/arcsec)
- 5.817764E-4  field radius angle (ubar1), (rad)
- 0.1440119  linear diameter of focal plane (m)
- 0.047  rms angular image radius tolerance (arcsec)
- 28.20233  rms physical image radius tolerance (microns)
- 1.520967  fractional curved field radius
- 6.083869  maximum curved field diameter (arcmin)
- -0.8950837  petzval radius of curvature (m)
- -1.042961  focal plane radius of curvature (m)
- 0.8939903  fractional flat field radius
- 3.575961  maximum flat field diameter (arcmin)
- 1.17422  height of largest flat field (mm)
- -0.550124  full field distortion (microns)

**field focus curve for aligned system**

<table>
<thead>
<tr>
<th>radius (mm)</th>
<th>focal plane height (mm)</th>
<th>image size (+/-mm)</th>
<th>wave aberration (microns rms)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.00</td>
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secondary alignment tolerances based on rms image radius

0.09588546 wavefront focus -- axial motion (micron/micron)
7.064276 m2 focus tolerance (on-axis) -- axial motion (micron)
5.507792 m2 focus tolerance (field) -- axial motion (micron)
1.833691E-7 scale change without refocus (fraction/micron)
2.532618E-7 scale change with refocus (fraction/micron)
0.004568509 wavefront spherical ab'n -- axial motion

(ind micron/micron)
0.08966701 induced image radius (micron/micron)
1.494327E-4 induced image radius (arcsec/micron)
314.5229 wavefront spherical ab'n -- focal motion (micron/meter)
-0.05227985 tolerable focal plane motion (m)
0.01103283 wavefront spherical ab'n -- primary asphere

(ind micron/ppm)
0.2165435 induced image radius (micron/ppm)
3.608759E-4 induced image radius (arcsec/ppm)
1.302387E-4 tolerable primary asphere error
0.001529529 wavefront spherical ab'n -- secondary asphere

(ind micron/ppm)
0.03002037 induced image radius (micron/ppm)
5.002981E-5 induced image radius (arcsec/ppm)
9.394400E-4 tolerable secondary asphere error
1.063686 distance from m2 to zero-coma pivot (m)
0.0 distance from prime focus to zero-coma pivot (m)
-0.1022064 image motion from zero-coma rotation (arcsec/arcsec)
-0.2216011 image motion from m2 vertex rotation (arcsec/arcsec)
13.89261 image motion from lateral displacement (micron/micron)
0.02315244 image motion from lateral displacement (arcsec/micron)
0.02098232 wavefront coma -- lateral motion (micron/micron)
0.5043794 induced image radius (micron/micron)
8.405629E-4 induced image radius (arcsec/micron)
55.91491 tolerable motion (micron)
0.1082036 wavefront coma -- vertex rotation (micron/arcsec)
2.601031 induced image radius (micron/arcsec)
0.004334593 induced image radius (arcsec/arcsec)
10.84275 tolerable rotation (arcsec)
-0.4882808 wavefront coma -- vertex chop angle (micron/arcsec)
-11.73745 induced image radius (micron/arcsec)
-0.01956079 induced image radius (arcsec/arcsec)
-2.402766   tolerable vertex chop throw (arcsec)
74.90606    tolerable zero coma chop throw (arcsec), astig only
0.9765616   wavefront coma -- primary rotation (micron/arcsec)
23.47489    induced image radius (micron/arcsec)
0.03912158  induced image radius (arcsec/arcsec)
1.201383    tolerable rotation (arcsec)

Writing OSLO format input file: y15D.len
Deleting existing output file.