PUE’O-NUI, the CFHT large optics and the AO Bonnette
A through-focus image sequence taken at Prime Focus (100 um steps; 0.52 arcsec fwhm at best focus)
A through-focus image sequence at Prime Focus Calculated from a wavefront map derived by Claude Roddier (100 um steps, convolved with 0.50 arcsec fwhm seeing)
A wavefront map at 1 um for the CFHT Primary Mirror showing the Cassegrain central obstruction (rms wavefront error = 0.228 um)

Strehl ratios: 0.00 at 0.5 um; 0.13 at 1.0 um; 0.60 at 2.0 um
Knife edge test of CFHT primary mirror showing zonal errors
Knife-edge test showing Couder fringes across the mirror diameter
An on-sky knife-edge image taken at the f/8 Cassegrain focus showing zonal wavefront errors. The spherical aberration evident in this image was subsequently corrected by bending the mirror.
A radial wavefront map for the CFHT primary mirror
Image profiles generate from the radial wavefront map. Each plot contains profiles from:

- an unobstructed perfect pupil
- an obstructed perfect pupil
- the radial wavefront map
**Phase variance and system Strehl ratios after adding the effects of 5 mirrors inside the AO Bonnette:**

- $R_0 = 20$ cm at 500 nm
- Primary and secondary mirror combined wavefront error = 20nm
- 100 elements AO system

<table>
<thead>
<tr>
<th>AO Mirror quality @ 632.8 nm</th>
<th>20 %</th>
<th>30 %</th>
<th>50 %</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/25 wave</td>
<td>0.3088 (73%)</td>
<td>0.249 (78%)</td>
<td>0.202 (82%)</td>
</tr>
<tr>
<td>1/50 wave</td>
<td>0.214 (81%)</td>
<td>0.154 (86%)</td>
<td>0.107 (90%)</td>
</tr>
<tr>
<td>1/100 wave</td>
<td>0.190 (83%)</td>
<td>0.131 (88%)</td>
<td>0.083 (92%)</td>
</tr>
</tbody>
</table>
f/8 Cassegrain

**f/8 Secondary Mirror**

- Thickness at edge: 115mm
- Thickness at center: 131mm
- Weight: 485kg
- Diameter of Cell: 1510mm
- Diameter of glass (clear): 1417mm
- Diameter on axis rays: 1397mm
- Radius of C.: 16880mm
- Figure: hyperboloid
  
  \[ \frac{1}{e^2} = -6.79 \]
  \[ e = 2.791 \]
  \[ a = 2780.56 = \frac{r}{1-e^2} \]
  \[ f_1 = 4980 = a(1-e) \]
  \[ f_2 = 10542 = a(1+e) \]

- f/ratio = f/8.00
- plate scale = 138\(\mu\)/
- magnification = 2.12
- Coma Sensitivity (sagittal) Field radius: 141mm/\(\mu\)/coma
- Alignment Error:
  - lateral: 19.2mm/\(\mu\)/coma
  - rotational: 0.234/\(\mu\)/coma
- Focus Encoders:
  - coarse: 22.56\(\mu\)/bit
  - fine: 1\(\mu\)/bit

**Primary Mirror**

- Diameter of Glass: 3659mm
- Diameter (clear): 3592mm
- Central hole Diameter in glass: 863mm
- Central hole Diameter outer (obstructed): 951mm
- Central hole Diameter inner (clear): 680mm
- Radius of C.: 27067mm
- Focal length: 13533mm
- Figure: paraboloid

**Focus Range**

274 to 932 ± 3 behind bonnette

Disk: CASSCELL
CONFIG=1.dwg