

## Palomar Adaptive Optics Test Plan

<b>Title</b>	<b>PHARO pupil motion</b>
Version	1.1
Date released	4/9/2008
Lead	A. Bouchez
Time requested	1 hr.
Required conditions	Dome closed

### **Purpose**

Measure the amount of pupil motion observed by PHARO over the accessible sky.

### **Previous analysis**

None which I am aware of.

### **Test procedure**

#### **A. Verify pupil alignment at zenith**

1. Home the PHARO lyot stop.
2. Install the pupil mask on the deformable mirror. **Gloves required.**
3. Record a 4.2s dark with the PHARO block in to subtract from subsequent images.
4. Set up PHARO for pupil imaging: Pupil imaging, 25 mas field, J filter, standard cross pupil mask, 4.2s integration
5. Check the pupil image on PHARO using white-light stimulus. If necessary, adjust PHARO's pitch and yaw to align the PHARO pupil mask to the DM pupil mask to better than 5 pixels.
6. Remove the DM pupil mask.
7. Mark the location of the PHARO pupil using vertical and horizontal fiducials on each side of the standard cross mask central obscuration.
8. Turn on the high lamps, open the mirror cover, set stimulus selection motor to "sky".
9. Record an image of the telescope pupil. Adjust telescope secondary focus to sharpen the spider on the right side.
10. Check the telescope pupil on PHARO. If necessary, adjust the AO system's FM1 mirror to align the PHARO pupil mask to the telescope secondary to better than 5 pixels.
11. Check Cass ring angle; adjust as necessary to hide telescope spider behind standard cross pupil mask. Record final cass ring angle.

**B. Measure pupil motion as a function of zenith angle.**

12. System configuration:

- DM pupil mask *not* installed.
- Mirror cover open, high lamps on.
- PHARO configuration: Pupil imaging, 25 mas field, J filter, 1% ND, standard cross.
- Record a 1.4s dark (PHARO block in).

13. Record 10s pupil images at the following HA/Dec positions. Fill in image numbers in the table below.

	-6:00	-4:00	-2:00	0:00	+2:00	+4:00	+6:00
-20.0	N/A	N/A				N/A	N/A
0.0							
+20.0							
+40.0							
+60.0							

**Results and conclusions**

**04/10/08 UT**

Initial pupil alignment: PHARO-DM alignment required adjustment of ~0.1 pupil in x, ~0.05 pupil in y. Reached end of PHARO travel in y, but did not have to move FM3. FM3 may have to be adjusted in the future to return PHARO adjustment to mid-range. PHARO-telescope alignment required moving FM1 in y only. This moved caused image to change -135 pixels in y on PHARO. Cass ring angle of 334.52 appears optimum for matching PHARO pupil mask to telescope spiders

Pupil motion vs. zenith angle: Recorded pupil images at zenith and 6 positions at +/- 4 hrs HA. Analysis pending.