

Caltech Optical Observatories / NASA Jet Propulsion Laboratory  
Palomar Adaptive Optics

Palomar LGSAO Engineering Summary 06/15/06 UT

Daytime results:

1. Acq pixel position of optical axis: (336.2, 330.1)  
SSM defaults: SSM1:(5742, 7007) SSM2:(6547, 4267)
2. Tested denominator-free centroid code with fiber. Appears to improve Strehl on fiber at 2kHz.
3. Laser is stable at 7.0W

Night log:

1950 Preparing to project 589 in dome to test laser coalignment.  
2020 Problems with 1.06 laser; VV adjusting.  
2030 589 and 660nm lasers appear misaligned. Adjusting with personnel at prime focus.  
2100 Opening dome.  
2110 Moving to SAO 44742 (5.7 A0) for AO checkout.  
Strehl ~55% without much tuning. Tel foc 58.39  
TT only: ph0001. FWHM=0.53" (0.73" in V)  
2120 Called in US-STRATCOM laser status report.  
2125 Moving to zenith for laser propagation.  
2129 Propagating at zenith. Pointing good.  
2130 Detuned background: laser\_sky\_1  
2132 Focus run "acq1\_": 11900-150, 150, 3  
Best (unresolved) = 11900, 15.7 pix =  
2133 Focus run "l1t1\_": 7535-50, 50, 3  
Best (unresolved) = 7550, 16.3 pix =  
2135 Focus run "acq2\_": 11900-50, 50, 3  
Focus run "acq3\_": 11900-100, 100, 3  
Best (unresolved): 11900-200, 200, 3  
2144 Scanning over wavelength.

etalon	pk	total	
-65.0	0	0	laser_sky_2
Shuttered due to unknown Zone 8			
-80.0	0	0	laser_sky_2
-75.0	0	0	
-70.0	0	0	
-65.0	0	0	
-60.0	0	0	
-55.0	6	3050	
-50.0	17	3613	
-45.0	18	13900	
-40.0	35	9800	
-35.0	57	24400	
-30.0	48	16600	
-25.0	89	34700	
-20.0	91	37000	
-15.0	49	17900	
-10.0	53	28400	
-5.0	36	7500	
0.0	18	-	

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5.0      0      0
-22.5    100    37600    "-22.5_2"
Laser power = 7.5W
2210 Moving to Landolt 106-700 (V=9.79)
      5s integrations: landolt_106-700_1 & _2      total:34500
      2.5s integrations: landolt_106-700_3 & _4
2220 Slewing to target low in N-W (3458-0062-1) for photo-op.
2240 SAO65354, V=7.5 F5 for NGS lock: 700cts @ 200Hz
2246 SAO65392, V=8.5 G5 for NGS lock: 140cts @ 200Hz
      Optimizing NGS lock.
      param      frame      Strehl
      co_0      0016      0.13
      co_def_8   0017      0.15
      co_def_4   0018      0.17
      co_def_2   0019      0.15
      co_def     0022      0.14
      co_def_4   0023      0.12
      co_def_2   0024      0.15
      co_def     0025      0.13
      co_def_2   prop=.04  0.21
      prop=.02           0.19
      prop=.06           0.24
      prop=.08           0.21
      prop=.06   sub=10  0.25
      sub=100           0.25
      sub=150           0.26
      sub=200           0.24
      sub=250           0.24
      sub=10            0.21
      Switching to 60cts @ 500Hz to test centroiding better.
      sub=10            0.14
      sub=25            0.15
      sub=50            0.16
      sub=75            0.22
      sub=100           0.24
      sub=150           0.17
      sub=100           0.24
      sub=10            0.14
2325 Moving to WDS 1609.0+5756 (V1=6.33,V2=10.60,sep=12.3)
      Acquired in Dual-NGS.
      TTgain=0.17      S=0.25
      0.30              S=0.27
      0.50              S=0.28
      0.65              S=0.20
      0.40              S=0.28
      48cts on HOWFS, 400cts on LOWFS, both at 500 Hz.
      AO crashed due to known bug. Rebooting
2345 Moving to LGS target: 2611-0722-1
      Laser at 6.5-7.5W
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2350 Lost 5 minutes due to AO reboot. Same strange symptoms as last night. Required: video=off, then video on.  
LOWFS @ 500 Hz, 1400 Cts.  
Running HOWFS @ 100 Hz.

0005 Closing UTT, gain=0.1 -> 100cts @ 100Hz.  
Fluctuations too large to use HOWFS to tune laser.  
Background: laser\_sky\_3

Etalon	Pk	Phot
-35	0	0
-45	13	16755
-55	43	54500
-65	27	30000
-75		laser fluctuating, measurements suspect.
-55	63	47000

0025 Closing UTT, using old background. 150cts @ 100Hz.

0030 Detuned. Taking sky frames at a range of framerates.  
50Hz, 100Hz, 200Hz, 250Hz, 500Hz (w /gating)

0035 Seeing measurement: 20s, TTonly, Ks: ph0028: 1.30" at K.

0040 Closing LOWFS focus loop, with LOWFS zpt=-1.5  
79.3mm at start...

0045 Running with: co\_def\_2, DM=0.29, 0.06  
Image quality terrible (~0.5" FWHM). Trying centroid offsets, gains, etc.

0055 HOWFS counts oscillating by factor of 2. Perhaps related?

0100 Registering DM to lenslets on white light. AO system crashed

0120 Slowly recovering from crash.  
Acquiring laser at 100Hz.  
DM gain=0.35, TTgain=0.40, CO\_0  
Closed loop FWHM~0.5"

0130 Increasing framerate to 250 Hz.  
Seeing = 1.25" at K with TT closed. Same with TT open.

0150 Scanning over focus

77.68	1800
79.68	2400
81.68	2000
83.68	3000
85.68	1600

0152 LOWFS focus script not reporting values. Found that logging was at wrong settings.

0155 Taking new backgrounds for HOWFS: 100Hz, 200Hz.  
Seeing now 0.95" at K.

0200 Trying a switch to 500Hz framerate.

2005 AO system crashed again, while changing framerates. HO DSPs are out of synch. LO DSPs are OK.

0213 Moving to Neptune to try to determine what is limiting LGS performance. 300cts @ 100Hz

ph0032	30s Ks sky
ph0033	Neptune
ph0034-35	Nep+Triton

ph0036 300Hz - better image quality.  
ph0037 500Hz - 70 cts  
ph0038 500Hz - 90 ct subap threshold.  
0235 Moving to LGS target 2689-0054-1  
Acquiring... at 500Hz.  
First background gave negative numbers after subtraction.  
Repeated. Second background successful.  
0300 No return detected at 500Hz. Maybe delay generator is mis-  
configured? Unable to connect using laptop.  
0305 Configuring delay generator.  
0315 Unable to see 660nm laser on BTO. Determined it was due to  
DAC getting hosed by delay generator changes.  
0330 Reacquiring LGS target 2689-0054-1  
(lowfs\_x=31402, lowfs\_y=23565)  
0335 Closing loop at 500Hz. Taking yet another background.  
Detect only 10 cts/subap at 500 Hz.  
0345 Seeing is 2.0" at K. Giving up.  
0355 Acquiring target at 70 deg elev in S-E.  
LGS came in 20" to South on Acq.  
0400 Acquiring target at 47 deg elev in S-E. Direct slew along  
meridian didn't work (-6deg too far beyond model). LGS  
came in 45" to South on Acq.  
0419 Acquiring target at 50 deg elev in N-W. LGS came in 45" to  
E.  
0425 Calling the night.