Palomar LGSAO Engineering Summary 07/14/06 UT

Daytime results:
1. Tested new AO build: Dual mode problems appear to be fixed.

Night log:
2035 Opening dome.
2042 Moving to WDS42896 for AO checkout. (V=7.0/10.20, sep~14")

frame	int	pscl	filter	target
0002	1.4s	25mas	Ks+1%	sky

2059 DM loop crash - DM loop spontaneously opened. Mitch going
     to Cass cage to cycle power on DM rack.
2102 Back to experiment. Taking flat map.

3-7	1.4s	"	Ks+0.1%	WDS; Strehl=~73%
8	30s	"	"	TT only; FWHM=0.65"
9	30s	"	"	sky
10	1.4s	"	"	sky

2108 Moving to zenith for LGS propagation.
2115 Attempting to project at zenith. Power meter left in beam.
2128 Testing automated centering script. On 35" move, undershot
     by -5".
2130 Detuned image: laser1_sky
2132 Focusing Acq (laser1_). Best acq=11900, min=15.6 pix
2128 Focusing LLT (laser2_). Best llt=11300, min=16.4 pix
2140 Scanning over wavelength (bkg-subtracted peak cts)

detuned	laser2_sky	
-40	19	
-30	28	
-20	53	
-10	62	
0	55	
10	20	
20	17	
-10	66	laser4_-10, now set to zero

2148 Optimized images: laser5, 5s integration. 6.4W.
     Detuned: laser3_sky, 5s integration
2151 LLT focus +100 microns, in different FOV locations:
     ltt_defocus_right (40" right of spot)
     llt_defocus_left (40" left of spot)
2155 Moving to Landolt 108-551 (V=10.70)
     landolt1_1, landolt1_2. FWHM=9.9x12.5"
2205 Moving to Tycho 2630-1368-1 for bright star optimization.
     BTO locked up well. Acquiring. Tel focus=56.96
2235 Centered LGS on HOWFS. Noted LO centroid failure again.
2310 Attempting to lock DM and focus loops. Focus running away,
     while counts on WFS decrease...
2338 Opening loops, focusing telescope: 56.67mm
2338 Taking background with laser detuned. Raleigh avg ~100
     cts/subap at 50 Hz.
2345 Shuttered for passing helicopter.

2350 Closing loop at 50Hz. Performance variable. 150cts @ 50Hz.
2058 Taking 100Hz detuned background.
2010 Closed DM loop at 100Hz. Getting

DM integral gain
0.08 20000
0.15 11000
0.20 13000
0.30 13000
0.40 8000
0.08 16000
0.05 14000
open 8000
Set to 0.20

LOWFS integral gain
0.1   16000
0.2   12000
0.4   18000
Performance variable.

0038 Locking on V=10 star in NGS mode. 95 cts @ 100Hz. Strehl
     ~30%.
0044 Measuring Acq. platescale, using FSM to steer star on PHARO
     and LGS on Acq.
     FSM posn.   PHARO   ACQ
     [0,0]   110   acq...3155
     [2.5,2.5]   114   ...3265
     [-2.5,-2.5]   115   ...3315
     ~plate scale is 0.19, 0.16 "/pixel
0100 Moving to star 5156-0286-1
0112 Closing NGS loop: Focus = 56.79
0120 Closing LGS loop at 50 deg. elevation.
      WFS counts = ~30 cts @ 100 Hz.
0145 Moving to zenith for LLT collimation.
0215 propagating laser
         focus   x,y   peak   fwhm   max
 laser10 11300 562, 391 19peak 19x17 fwhm max = 45
  laser is at 3.7 Watts
 LLT = 0, 70
0225 Viswa trying to increase laser power,
0235 power back at ~6.0 watts
laser10
       11300   564, 397 54   18x17   84
laser10defocus 11200

0235 Antonin and Rich translating secondary, 1/8 turn towards
West.

re-center using LLT, new LLT = 0, 50

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laser11 11300 591, 391, 32  19x19  66
laser power = 5w
laser11defocus 11200, still comatic on left side

move secondary 1/8 turn west
offset llt by -60 llt_b new = 0, -10
lase12defocus, looks better, still slighty brighter on left side

move secondary 1/8 turn west
offset laser by -30 (llt_b), new =9, -40, looks better
laser13 - it was defocused

0245 Viswa reports laser room ~85 deg.

Total offset 110 in llt_b
Try to re-borsight +1unit in axis 1 moved to right (wrong
     direction)
-2 units in axis 1, offset lltB +10 new = -30
-5 units in axis 1, offset new = (-40, 90)

-2 units in axis 2, wrong way
-4 units in axis 2, , opps
+8 units in axis 2 new = (

+1 unit in axis 1, closer
+0.5 unit in axis 1
+0.5 unit in axis 1,

Total motion is -4 in axis 1, +2 in axis 2
final LLT = -5, 90 with laser back in same place as we started
     with.

laser14defocus, coma is back!

Move relative +4 in axis 1, -2 in axis 2
move llt to 10, -40, that is close
new LLT = 10, -60
laser15defocus, looks good
laser15  582, 352  41   19 x 17 77
3:15 5.2 watts
3:15 block beam, to retrieve Antonin and Rich from prime
     out-of-focus beam on LLT looks circular at +/- 100 microns
of LLT focus.

0335 Propagating at zenith to check out-of-focus LGS image.
      Looks A-OK.
0341 Moving to Tycho 2770-0301-1 for a final performance test.
0400 Cirrus moving in - ~1 mag extinction.
0410 Calling night for laser.
0415 Starting NGS dual-star test: WDS 719311
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     Acquiring...
0427 Closed loops in dual NGS mode.  Good performance (~30%
     Strehl) on V=9.9/10.4/sep=15" binary.

0435 Taking LO telemetry
     LO_INT_GAIN       TIME                   PHARO
     0.42              1152876836-6975        117-121 (5s, Ks+1%)
     0.20              6981-7036              122-127
     0.10              7045-7106              128-133
     0.05              7115-7177              134-139
     off               7191-7261              140-145
     TT ONLY (0.20)                           147 (30s, Ks+1%)
     sky                                      148 (")
     sky                                      149-151 (1.4s, Ks+1%)
0454 Imaging Neptune.  No trouble locking. ~350 cts/subap @
     100Hz.  FWHM ~0.30"
0457 Imaging Uranus.
     153        sky        30s   Ks
     155-160    Uranus     30s   Ks
0510 Calling night
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