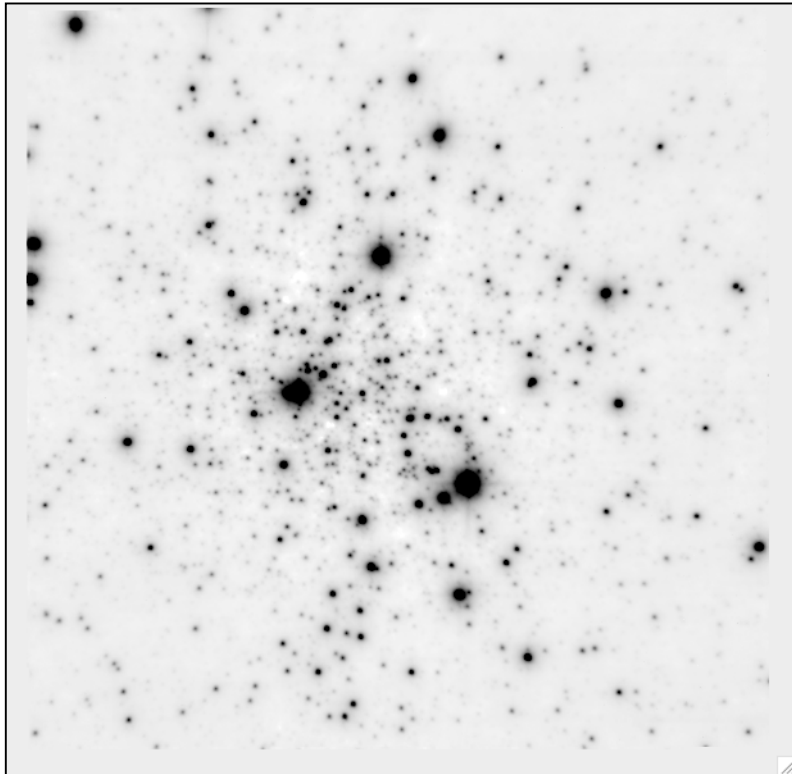


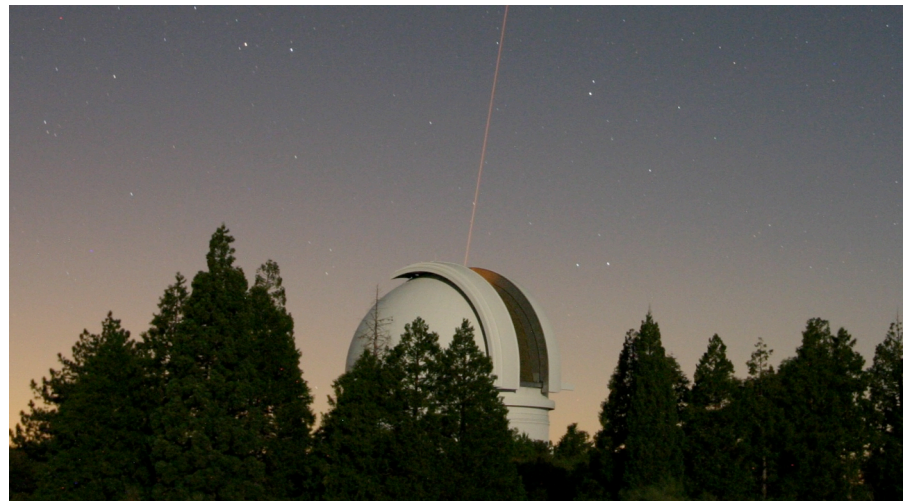


# The Chicago Sum-Frequency Laser

- 589nm macropulse/micropulse, mode-locked sum-frequency laser.
  - 8.5 W with high beam quality ( $M^2 \sim 1.05$ )
  - 2 GHz bandwidth
- Built at U. Chicago by E. Kibblewhite.
- First projection at Palomar October 2004.
- Shared-risk observing began April 2007 (14 nights to date)



GLIMPSE-C01 obscured globular cluster  
PHARO LGS Ks image  
(500s integ., 40" FOV, 150 mas FWHM)



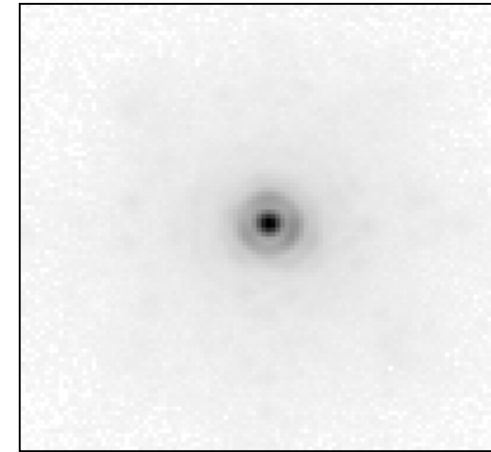


JPL

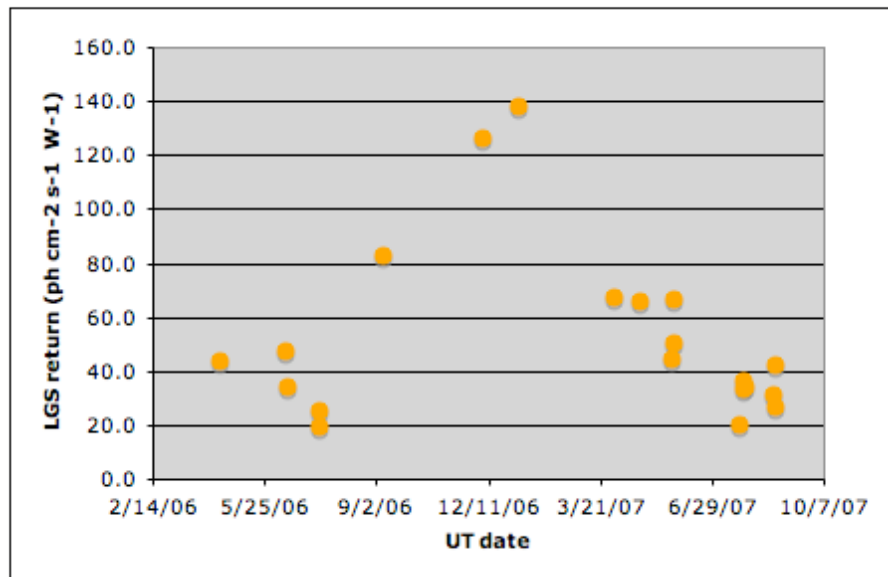
# Palomar LGS-AO performance

## LGS-AO system performance and efficiency:

- Laser power 7.5-8.5 W
- K Strehl with a bright on-axis tip/tilt star: 30-50 %.
- Tip/tilt star limiting magnitude:  $R \sim 18.0$
- Overheads:
  - 45 min. setup at start of night (from  $6^\circ$  twilight).
  - 10-12 min. acquisition time per target.
- Can operate through clouds with up to 2.0 magnitudes extinction due to laser wavefront sensor range gating.



LGS bright star PSF, 2.2  $\mu\text{m}$ , 30s  
FWHM=0.089", Strehl=48%



## Recent research results:

Return flux versus laser power reaching the mesosphere shows a very strong seasonal dependence at Palomar Observatory.