

GRIZLI Science Performance Goals
Includes also some performance goals for telescope and software
16 October 2011

A. Instrument specs

1. Delivered image quality, in each filter, across entire FOV

Goal: 0.5" FWHM, with well-behaved PSF, at high altitude (low airmass)

2. Limiting magnitude

Goal: 26th mag in griz gives S/N=10 in 3 min exposure

sky-limited in all filters with no moon

3. Exposure time

- minimum exposure ≤ 1 sec, with shutter illumination pattern repeatable (able to calibrate to 0.1%)

- maximum exposure at least 10 minutes, more for narrowband option

4. Readout

Goal: 10 seconds for all 4 chips in parallel

5. Detector performance

Goals:

- read noise < 5 e- per (binned 2x2) pixel

- dark current < 1 e- per (binned 2x2) pixel in 5 minutes

- full well should be close to or slightly above saturation limit

- linear response to at least 40K DN (assuming 63K range/saturation)

6. Throughput

Goal: 75% throughput

7. Fringing

Goals: (for 3 min exposure)

- less than 1% in i

- less than 5% in z

8. Scattered light

Goal: less than 0.1% effect over full field

9. Optical system performance

- optical system performance in each of griz measured and provided to high accuracy.

- Should be constant across FOV and stable in time.

- Provide comparison to standard SDSS passbands, e.g.

<http://www.sdss.org/dr3/instruments/imager/#filters>

- Feasibility of transformation to standard SDSS system demonstrated.

10. Alignment of images

Goal: sky coverage of different filters overlaps at 99% level

11. Metrology from instrument reported to Hub/TUI, placed in image headers as appropriate

B. Next items also depend on telescope

12. Field of view

Goal: 10' diameter circular unobstructed FOV

18' diameter FOV with modest vignetting by tertiary baffle

13. Guiding

Goal: centroid shift less than 0.2" for three minute exposure

14. Focus

Goal: Fast focusing method, and ability to update focus quickly while observing.

C. Next items relate to flatfielding, image processing, software, future upgrades

15. Photometry

Goal: Ability to take out of focus images of bright objects, and flatfield to obtain competitive differential photometry, 0.001 mags precision

Goal: Ability to do competitive absolute photometry to obtain 0.01 mag precision (depends on flatfielding, scattered light, fringing)

16. Software to process and co-add images quickly (needed if using short exposures for on-chip guiding)

17. Photometric transformation from instrument griz to SDSS griz

18. Geometric transformations between griz images

19. Narrow band filter specs, TBD.