RLMT Technical Specifications

compontent	Make,model	specification	comments
optical tube	planewave CDK-20	0.51m diameter f/6.8 corrected Dall-Kirkham optics	includes dew heaters
Mount	Mathis MI750	Equatorial with high-resolution encoders	M1000 fork arms
Focus controller	Planewave EFA	The EFA kit automates focusing monitors temperature (Delta T Dew Heater), controls fans	controlled by PWI3 software
Focuser	Hedrick		1.3" travel
Dew heater	Planewave Delta-T	Primary, secondary mirrors heated	controlled by PWI3
Camera	Andor Aspen CG-42	2048x2048 13.5 micron pixels, high QE (95% peak)	e2v back thinned sensor
Filter wheel	FLI CFW 3-12	12-positions	includes mini-grisms
Filters	Astrodon	none (no filter), W(650+) longpass, B,V,R Tru-balance color, Ha, OIII, SIII, 5nm Narrowband Sloan g,r	
Grism spectrometer	Designed, built at University of Iowa	R=300, 400nm-750nm	ref: Ludovici &Mutel 2017, A.J. Phys.
Echele spectrometer	Designed built at University of Iowa	R=7000 fiber-fed	Under development

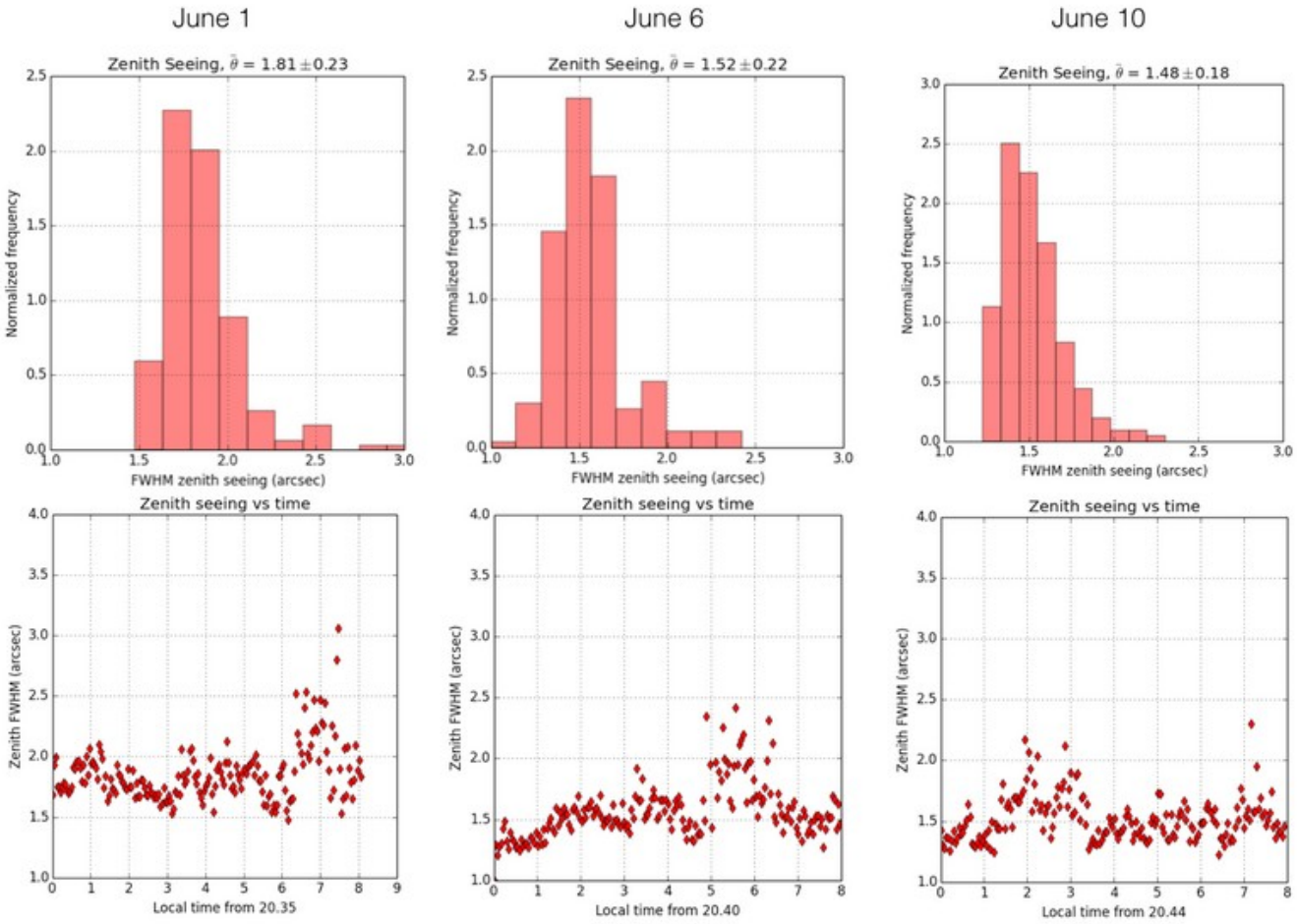
Performance	
Seeing	1.8"-2.5"(90%)
Field of view	28.0 arcmin x28.0 arcmin
Plate scale	16.5 micron/arcsec
Pixel scale	0.82 arcsec
Zero-point magnitudes (5:1 SNR), 60 sec, dark sky	No filter 21.5, Sloan G filter 20.5
Grism spectrometer	1 nm resolution (R~300) 400nm-750nm
Echelle spectrometer	0.5 A Resolution (R~7000) under development

Filter Information

Iowa Gemini telescope filters			
Position	**Name**	**Code**	**Note**
0	Lumincance	L	Luminance with near-IR cutoff
1	Red	X	Astrodon true-balance series 2 625nm-690nm
2	Visual	V	Astrodon true-balance series 2
3	Blue	B	Johnson-Cousins B filter
4	H, alpha	H	Astrodon 656.3nm 5nm FWHM
5	Beamsplitter	S	90/10 beamsplitter for spectrometer
6	Oxygen III	O	Astrodon OIII 500.7nm, 7nm FWHM
7	Sulfur	D	Astrodon SII 671.6nm 5nm FWHM
8	Sloan I	I	Sloan i'
9	Sloan g	G	Sloan g'
10	Sloan r	R	Sloan r'
11	Grism	6	600 lpmm grism

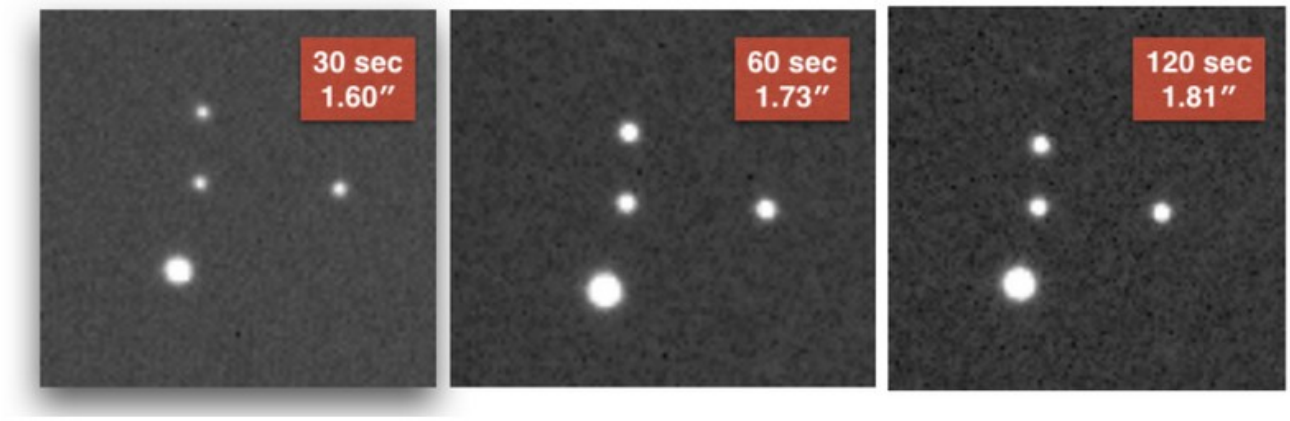
Observing

Over the course of several days of tests in june 2015, the median seeing varied from 1.5 arc second to 1.8 arc seconds as described below. The tests were made by taking images of the north celestial pole (constant airmass) and repeatedly performing a focus sequence using the Planewave PWI3 program. The observed FWHM angular sizes were corrected into one airmass.



Tracking

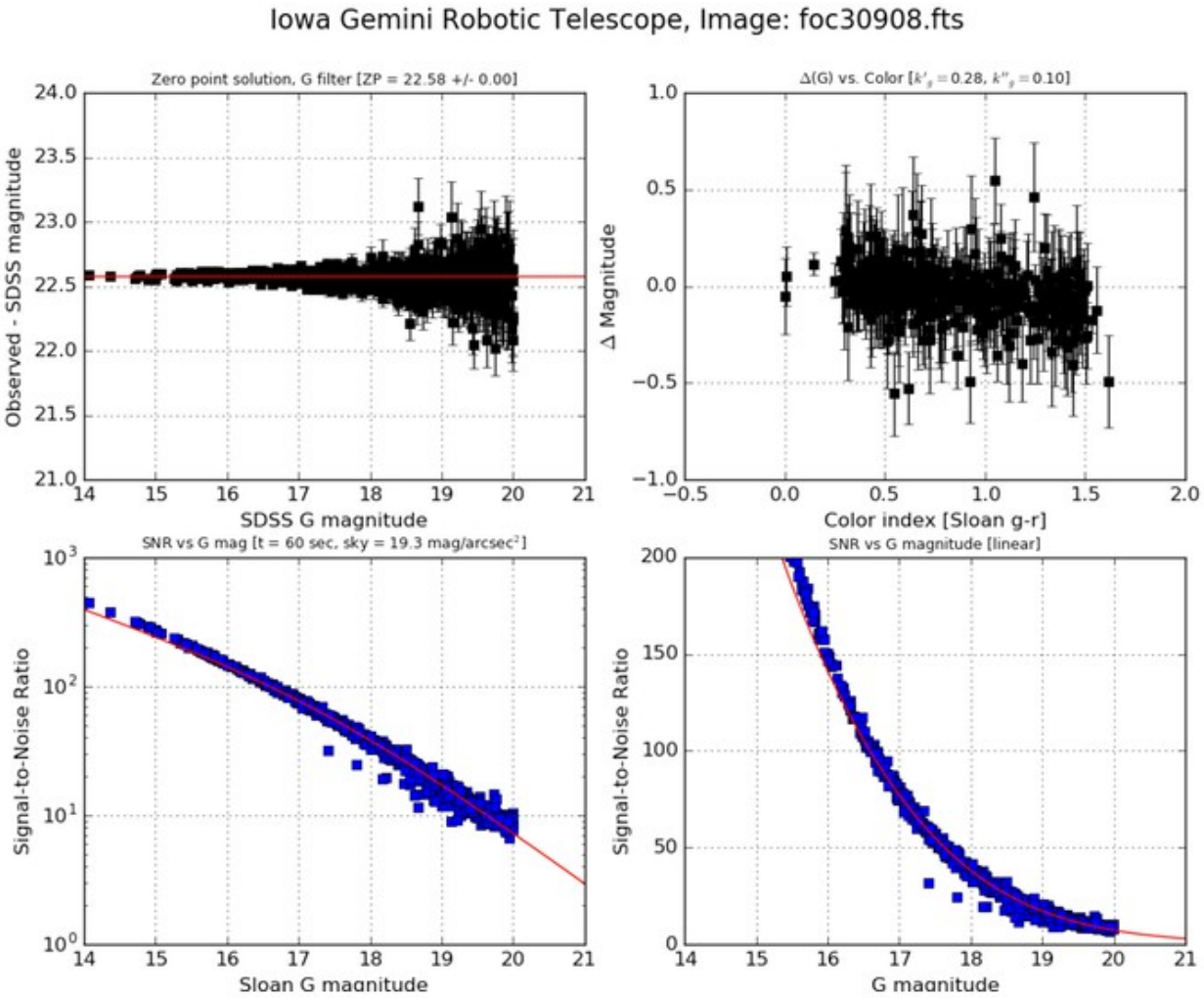
Telescope tracking was tested via taking a series of images with increasing a series of exposure times. these range from 30 sec to 960 sec in multiples of two. The images below are images taken with various exposure times of the original image with exposure time FWHM stars sizes, and roundness is the insets. the tacking is excellent, even the 480 sec exposures. There is a significant increase in FWHM and ellipticity at 960 sec, this is most likely a result of a non-ideal mount model.



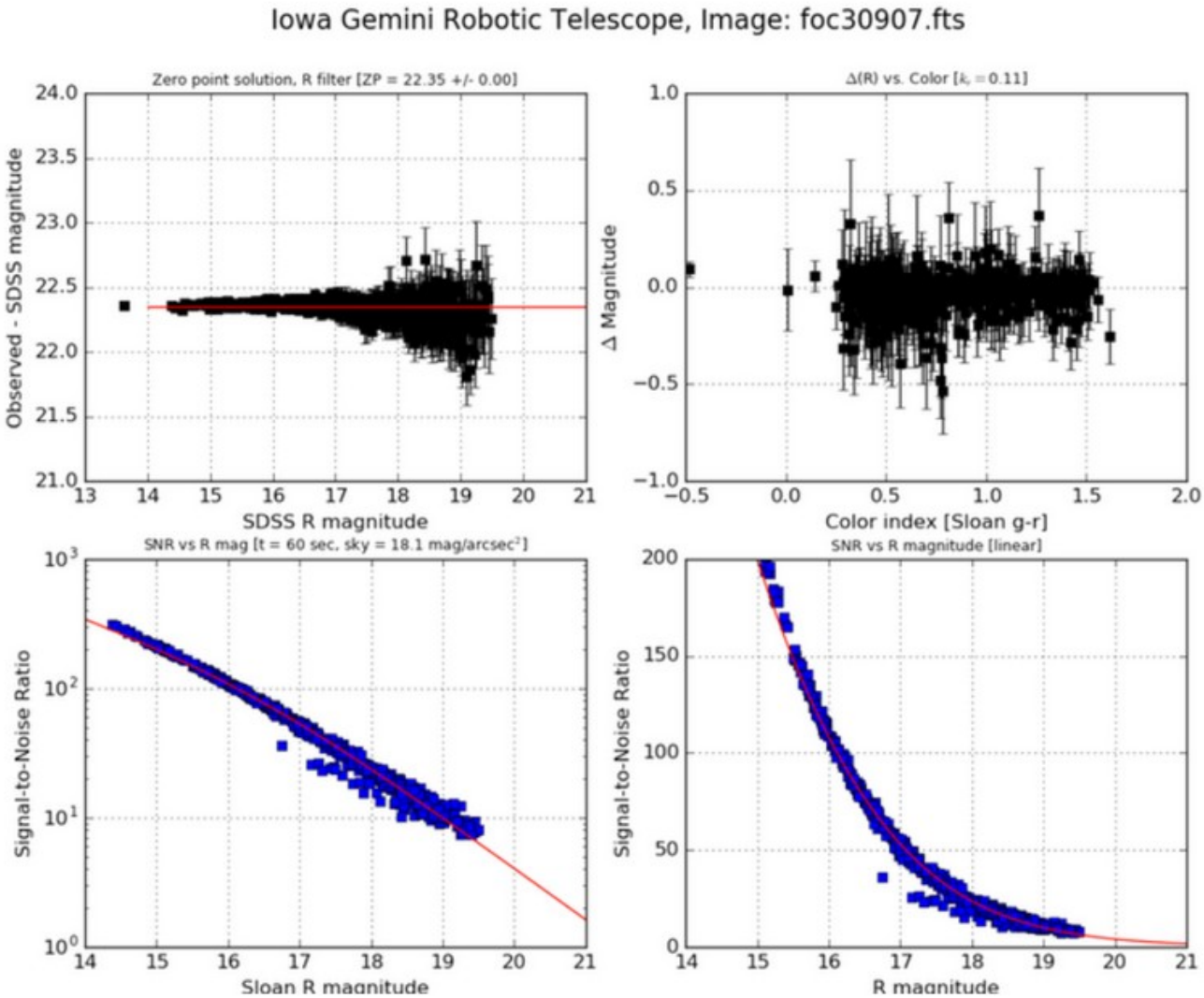
Sensitivity (Signal to noise ratio) and zero-point magnitudes

In order to test the signal to noise ratio (SNR) of an unresolved target (star) as a function of magnitude, filter, and exposure time, we observed various star fields that contained SDSS survey stars with very accurate magnitudes. Photometry of the Sloan g', r', and i' images were done using SExtractor, and the resulting star lists were compared with star positions and magnitudes in the SDSS catalogue. The resulting zero-point magnitudes were determined by a best-fit least-squares fit.

Sloan g' filter: Zero-point magnitude 22.58



Sloan r' filter: Zero-point magnitude 22.35



Sloan i' filter: Zero-point magnitude 21.78