


# Goodman Spectrograph Cheat Sheet




## Quick observing guide:

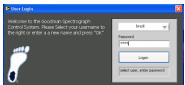
1) Connect to SOAR VPN. Open VNC connection to your choice of camera: soaric4 (BlueCam) or soaric6 (RedCam)


2) Make sure TrayTime  and Symmetricom  apps are running.

4) Make sure the Transfer\_to\_soaric7 app is running 

5) If not already open, double click on the Goodman GUI app 

6) Start Goodman GUI by clicking RUN button in upper left 


7) Click on "Main" menu and Logon 

8) Home systems (make sure with Telescope Operator Rotator and Instrument PA are both at 0 deg. 

9) Set Collimator value to 1000. Click on LED to activate flexure compensation.  

10) Select grating  and wavelength setup 

11) Select ROI  and Readout mode 

12) Select slit  Always use the 0.46" slit for focusing the

spectrograph in the afternoon, prior to calibrations. FWHM of comp lamp lines with 0.46" slit should be  $\sim < 3$  pix.

13) **Calibrations - Spectroscopic:** obtain dome flats (lamps at 100%) for the 400 and 600 l/mm gratings. Use quartz lamps for higher dispersion gratings. Set tab to "Flat". Obtain  $> 20$  bias frames; set tab to "Zero". Make sure to use same ROI and Readout as for science frames.



14) **Acquiring targets:** Use Acquisition Cam – GACAM (VNC into 139.229.15.32:5) to acquire brighter  $V \sim < 18$  targets. Use pre-imaging for faint, difficult targets (e.g. crowded fields)

## Spectroscopic Info

Grating (lines/mm)	Dispersion (Å/pixel)	Coverage (Å)	Max R @ 550nm (3pix with 0.46" slit)	Blocking Filter
400	1.00	M1: 300-705 M2: 500-905	1850	– GG-455
600	0.65	UV: 301-569 Blue: 350-616 Mid: 435-702 Red: 630-893	2800	-- – GG-385 GG-495
930	0.42	M1: 300-470 M2: 385-555 M3: 470-640 M4: 555-725 M5: 640-810 M6: 725-895	4450	– – GG-385 GG-495 GG-495 OG-570
1200	0.31	M0: 302-436 M1: 350-485 M2: 420-550 M3: 490-615 M4: 555-685 M5: 625-750 M6: 695-815 M7: 765-880	5880	– – – – GG-455 GG-455 GG-495 OG-570
1800	0.19	800	9610	As needed
2100	0.15	630	11930	As needed
2400	0.12	510	14280	As needed

**Field of View:** 7.2' diameter circle

**Pixel scale:** 0.15"/pixel

Approximate exposure times in imaging mode required to achieve a SNR=100 on a star of  $V=16$  and  $V=20$ , for a Moon Phase=7 days, Seeing=1", Airmass=1.2

## Imaging Info

### Available Filters:

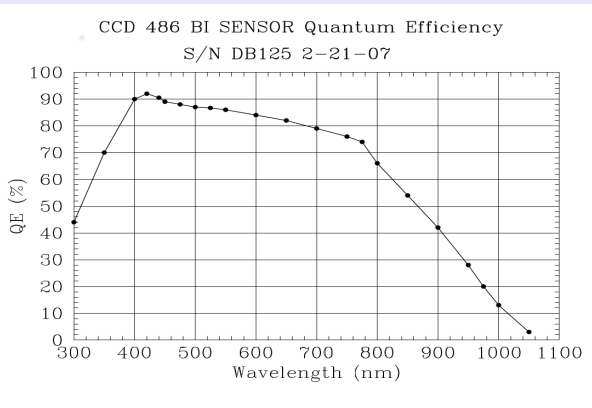
- Johnson UBV, Kron-Cousins Rc (round 4" diameter)
- UVRI (Bessell; 4"x4")
- SDSS ugriz (4"x4")
- H $\alpha$  (4"x4")
- Other filters per request. Contact the instrument scientist

Filter	Exp (s) V=16	Exp (s) V=20
U	7	650
B	1	50
V	1	48
R	0.6	42
I	1.5	110

# Blue Camera

Read Rate	Analog ATTN	Gain (e-/ADU)	Read Noise (e-)	50% Full Well (ADU)
50 kHz	0	0.25	3.33	279600*
	2	0.47	3.35	148723*
	3	0.91	3.41	76813*
100 kHz	0	0.56	3.69	124821*
	2	1.06	3.72	65943*
	3	2.06	3.99	33932
200 kHz	0	1.4	4.74	49928
	2	2.67	5.12	26179
400 kHz	0	5.67	8.62	12328

\* Digital saturation reached before 50% full well



**Digital saturation:** 65,536 e-  
**Single Pixel Full Well:** 139,800 e-  
**Linearity:** 0-80% Full Well  
**Dark Current:** 0.0003 e-/pixel/sec  
**Pixel size:** 15 microns

Mode	Binning	Serial Origin	Serial Length	Parallel Origin	Parallel Length	Approx. Image Size
Imaging 1x1	1x1	516	3096	500	3096	19 Mb
Imaging 2x2	2x2	516	1548	500	1548	5 Mb
Imaging 3x3	3x3	516	1032	500	1032	2 Mb
Spec 1x1	1x1	0	4142	1100	1896	16 Mb
Spec 2x2	2x2	0	2071	1100	948	4 Mb
Spec 3x3	3x3	0	1381	1100	632	2 Mb
Slit Imaging /align	1x2	1250	1200	1100	948	800 Kb

**Note:** Origins are given in un-binned, absolute pixels, lengths are given in binned pixels

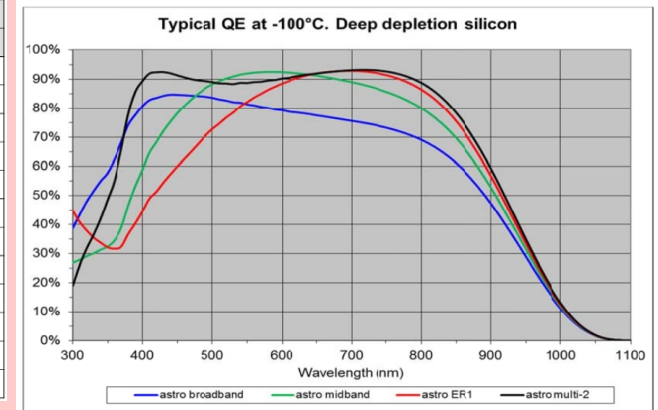
# Red Camera



Read Rate	Analog ATTN	Gain (e-/ADU)	Read Noise (e-)	50% Full Well (ADU)
100 kHz	3	1.54	3.45	66,558*
100 kHz	2	3.48	5.88	29,454
344 kHz	3	1.48	3.89	69,257*
344 kHz	0	3.87	7.05	26,486
750 kHz	2	1.47	5.27	69,728*
750 kHz	0	3.77	8.99	27,188

\*Digital saturation reached before 50% full well

Full frame readout times		
Readout	ROI	t(s)
750ATTNO	Imaging 1x1	16.2
750ATTNO	Imaging 2x2	6.5
750ATTNO	Spec 1x1	14.0
750ATTNO	Spec 2x2	6.0
344ATTNO	Imaging 1x1	31.5
344ATTNO	Imaging 2x2	10.3
344ATTNO	Spec 1x1	26.0
344ATTNO	Spec 2x2	9.0
100ATTNO	Imaging 1x1	98.0
100ATTNO	Imaging 2x2	26.7
100ATTNO	Spec 1x1	80.5
100ATTNO	Spec 2x2	22.7



\* e2v 231-84 deep depletion CCD with multi-2 coating (black line)

**Digital saturation:** 65,536 e-  
**Single Pixel Full Well:** 205,000 e-  
**Linearity:** 5-80% Full Well  
**Dark Current:** 0.00008 e-/pixel/sec  
**Pixel size:** 15 microns

Mode	Binning	Serial Origin	Serial Length	Parallel Origin	Parallel Length	Approx. Image Size
Imaging 1x1	1x1	530	3096	388	3096	19 Mb
Imaging 2x2	2x2	530	1548	388	1548	5 Mb
Imaging 3x3	3x3	530	1032	388	1032	2 Mb
Spec 1x1	1x1	0	1896	980	4142	16 Mb
Spec 2x2	2x2	0	948	980	2071	4 Mb
Spec 3x3	3x3	0	632	980	1381	2 Mb
Slit Imaging/Align*	1x1	1100	1100	1300	1500	3 Mb

**Note:** Origins given in un-binned, absolute pixels, lengths are given in binned pixels  
\*Subject to change.