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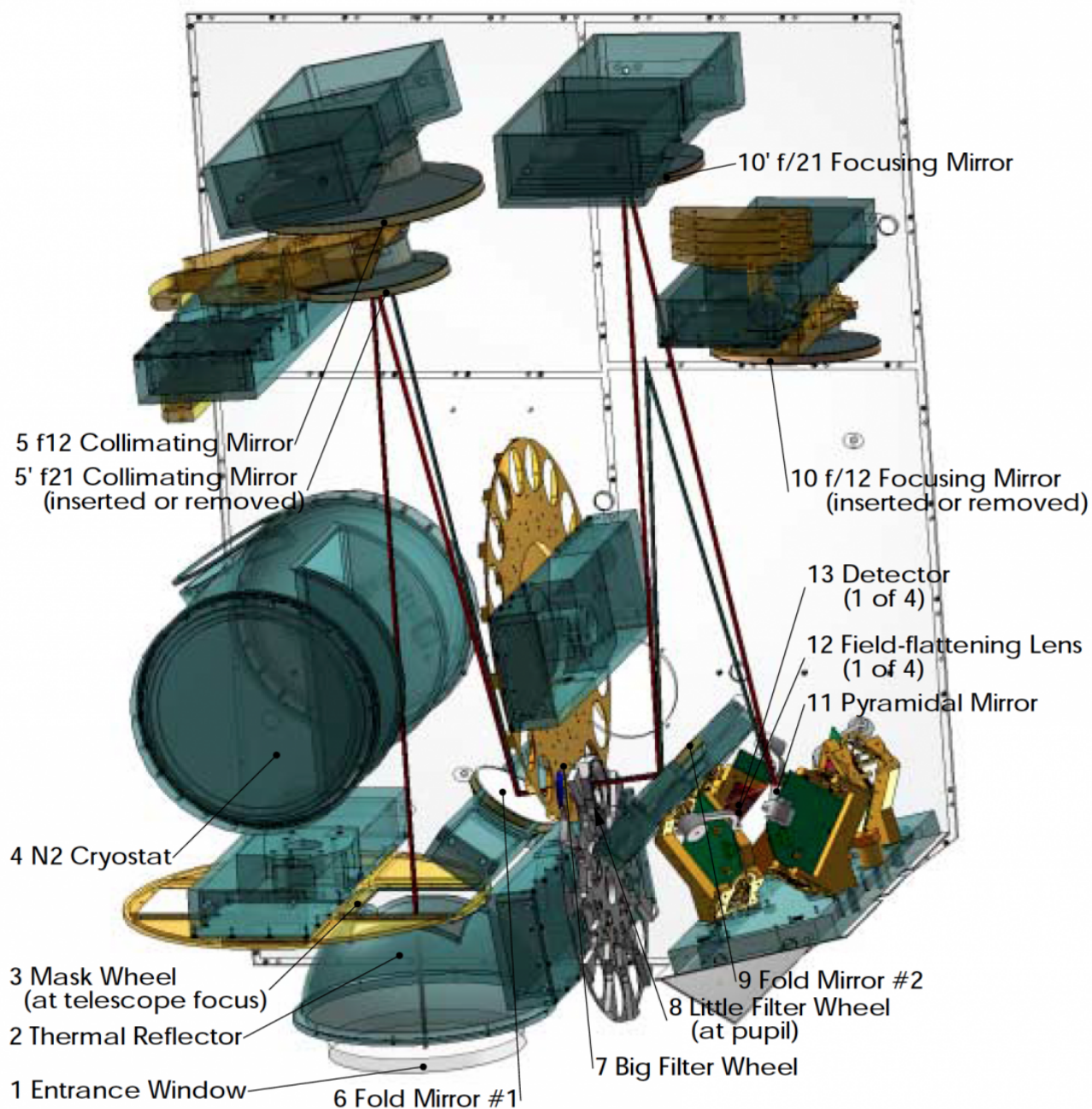
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SPARTAN Near-IR Camera

(Revised June 27, 2021)

System Overview





The Spartan Infrared Camera is a high spatial resolution near-IR imager. Spartan has a focal plane consisting of four "Hawaii-II" 2048x2048 pixel HgCdTe detectors. **NOTE** - the detectors don't have all quadrants fully functional - see the "Cookbook" for details. Although two different scales were provided, only one is now supported: the f/12 channel offers an FOV of 5.04 x 5.04 arcmin at 0.066 arcsec/pixel; the scale was chosen to resolve the diffraction-limited core of tip-tilt-corrected images in the H, and K bands. The f/21 channel, which has been disabled, had an FOV of 3.05 x 3.05 arcmin with a scale of 0.040 arcsec/pixel ([Loh et al., 2012, PASP, 124, 343](#)) [1]. Spartan has two filter wheels which together can hold a total of 29, 50mm diameter filters of thickness up to 15mm. Broadband Y, J, H and K (based on the MKO-NIR prescription) and 9 narrow-band filters are available. (For details see [Spartan filters](#) [2].)

For more information, [contact the SPARTAN support staff](#) [3]. Further information is available from the [Spartan IRC home page at MSU](#). [4] (In particular, look at the "observer" pages. However, be aware that the MSU pages are "legacy" information. In case of discrepancies between the MSU pages and the SOAR pages,

the latter are likely to be correct; contact support staff if necessary.)

Useful Information:

Spartan Cookbook

The [Spartan Cookbook](#) [5] provides a good introduction, however some of the specifics related to bad quadrants or recommended flat field exposure times have evolved.

Spartan Trouble-shooting

The [trouble-shooting](#) [6] hints will solve many problems. **Note** - some of the steps listed are things the observer can do, but please let the telescope operator know beforehand, since they may also be able to help. The more extreme interventions require the operator.

[SPARTAN Cheat Sheet](#) [7]

NOTE - All magnitudes in the documentation are "Vega" magnitudes (Vega = 0), not "AB" magnitudes.

Geometric Parameters

Pixel size	66 mas
Field width (edge-to-edge)	5.04'
Field width (single detector)	2.25' (2048 pix)
Blank strip	0.56'
Min. Exposure Time	10 s
Skew and distortion	24 pix max; 10 pix RMS
Distortion (after removing skew, quadratic terms, and barrel distortion)	0.16 pix max; 0.03 pix RMS

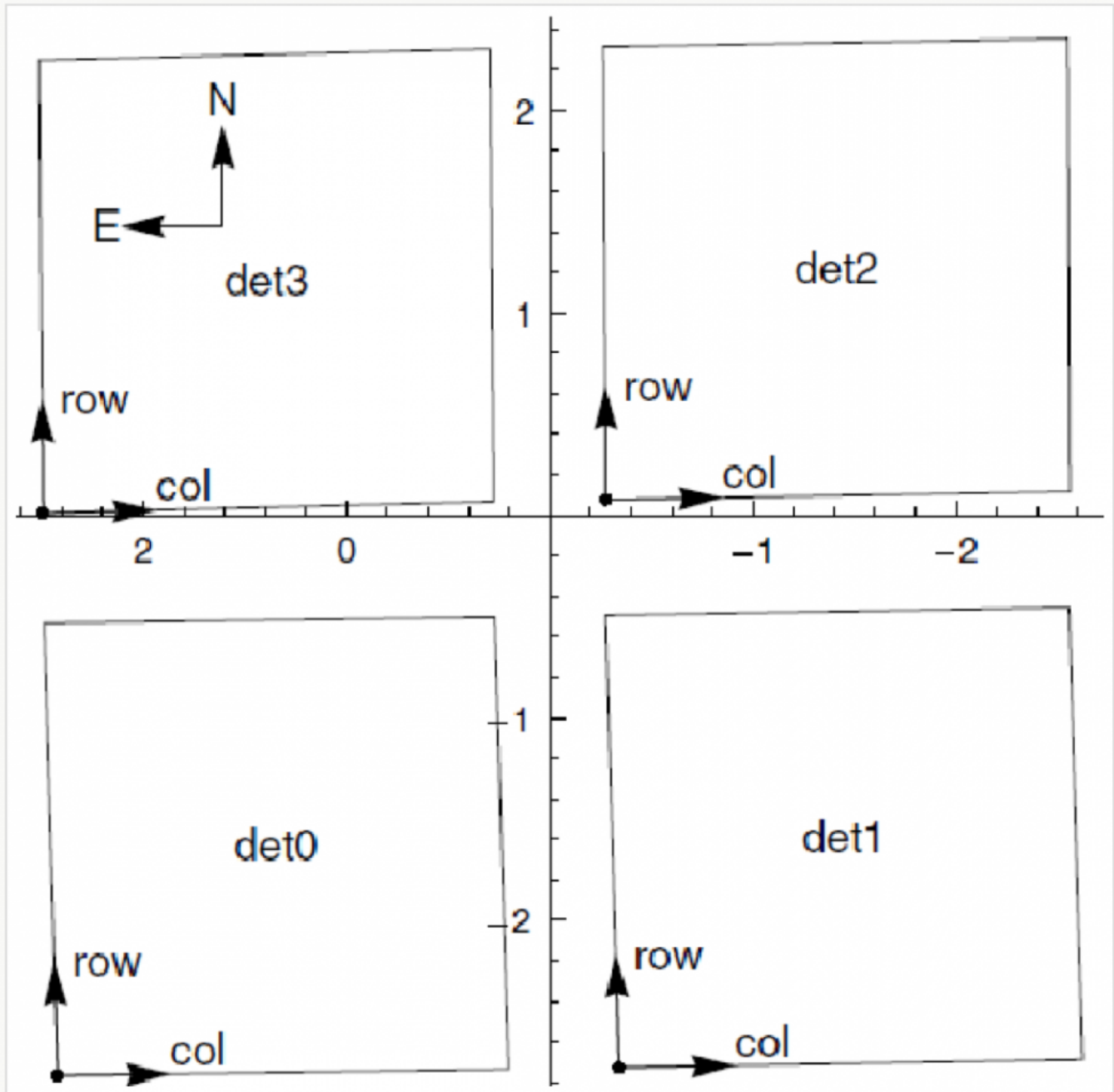
Detector Parameters

Parameter \ Detector	0	1	2	3
Gain [e/DU]	4.9	3.6	3.8	4.6
Detector noise [e]	15	11	14	16
Saturation [kDU]	30	33	33	26

Parameter ¹ \ Filter	J	H	K
QE (photons above atmosphere → electrons)	0.35	0.41	0.41
Rate for 15th mag star [ke s ⁻¹]	11	15	7.5
Sky [ke s ⁻¹ arcsec ⁻²]	3.5	23	46

¹The parameters are for detector 0. The values for detectors 1-3 are similar.

Detector Map

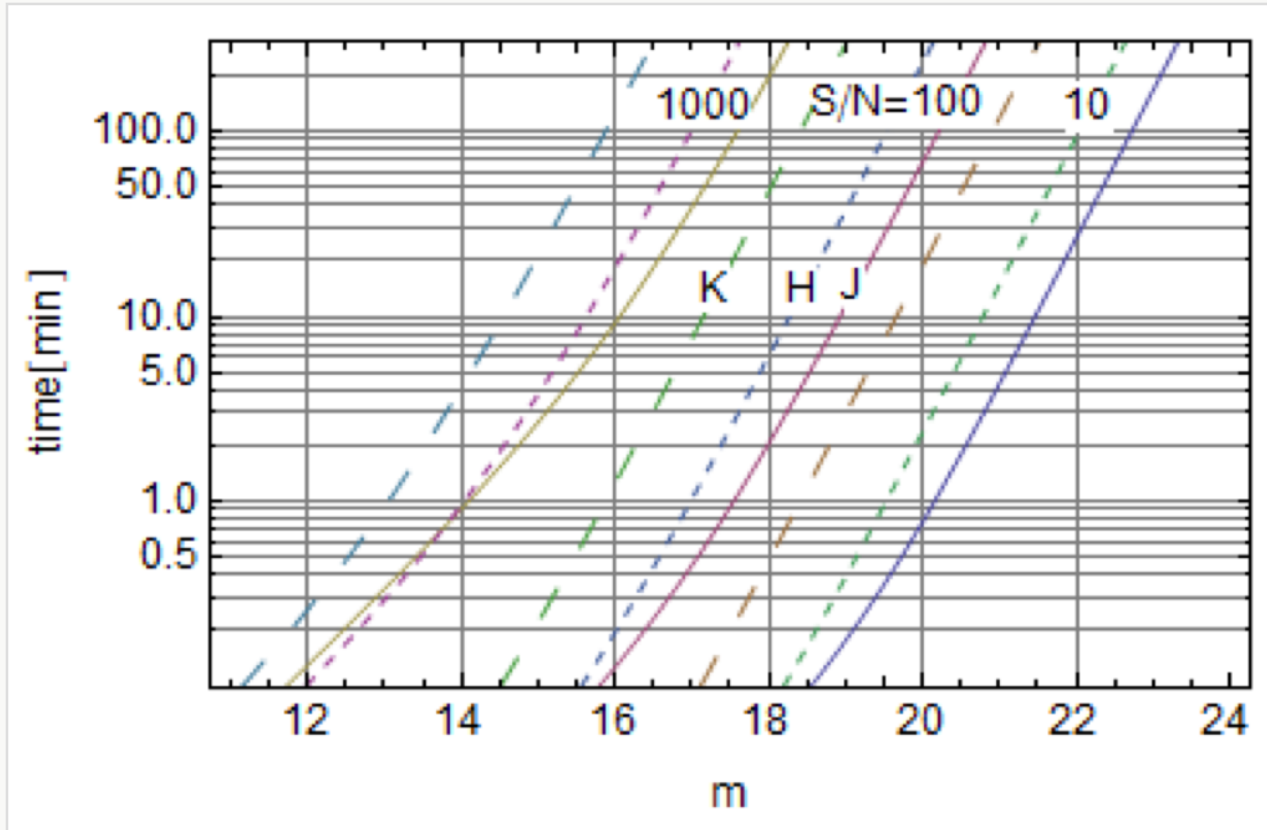


Caption - Map of the 4 detectors on the sky. Note the gap between detectors. The scale is in arcmin. The axes show the direction of increasing rows and columns. The orientation in the sky can change since the instrument is mounted at a Nasmyth port. The map is stored in the FITS header.

[5]

Exposure Times with SPARTAN

Exposure time



Caption - Exposure time for a given S/N ratio for a star of magnitude m for the J (solid line), H (dashed line), and K band (long dashed line). The seeing is 0.7arcsec(FWHM), and the diameter of the aperture is 1.0arcsec. The temperature, which affects the K band, was 13C. For the narrow-band filters, the approximate factors by which to increase the exposure time are 22 for HeI λ 10830 (J band), 13 for [FeII] λ 16400 (H band), 11 for HeI/CIV λ 20650 (K band for this and the following), 10 for H2 λ 21170, 19 for Bry λ 21620, and 4.3 for CO λ 23310.

[8]

Further information is available from the [Spartan IRC home page at MSU](http://www.ctio.noirlab.edu/soar/content/spartan-near-ir-camera) [4]

Source URL: <http://www.ctio.noirlab.edu/soar/content/spartan-near-ir-camera>

Links

[1] <http://www.jstor.org/stable/10.1086/665597>

[2] <http://www.ctio.noirlab.edu/soar/content/filters-available-soar>

[3] <http://www.ctio.noirlab.edu/soar/content/soar-staff>

[4] <http://www.pa.msu.edu/people/loh/SpartanIRCamera/>

[5] <http://www.ctio.noirlab.edu/soar/content/spartan-cookbook>

[6] <http://www.ctio.noirlab.edu/soar/content/spartan-trouble-shooting>

[7] <http://www.ctio.noirlab.edu/soar/sites/default/files/documents/Instruments/spartanObserversCheatSheetV2.pdf>

[8] http://www.ctio.noirlab.edu/soar/sites/default/files/Instrument_Plots/SPARTAN_Saturation_Exp_Time.png