MADAWASKA HIGHLANDS OBSERVATORY

An Astrophotographers Dream

It will Produce the Best Wide-Field Monolithic Deep Sky Images in the World[1]

THe Madawaska Highlands Observatory 1-m 2/.4 5 degrees^2 FOV telescope is designed to outperform almost all telescopes in the world in terms of Widefield imaging and deep magnitude. The only telescopes that can outperform it are the Pan-Starrs - 1.8m, Large Synoptic Survey Telescope (LSST) – 8.4m and the Discovery Channel Telescope - 4.3m (DSC). Even these telescopes have mosaic array CCD's thereby limiting their ability to take to contiguous and seamless images. They need to dither the telescope in other to fill in the areas between the CCD's. In this respect the MHO is the most powerful wide-field telescope in the world with a seamless and monolithic FOV. It's 5 degrees^2 FOV allows it to image large sections of the sky in one frame. The highly corrected FOV offers images with 80% of the energy focused on less than one pixel for the entire FOV. The following brief specifications are the main reasons why astro-photographers 'drool' about this intrument. The nearest comparison is the Palomar Observatory Sky Survey II (1.2m), except with 4 magnitudes deeper, significantly better PSF (0.76"/pixel vs. 1"/pixel) and better optical correction (smaller stars) across the FOV and lower vignetting.

1. 5 degrees^2 field-of-view (2.23º X 2.23º)
2. 28th magnitude in 33 hours (420-870nm BW, s/n=3, Zθ=0º)
3. 27th magnitude in 5 hours (420-870nm BW, s/n=3, Zθ=0º)
4. 24th magnitude in ~1 minute (420-870nm BW, s/n=3, Zθ=0º)
5. 0.76"/pixel, 9µ pixel pitch (square pixel), 100% fill factor
6. 2 second full frame download, 9 e- read noise
7. -100ºC +/-0.1º cryo-tiger, 1e-/pixel/hour dark noise
8. 95.22mm X 95.22mm 112MP CCD, 10,560 X 10,560, 16 bits, 250MB/image (monochromatic)
9. 76% QE @400nm, 83% QE @500nm, 92% QE @600nm, 95%QE @700nm, 50% QE at 1000nm
10. Highly corrected FOV, 80% energy in < 1pixel across the FOV
11. ugriz filter set with the addition of L (400-700 nm) + wL (420-870 nm) wideband filters
12. <10s change time between filters
13. 125mm BONN shutter, 100µs shutter time
14. Active optics with 1µ resolution with 6 degrees of freedom with 1µ focus
15. 200 Kg carbon fibre OTA with 60 Kg open back cellular mirror
16. 21.9 mag/arcsec^2 night sky brightness (v, SQM)
17. 450 m hilltop with 360º horizon < 2º
18. ¾ sphere Calotte dome of carbon fibre for optimum dome seeing
19. Dome elevated ~4m above ground for optimum air flow and minimal ground air turbulence
20. Fully autonomous queuing system
21. Dual harmonic drive single tyne fork with Serrurier truss, <5" rms pointing, <0.1" rms guiding
22. Observatory and site designed and optimized for best seeing with a 1.25 arcsec target

[1] Wide-field as defined by a FOV of greater than 3 degrees^2