



Southern Astrophysical Research Telescope
Brazil – NOAO – UNC – MSU - Chile



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Optical data for the SOAR telescope and instruments

Note that for focal lengths and f/ratios two values are given: the first one is the working value and is used to compute the plate scales etc., while the second one is the paraxial value to be used for "calculating backwards". The difference between the working and paraxial values for the telescope is very small; it is significant for the faster beams at the guider foci. The entrance pupil value is determined by the primary mirror baffle which has a diameter of 4100mm.

SOAR telescope as built Optical Specifications:	
M1 total diameter	4300mm
Entrance Pupil Diameter	4100mm
Pupil central Obstruction	980mm
M1 working f/#	1.6855
SOAR focal plane working f/#	16.625
SOAR EFL	68176.3mm
Gamma ratio (dZ(foc)/dZ(M2))	100.5
Zero-Vignetting Field Diameter	14.4 arcmin (without baffles) 10 arcmin (with added baffles)
Focal Plane Radius of curvature	966.3mm
Sag w/r to Maximum Field	10.59mm

Nasmyth Foci at the Instrument Support Boxes:

Entrance Pupil diam.	4100mm	
EFL	68162.5mm	68176.3mm
f/#	16.625	16.628
Plate Scale	330.53 um/arcsec	3.025 arcsec/mm
Field diameter	14.4 arcmin (no vignetting)	
Back-focal distance	150 mm (side ports) 200 mm (director ports)	

OPT_ISB TTGuider:

Entrance pupil diam. 4100mm

EFL 13445.1mm 12579.9mm

F/# 3.279 3.068

Plate Scale 65.20 um/arcsec = 15.3 arcsec/mm = 0.37 arcsec/pix

Pixel size 24um

Field diameter 8 arcsec

IR_ISB TTGuider:

Entrance pupil diam. 4100mm

EFL 17056mm

F/# 4.16

Plate Scale 82.76 um/arcsec = 12.08 arcsec/mm = 0.29 arcsec/pix.

Pixel size 24um

Field diameter 8 arcsec

CWFS acquisition camera:

Scale SOAR scale x Magnif.factor

Scale $329.847 \times 0.606 = 0.20 \text{ mm/arcsec} = 5.00 \text{ arcsec/mm} = 0.12 \text{ arcsec/pix}$

Pixel size 24um

Aquisition Field 2.05 arcmin

CWFS Shack-Hartmann camera:

scale SOAR scale x 60/246.492

scale $80 \text{ um/arcsec} = 12.46 \text{ arcsec/mm} = 0.30 \text{ arcsec/pix}$

Pixel size 24um

SOAR Optical Imager:

Exit pupil diam. 617.272mm

Exit Pupil position -6073.094mm

Entrance Pupil diam.	4100mm
EFL	40303.1mm 40294.9 mm
F/#	9.83 9.828
Scale	195.4 um/arcsec = 5.12 arcsec/mm = 0.077 arcsec/pix
Pixel size	15um
SOI Field	5.24 x 5.24 arcmin ²
Field Diag.	7.4 arcmin

SOI TT Guider:

Entrance Pupil Diam.	4100mm
EFL	22796mm 20759.1mm
F/#	5.56 5.06
Scale	110.5 um/arcsec = 9.05 arcsec/mm = 0.22 arcsec/pix
Pixel size	24um
Guiding Field	6.34 x 6.34 arcsec ²
Field Diag.	9 arcsec

Goodman Spectrograph

Scale	10 arcsec/mm = 0.15 arcsec/pix
Pixel size	15um
Detector	Fairchild 4096 x 4096 pixels
Full field in imaging mode	Circular: 7.2 arcmin diameter (3096x3096 unbinned pixels)
Full field in spectroscopic mode	Rectangular: 4096 x 1896 unbinned pixels
Length of single slit	3.9 arcmin (1560 unbinned pixels)

Goodman Acquisition Camera (GACAM)

Camera	Prosilica GC650 Monochrome camera, 659x493 pixels
Scale	43.5 um/arcsec = 23 arcsec/mm = 0.17 arcsec/pix
Field of view	84 x 112 arcsec = 1.4 x 1.87 arcmin
Pixel size	7.4um

SOAR Adaptive Optics Module (SAM)

Detector	4096 (horizontal) x 4112 (vertical) pixel CCD231-84 from e2v
Scale	330.03/ um/arcsec = 3.03 arcsec/mm = 0.0455 arcsec/pix
Field of view	186 x 186 arcsec = 3.1 x 3.1 arcmin
Pixel size	15um

SPARTAN - Infrared Imager

Detector	4 x HAWAII-2 HgCdTe - 2048 x 2048 pixels each
Focal Ratio	F/21 - Wide Field Mode / F/12 - High Resolution not really useful
Plate Scale	66 mili-arcsec / pixel / 40 mili-arcsec / pixel
Field width per detector	2.25 arcmin / 1.36 arcmin
Blank strip width	0.56 arcmin / 0.34 arcmin
Full field width	5.04 arcmin / 3.05 arcmin

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