Installation of the OGLE III camera in Tasmania

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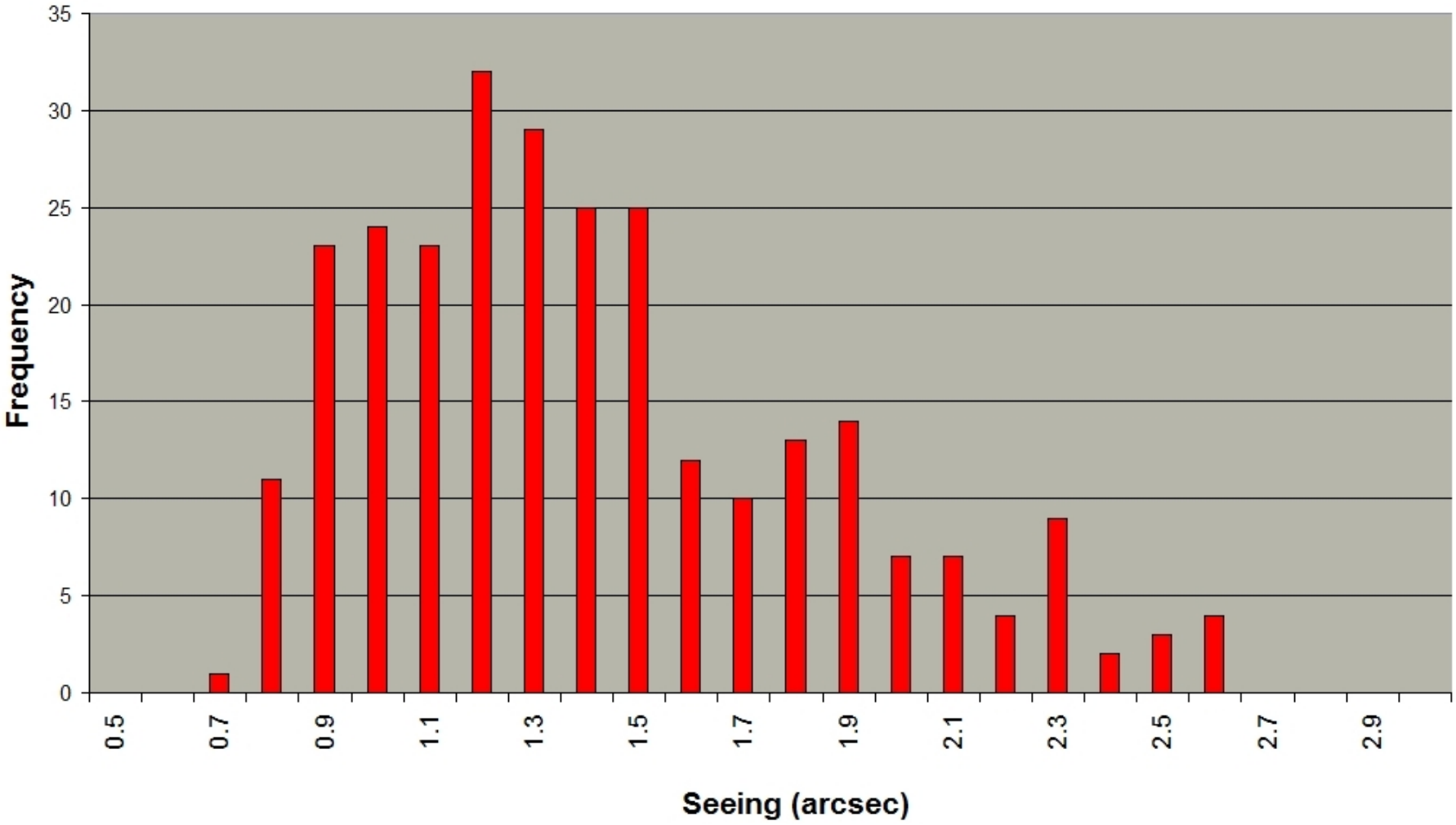
Future for UTas astronomy

- **Light pollution forcing closure of Mt Canopus Observatory**
- **Caisey Harlingten has 1.3 m telescope built for UTas. Part of Searchlight Network of telescopes around the world (son-astro.net)**
- **University builds new observatory on Bisdee Tier in Tasmanian Midlands**
- **Mt Canopus 1 m telescope to be moved to New Mexico as part of the Searchlight network**

Bisdee Tier Site

- Sky brightness: well below IAU recommended maxima in all directions
- Geographical position ~ 42 S, 147 E, altitude ~700 m
- Astronomical seeing: Typical of Australasia! DIM monitoring on 25 nights over 2 years shows median seeing ~1.3 arcsec. Likely to be under-estimate - measurements only when good weather predicted.
- Cloudiness: Photometric nights rare (<15%) but overcast nights also infrequent. Mean frequency of cloud free observing similar to other Australian, NZ astronomical sites
- One hour drive from Hobart

Sample (25 nights) of seeing at Bisdee Tier



The observatory

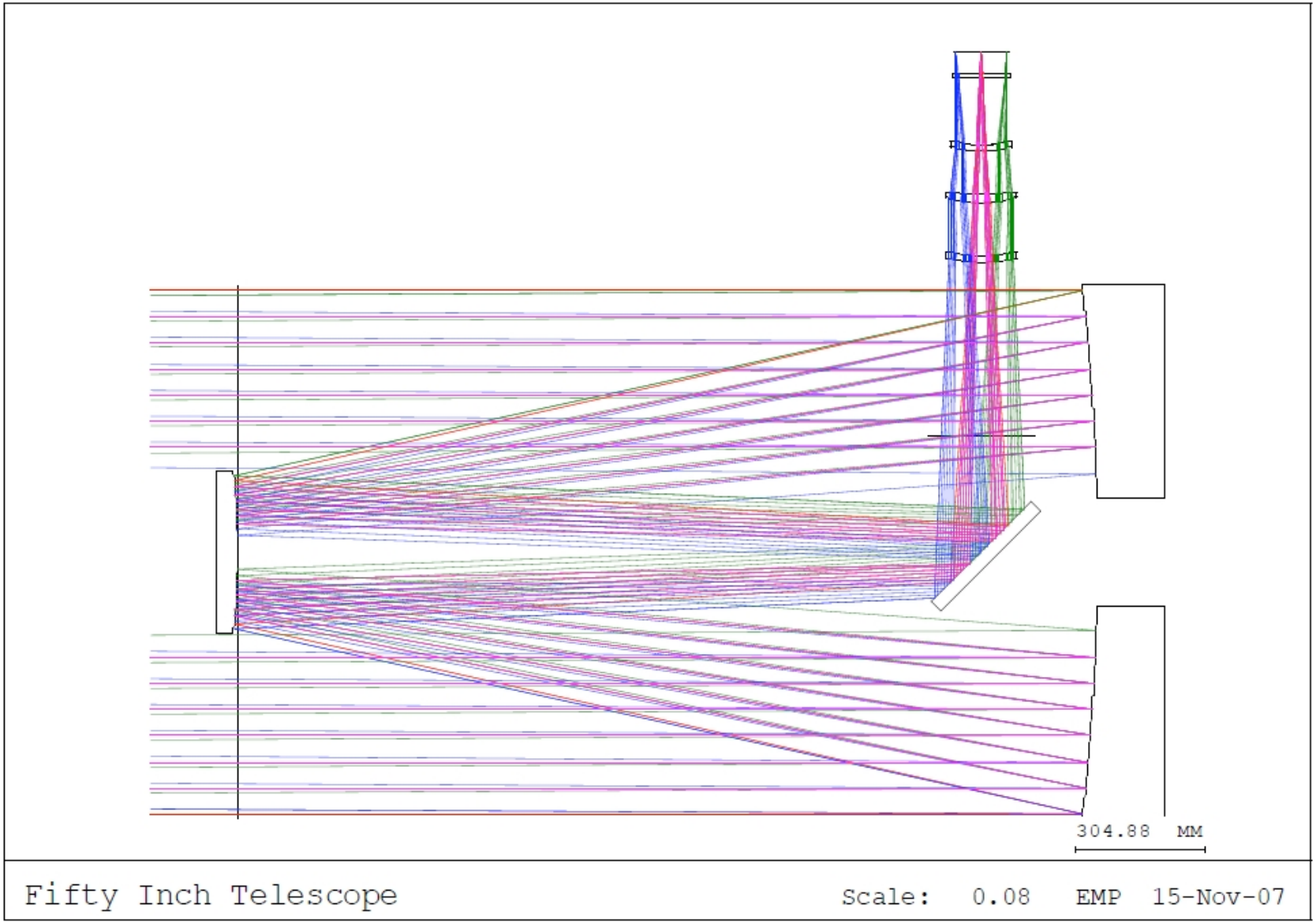
- Thermal design critical
  - Air conditioned 6.5 m Sirius dome
  - Low thermal capacity dome with computer controlled ventilation
  - Control room in observers quarters
- Remote control from Sandy Bay campus via microwave link – probably by 2014
- Accommodation for on-site observers

New observatory from the air

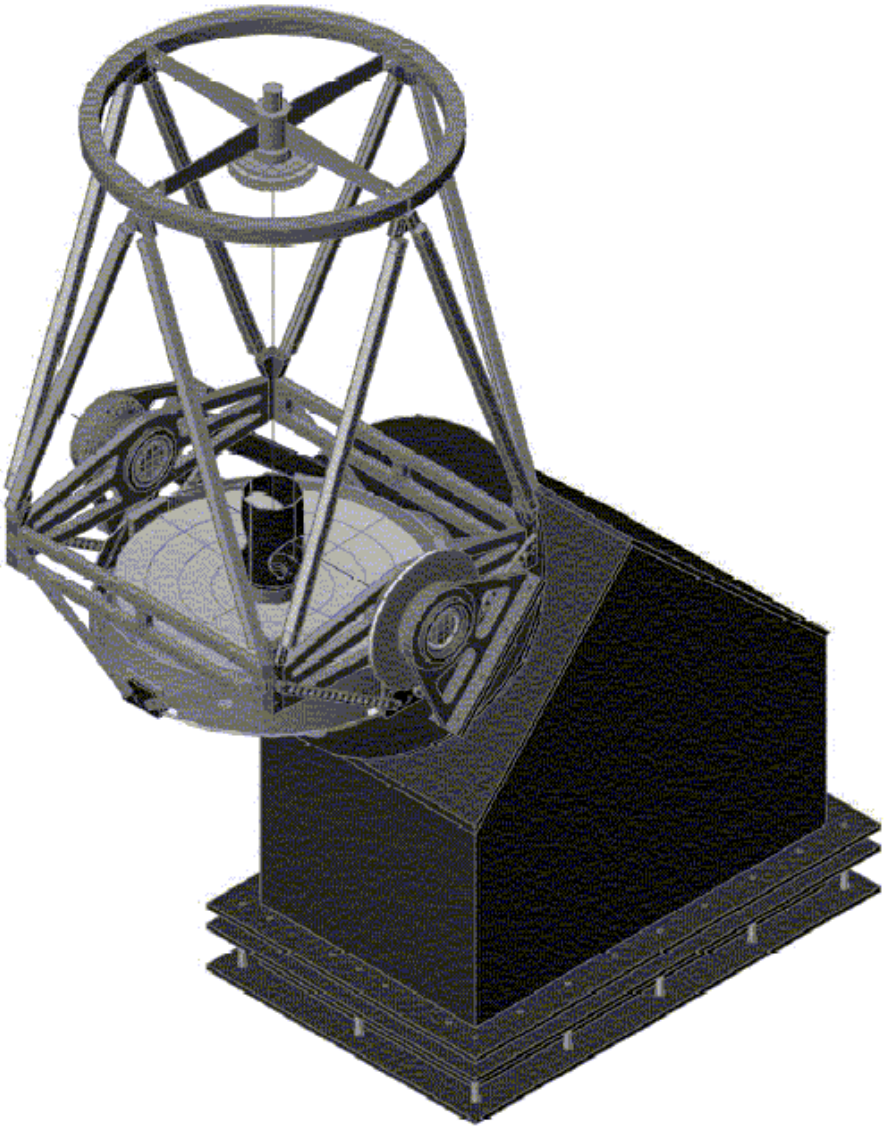
The Telescope

- 1.27-m (50”x8”) fused silica primary – originally bought by Ted Dunham for “Project Canopus” in 1971.
- f/9 equatorial mount, folded Cass, 40 arcminute corrected FOV, image scale 55 microns/arcsec, .
- Direct Cass and two Nasmyth focal stations. Quick switch between Nasmyth stations by remote control.
- All systems built to order by Caisey Harlingten
- Medium resolution dual beam fibre fed spectrograph – ex ANU 2.3 m telescope at Siding Spring Mountain

Optical design



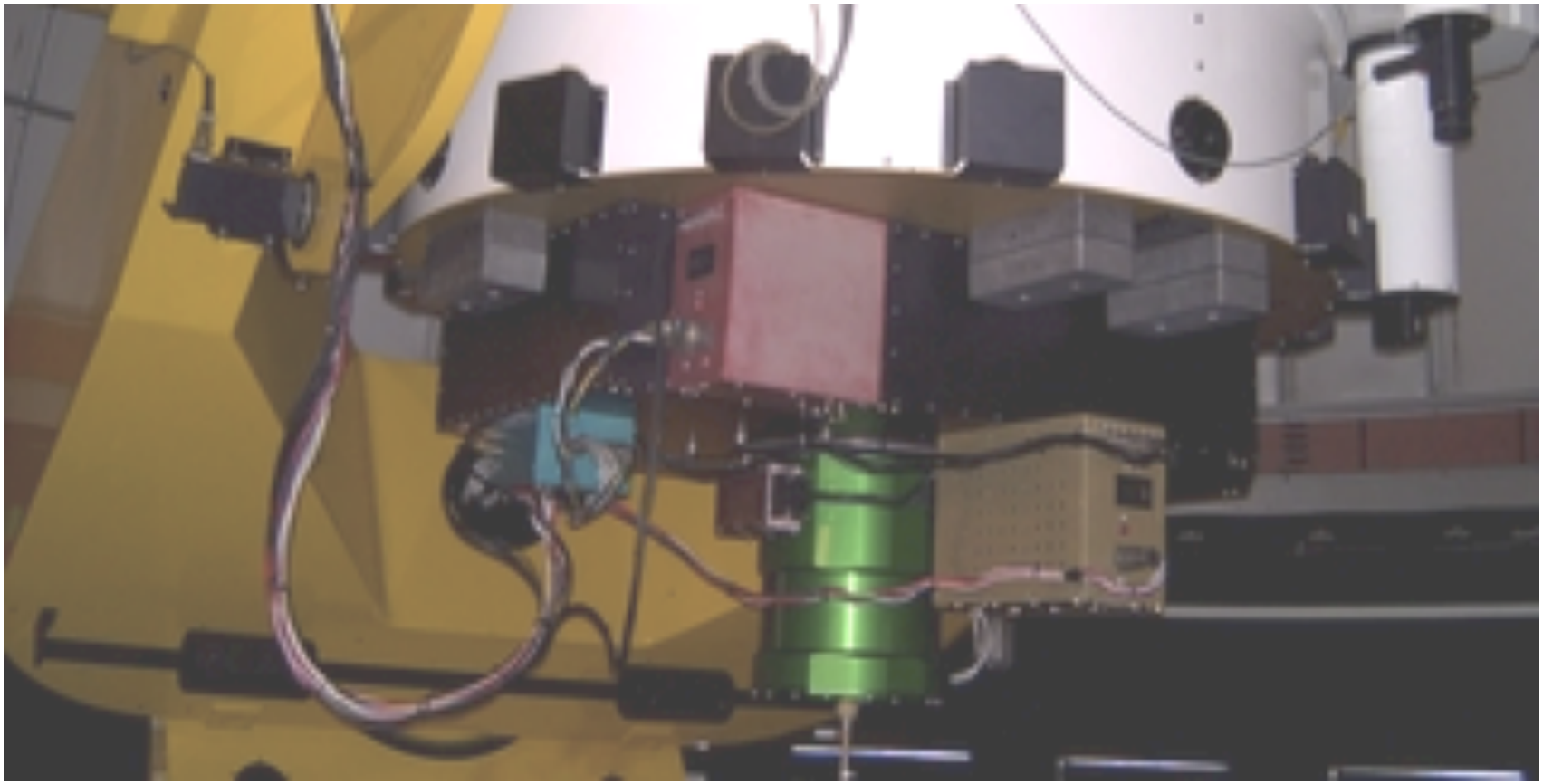
New 1.27-m telescope



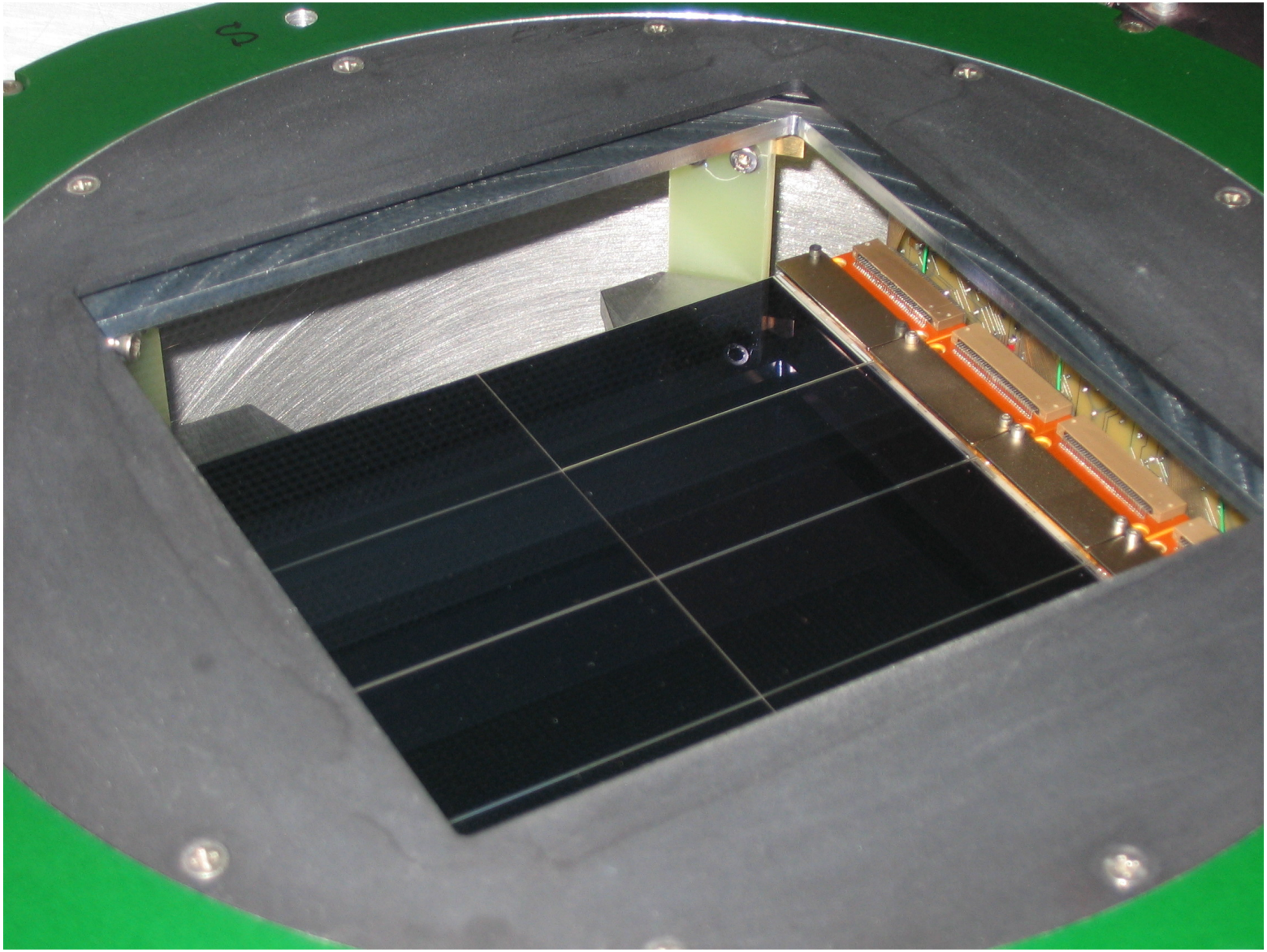
Wide field camera

- Collaboration between UTas, OGLE and IAP to install OGLE III wide field camera at one folded Cass focus. Camera specs:
  - Eight thin SITe 2048×4096 CCD chips (total of 8192×8192 pixels)
  - 0.54 arcsec/pixel scale (binned 2x2) , 37'× 37' total field of view
  - 6-9 e- readout noise (depending on chip) at 1.3 e-/ADU gain
  - 50 s readout time
  - Observing strategy – 3 min exp, 1 min readout + slew => 15 fields/hr covering 5.4 sq deg. Estimate 640K stars/image and ~10^7/hour

OGLE III camera



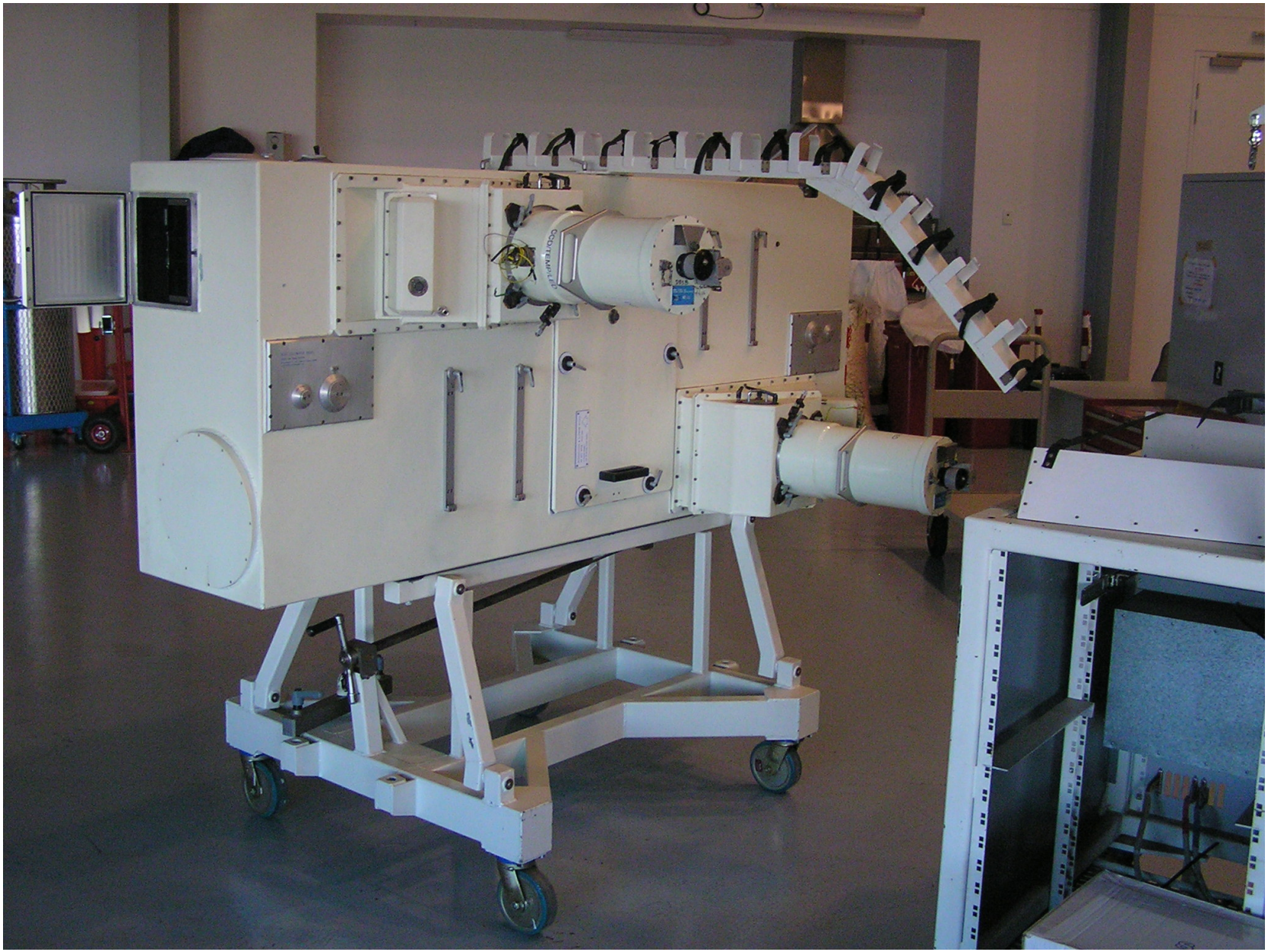
Eight 2Kx4K CCD array



Other instrumentation

- SITe 1024x1024x24 micron pixel CCD photometer (ex Mt Canopus) => 7.5 x 7.5 arcmin FOV.
- 10 channel filter wheel including narrow band Washington system filters to separate late type dwarfs from giants.
- Fibre-fed double beam DBS spectrograph (ex ANU) with range of resolutions up to ~5,000 in first order
- High speed EM CCD photometer for planetary occultations and lucky imaging
- Rapid remotely controlled switch between wide field photometry, high speed photometry and spectroscopy.

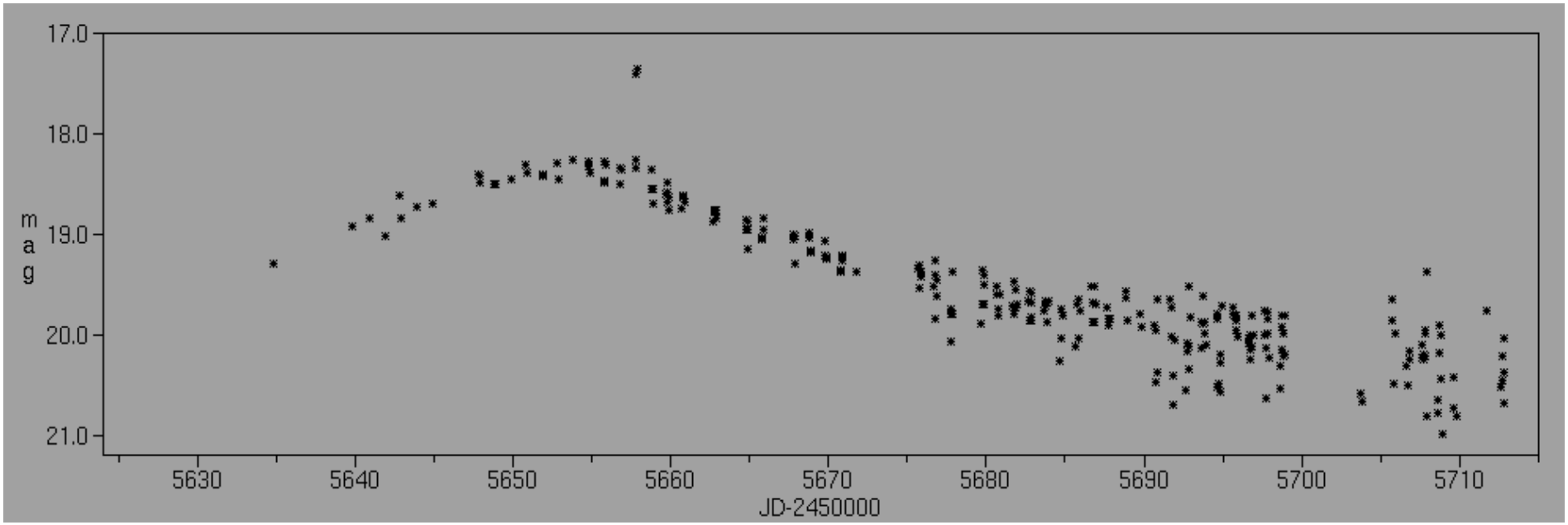
DBS spectrograph



Science objectives

- **Microlensing survey and follow-up complementing OGLE, MOA and others**
- **Collaborative studies (exoplanets and TNO's) with Searchlight Observatory Network**
- **Spectroscopy of red dwarf candidates for exoplanetary transit detections**
- **Magellanic Cloud and other Galactic structure studies. LMC and SMC observable all year**
- **TNO occultations**

Short duration ~1 mag anomally detected near dawn by OGLE IV



- Probably a very low mass planetary anomally.
- Follow-up by UTas OGLE III camera could have verified this.

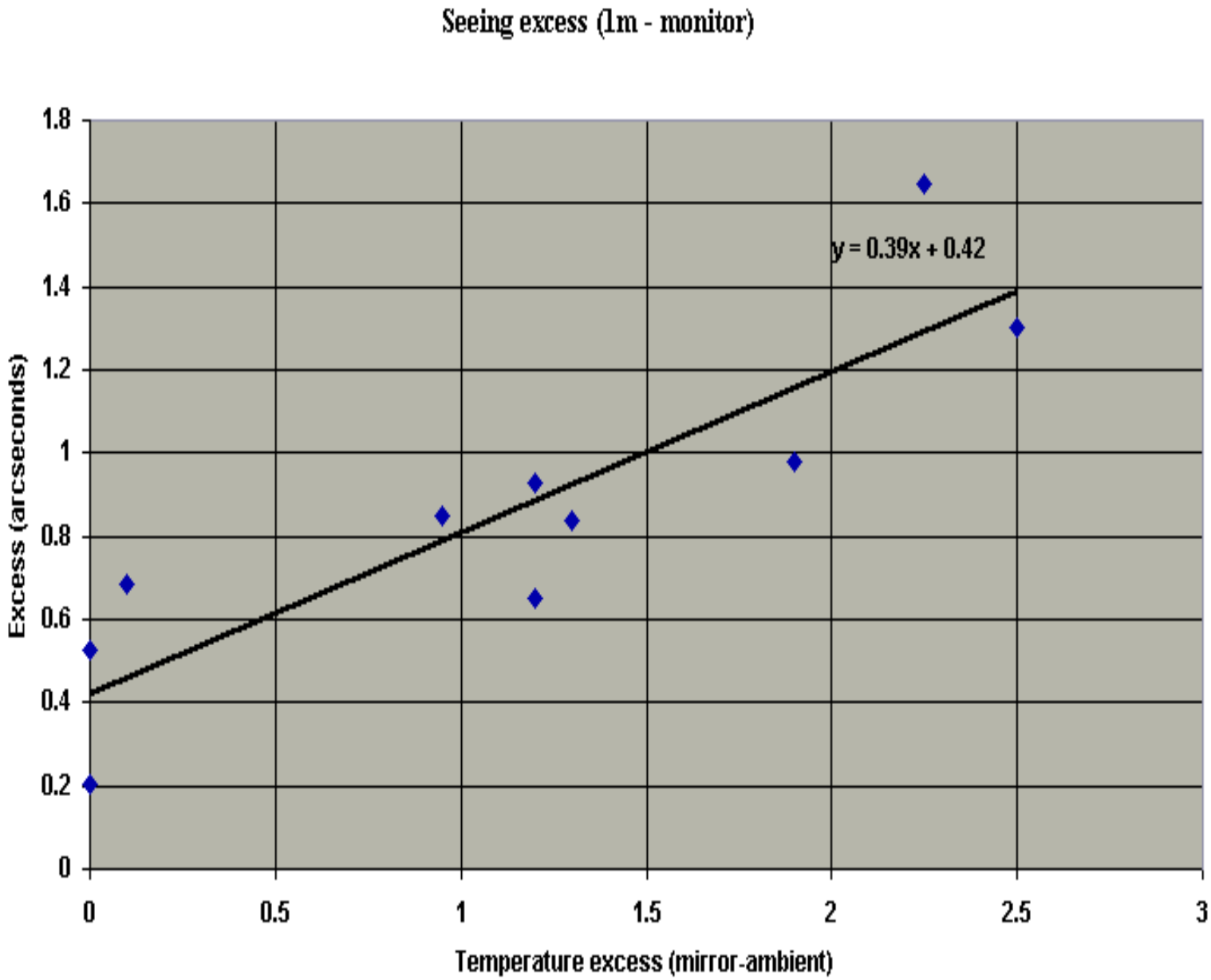
Timescales

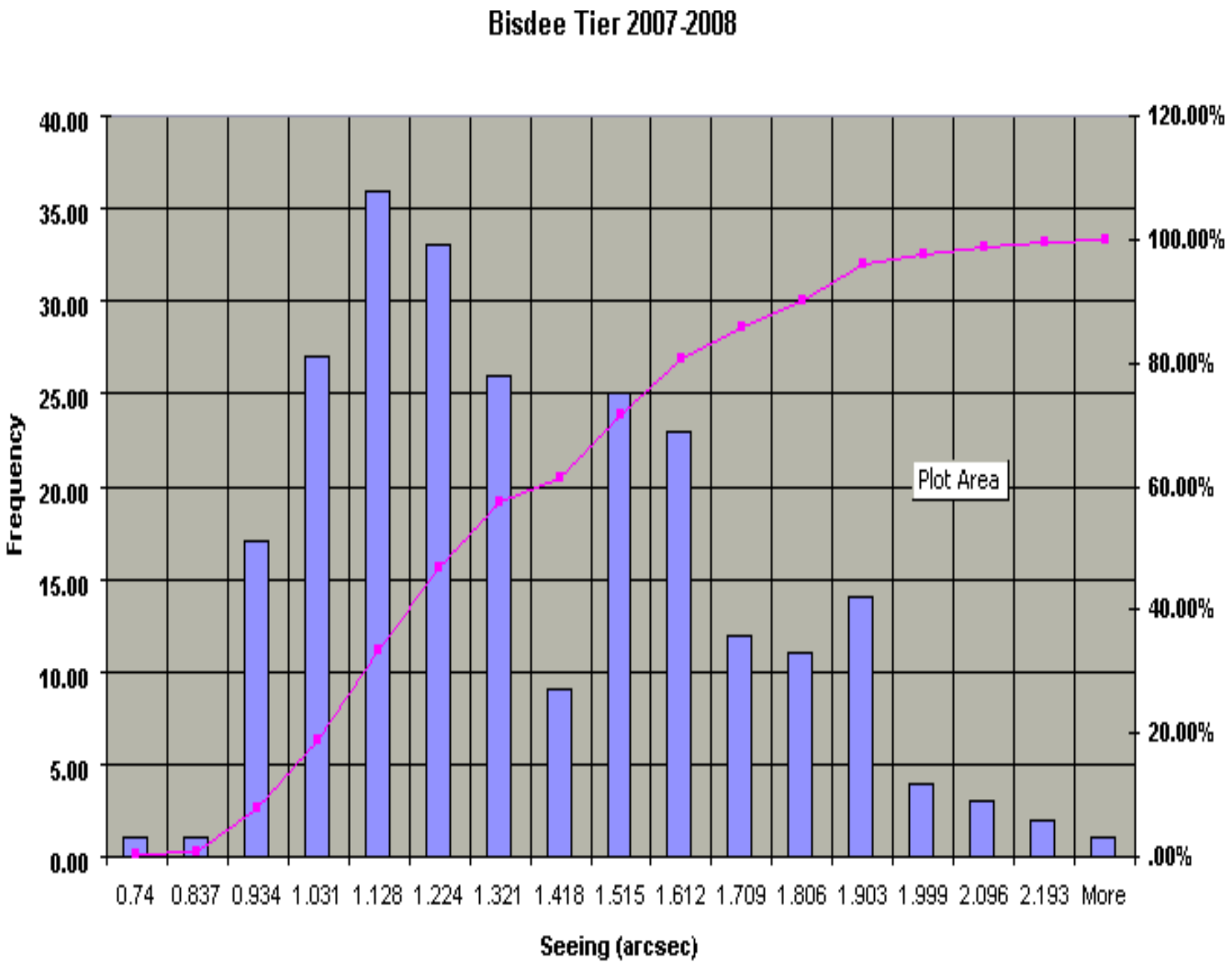
- **Observatory completion:February 2011**
- **Telescope delivery to site: late 2010**
- **First light: mid 2011**
- **Regular observations begin: late 2011**

end

PLANet 2010 and beyond

- SAAOCanopus Observatory 1-m, Perth 0.6-m and Canopus 1-m will continue follow-up microlensing May - August 2010
- 0.4-m telescope at Dome C and 0.5-m at San Pedro de Atacama may contribute
- IAP seeking funding to support PLANet observations for a further 4 years
- Ex ESO/Dutch 0.9-m being rebuilt at San Pedro de Atacama


Seeing excess (1m - monitor)
y = 0.39x + 0.42
Excess (arcseconds)
Temperature excess (mirror-ambient)
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
1.8
0
0.5
1
1.5
2
2.5
3


Bisdee Tier 2007-2008
40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
Frequency
120.00%
100.00%
80.00%
60.00%
40.00%
20.00%
.00%
Plot Area
0.74
0.837
0.934
1.031
1.128
1.224
1.321
1.418
1.515
1.612
1.709
1.806
1.903
1.999
2.096
2.193
More
Seeing (arcsec)

Prototype of new telescope

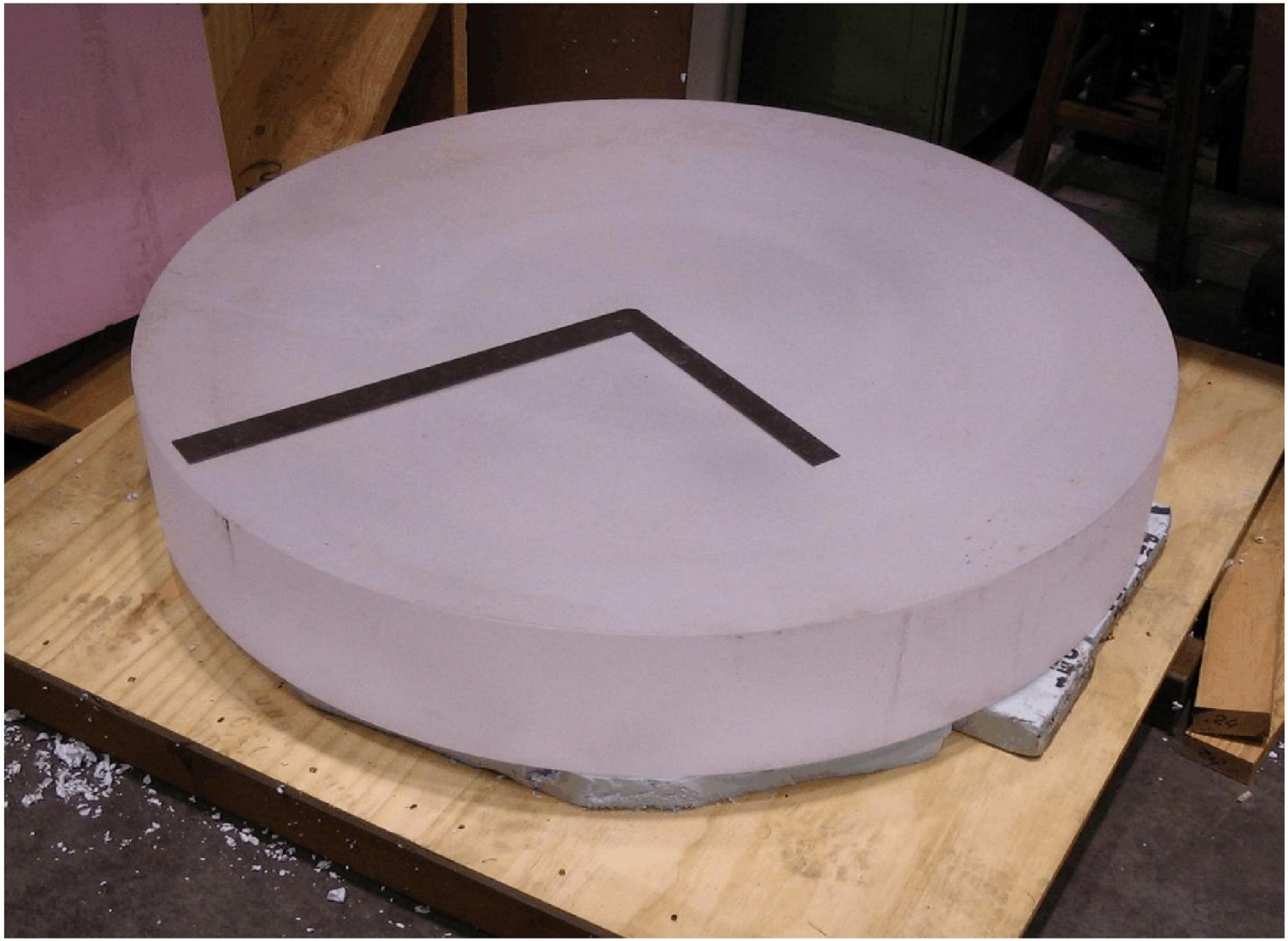
Future possibilities

- Large area CCD array giving ~0.5 square degree sky coverage
- Near IR (JHK) photometry at Cass focus
- High speed photometer
- Echelle high resolution spectrograph

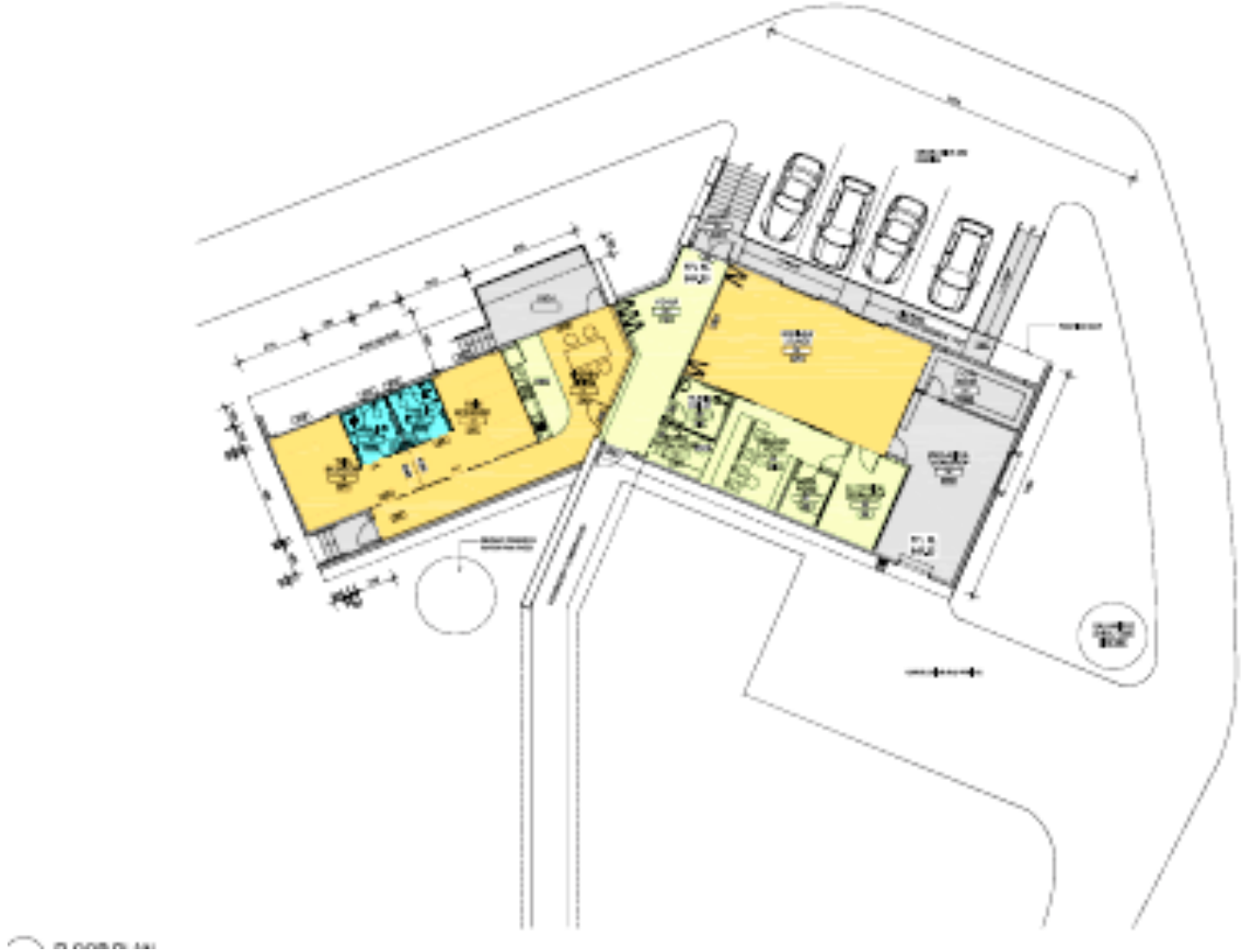
Tasmanian Mirror Blank

Included in this document are photographs of the Tasmanian mirror blank and some documentation.

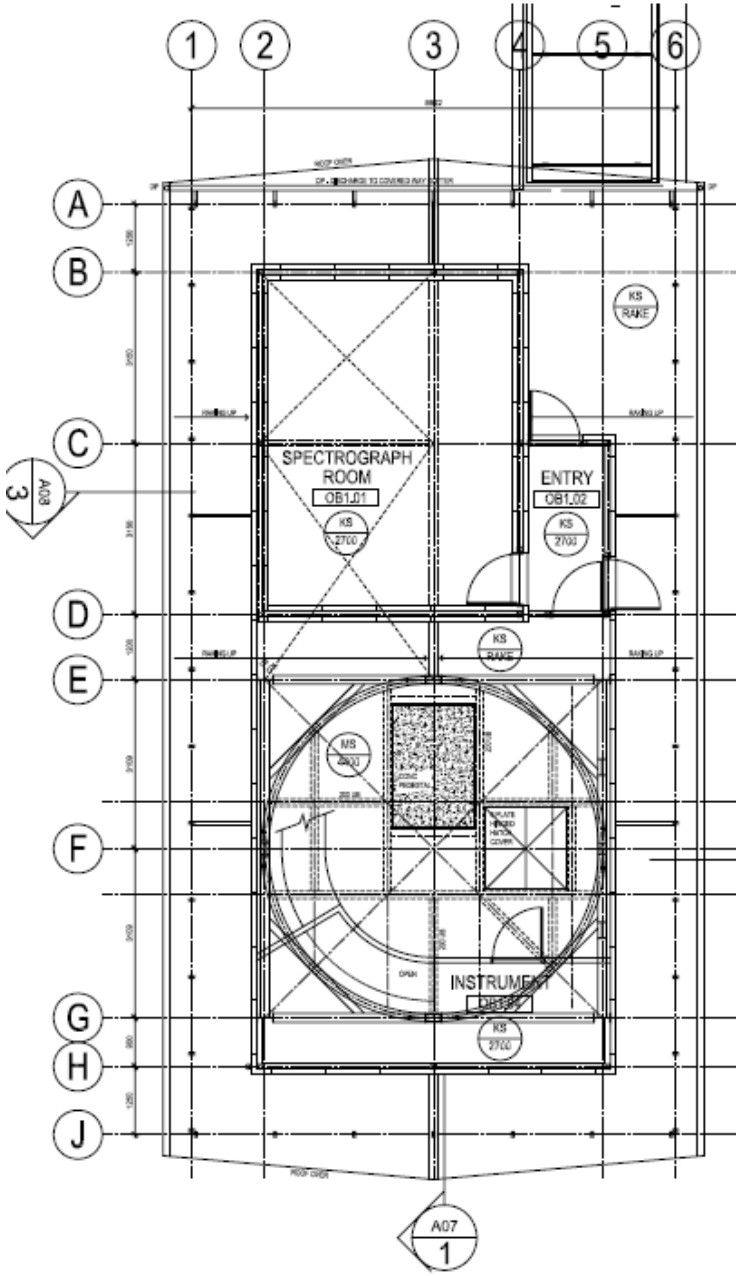
The Figure 1 shows the full mirror blank with a two foot ‘square’ to indicate scale.



Admin, observers quarters and control room

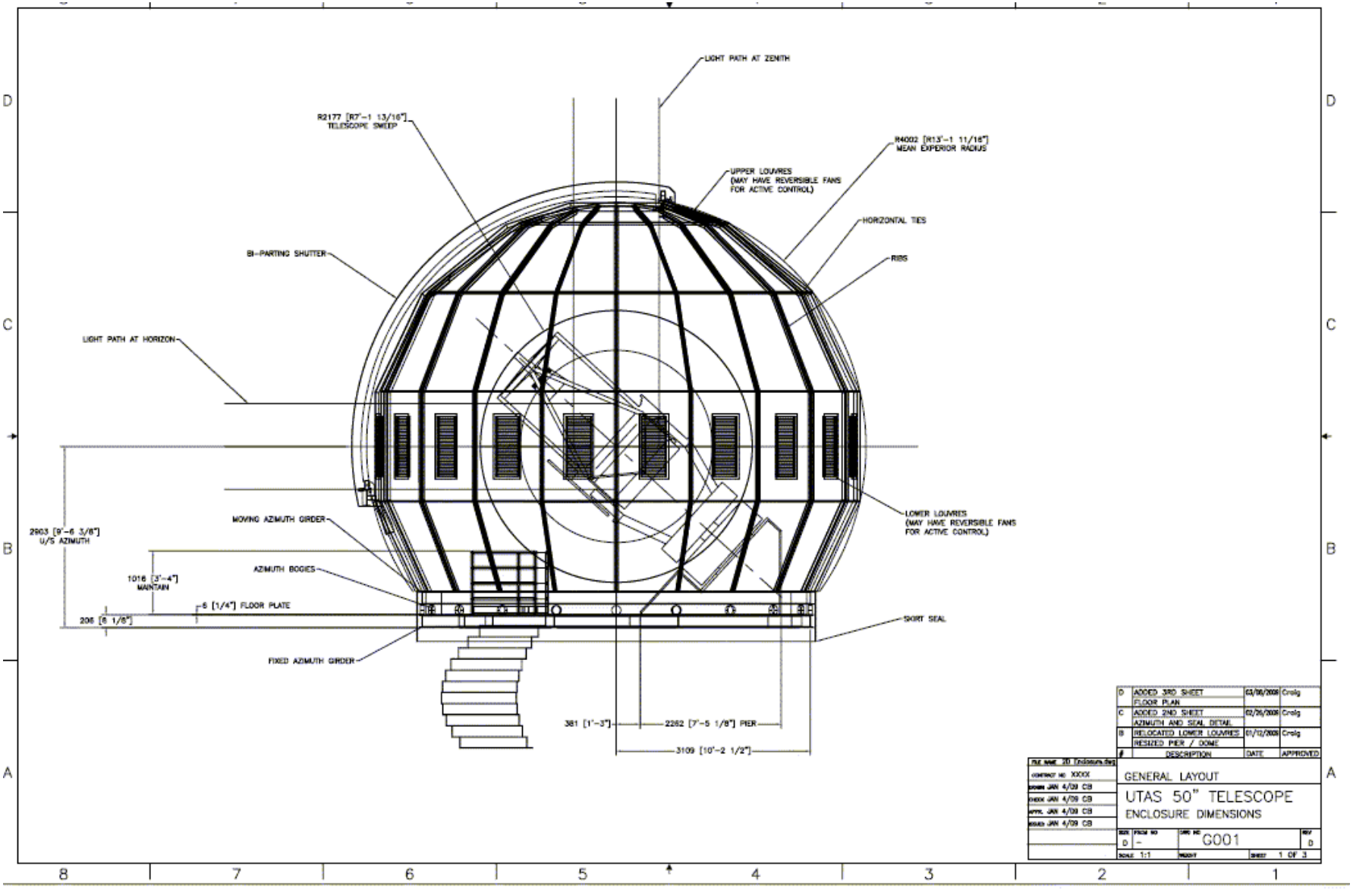


Observatory plan



REFLECTED CEILING PLAN - GROUND FLOOR

The dome


LIGHT PATH AT ZENITH
R2177 [R7'-1 13/16"]
TELESCOPE SWEEP
R4002 [R13'-1 11/16"]
MEAN EXPERIOR RADIUS
UPPER LOUVRES
(MAY HAVE REVERSIBLE FANS
FOR ACTIVE CONTROL)
HORIZONTAL TIES
RIBS
BI-PARTING SHUTTER
LIGHT PATH AT HORIZON
LOWER LOUVRES
(MAY HAVE REVERSIBLE FANS
FOR ACTIVE CONTROL)
MOVING AZIMUTH GIRDER
2903 [9'-6 3/8"]
U/S AZIMUTH
AZIMUTH BOGIES
1016 [3'-4"]
MAINTAIN
6 [1/4"] FLOOR PLATE
206 [8 1/8"]
SKIRT SEAL
FIXED AZIMUTH GIRDER
381 [1'-3"]
2262 [7'-5 1/8"] PIER
3109 [10'-2 1/2"]
D ADDED 3RD SHEET FLOOR PLAN 03/06/2009 Craig
C ADDED 2ND SHEET AZIMUTH AND SEAL DETAIL 02/26/2009 Craig
B RELOCATED LOWER LOUVRES RESIZED PER 7 DOME 01/12/2009 Craig
DESCRIPTION DATE APPROVED
GENERAL LAYOUT
UTAS 50" TELESCOPE
ENCLOSURE DIMENSIONS
G001
SCALE 1:1
SHEET 1 OF 3

VIEW LOOKING SOUTH EAST

BISDEE TIER UTAS OPTICAL OBSERVATORY

PhilpLighton Architects

UTAS