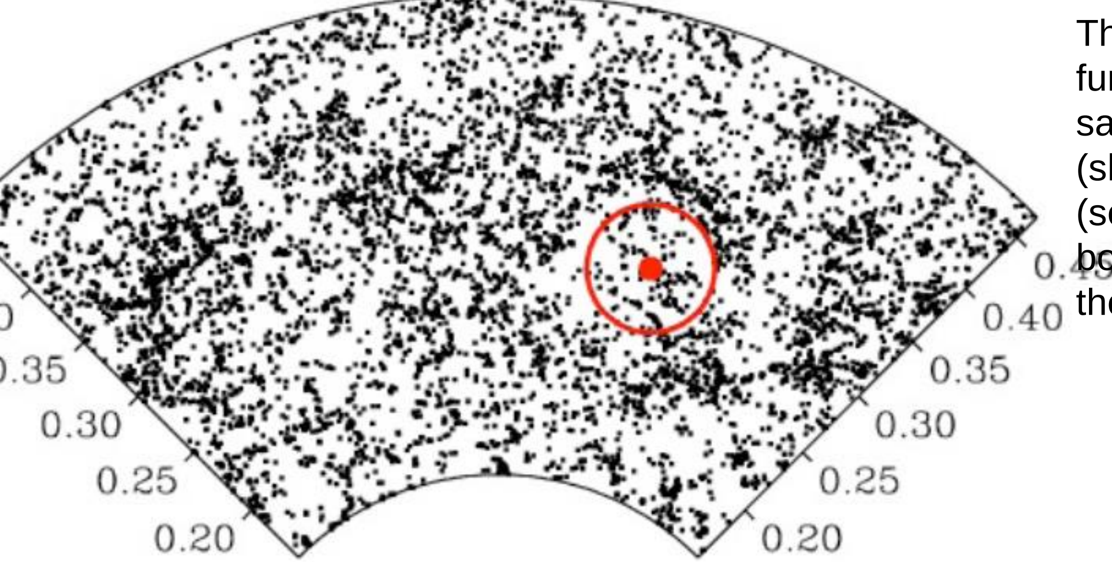
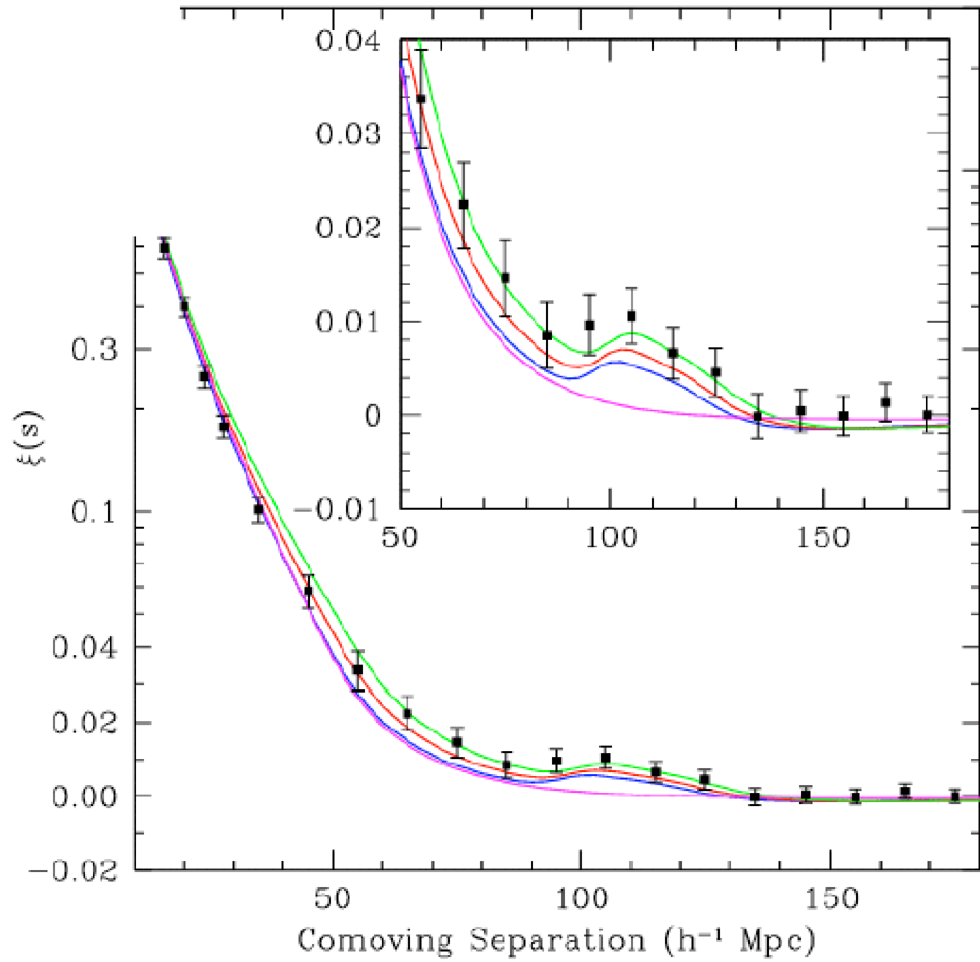
JPAUAS PAU-BRASIL

The Baryon Acoustic Peak (BAP) in the correlatio[redacted]
function –clustering of the SDSS LRG 47k galaxy[redacted]
sample, and is sensitive to the matter density
(shown are models with $\Omega_m h^2 = 0.12$ (top), 0.13
(second) and 0.14 (third), all with $\Omega_b h^2 = 0.024$). T[redacted]
bottom line without a BAP is the correlation functi[redacted]
the pure CDM model, with $\Omega = 0$.

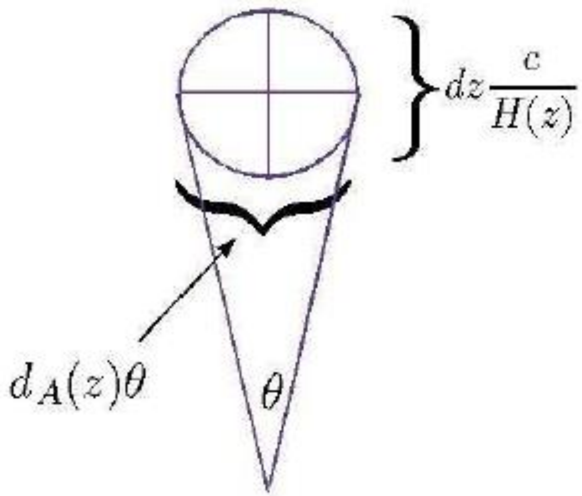


Eisenstein et al. 2005



For a flat universe

$$H(z) = h\sqrt{\Omega_m(1+z)^3 + \Omega_X \exp\left[3\int_0^z \frac{1+w(z)}{1+z}dz\right]}$$



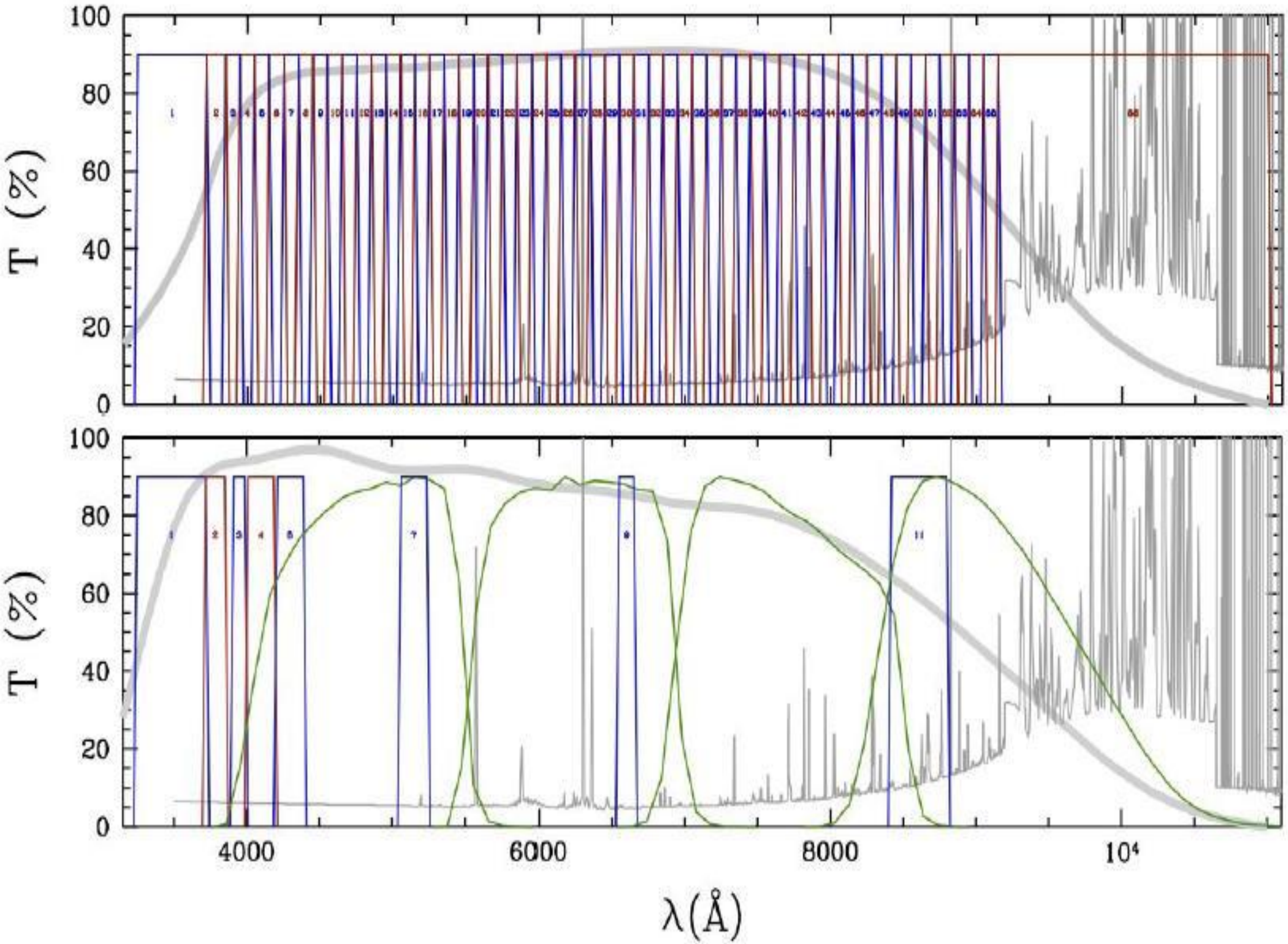
- If we could measure H(z), we would get the dark energy density evolution
- However it is easy to measure **a** (redshift) but not **da/dt**
- We can indirectly measure H(z) through the measurement of distances:

$$D_A(z) = \frac{c}{1+z}\int_0^z \frac{dz}{H(z)}$$

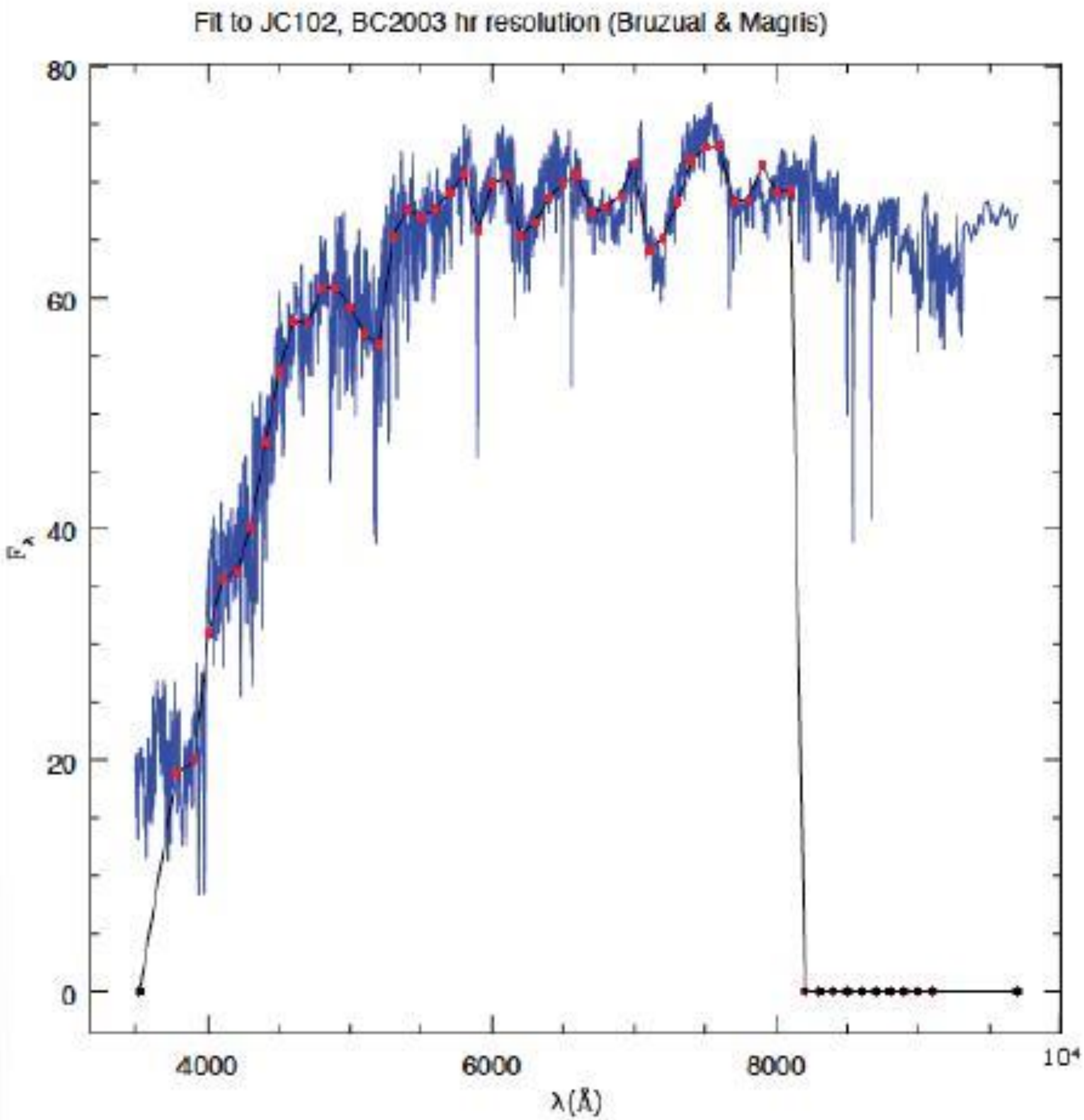
To measure dw/dz we need $d^2H(z)/dz^2$ or $d^3D_A(z)/dz^3$

Radial BAO requirements

- **Redshifts** and positions for enough objects, n~0.001 (h/Mpc)^3
- Peak width of the BAO feature ~ 10Mpc
- Redshift precision $dz/(1+z) < 0.003$ to avoid signal degradation
- Traditional photo-z have $dz/(1+z) \sim 0.03$
- Usual approach: spectroscopy



1. (Top): The set of 56 J-PAS filters; (Bottom): The set of 12 J-PLUS filters. Thick grey lines in bo
e the CCD quantum efficiency curves. Typical night-sky spectra are plotted in thin grey lines.


Fit to JC102, BC2003 hr resolution (Bruzual & Magris)
80
60
40
20
0
F_λ
4000
6000
8000
10^4
λ(Å)

JPAS = ALL SKY IFU

JPAS = Javalambre-*Physics of the Accelerated Universe* Astrophysical Survey, Spanish-Brazilian collaboration, PAU-BRASIL is the Brazilian conterpart

8000 sq.deg. survey with 56 contiguous filters with 138A width, 100A apart 3700A< λ < 9200A + 1 broad for lensing.

Dark site with 0.71 arcsec seeing: Javalambre in Teruel, Spain

2.5m tel. + 6 sq.deg. JPCam, 1.2Gpix/shot

It will measure 0.003(1+z) photo-z for ~100M galaxies (E @ z~1.05 and S @ z~1.3

It will measure radial BAOs up to z~1.1 ➔ 11 $(Gpc/h)^3$

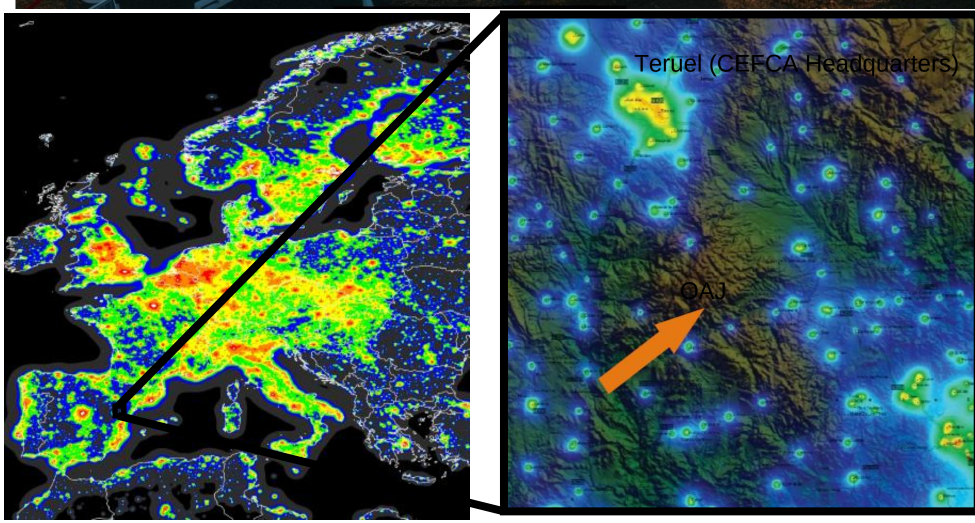
Clusters (10^5), Weak lensing, SN(10^4), QSOs (10^6), Galaxy evolution (10^8), Stars (10^8), Asteroids, etc

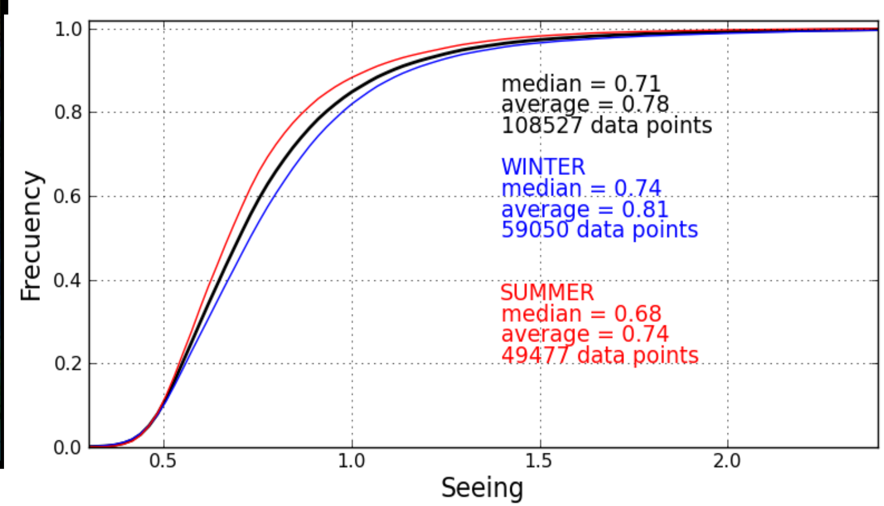
Start= 2014-15 End= 2019-20

WHERE?

Sierra de Javalambre,Teruel, Spain

Site testing since 2007 @ Moles et al. (2010), PASP, Vol. 122, 889, 363

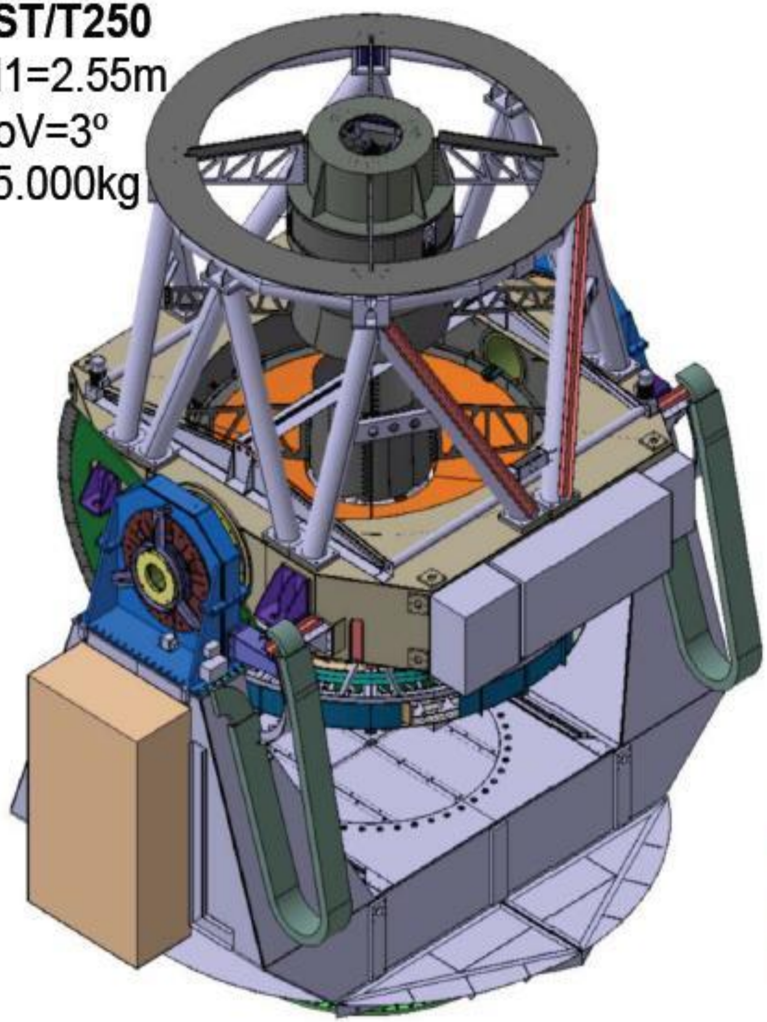




THE OAJ TELESCOPES

- Design: UTE-OAJ (AMOS) y CEFCA
- Supervised by a international committee of experts (PDR, FDR, etc)

JST/T250
M1=2.55m
FoV=3º
45.000kg



JAST/T80
M1=0.83m
FoV=2º
2.500kg

Fabrication

- T250: AMOS (Belgium)
- T80: ASTELCO (Germany)

- Main subcontractors: Tinsley (USA), Brashear (USA), Schott (Germany), Symétrie (France), PI (Germany), OSL (UK), etc.

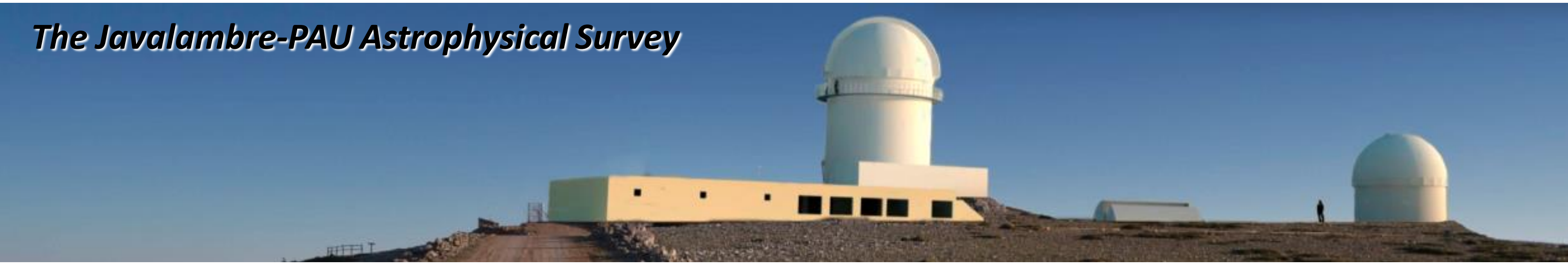
OAJ

Cenarro et al. 2013 SPIE

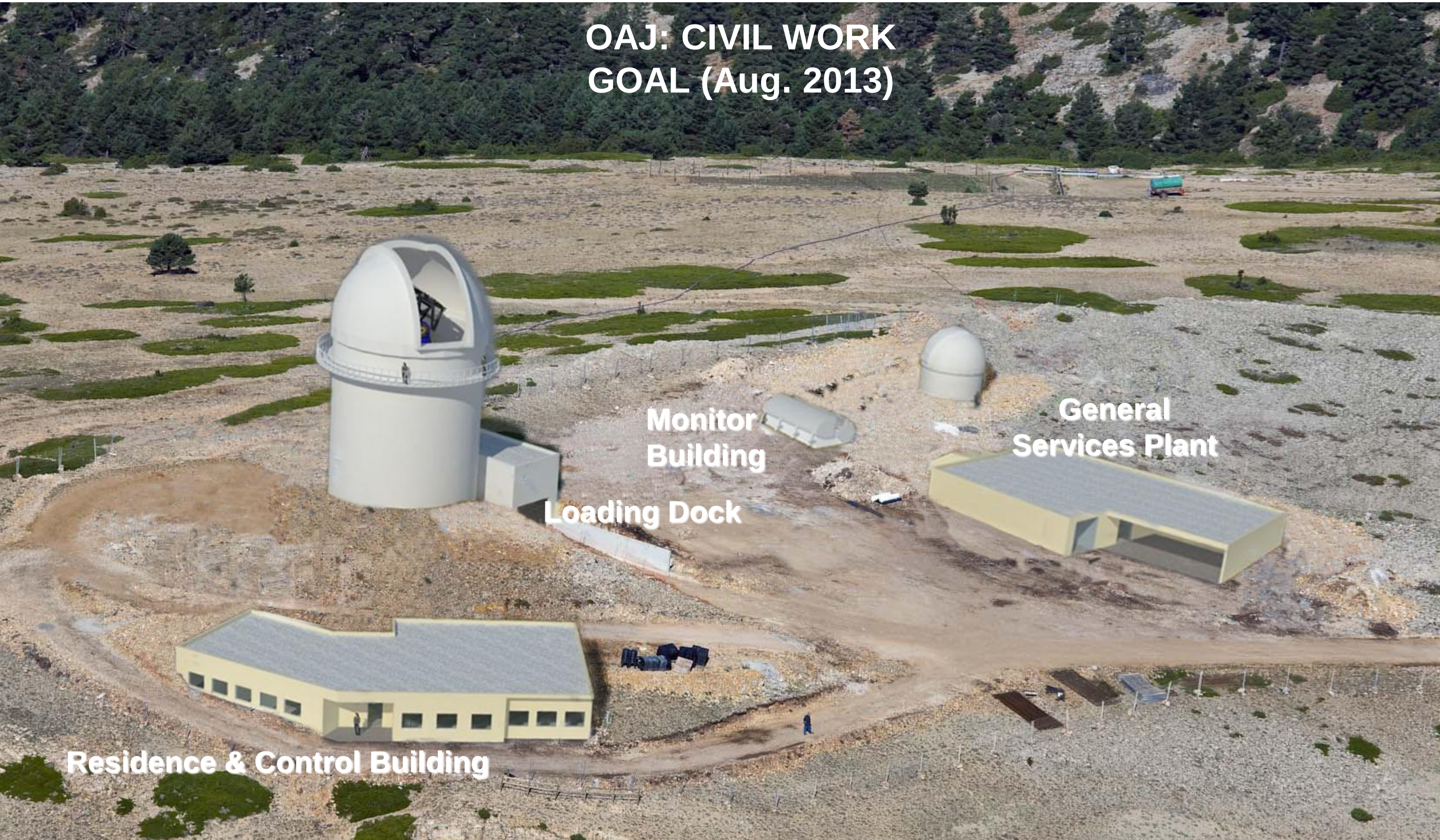
The Observatorio Astrofsico de Javalambre is a new astronomical facility at the Pico del Buitre of the Sierra de Javalambre, in the Spanish province of Teruel. The site, at an altitude of 2000m, has superb astronomical characteristics in terms of median seeing (0.71 arcsec in V band, with a mode of 0.58”), fraction of clear nights (53% totally clear, 74% with at least a 30% of the night clear) and darkness, with no significant man-made light contamination.

Responsability of Centro de Estudios de Fisica del Cosmos de Aragon (CEFCA)

The goal of the OAJ is to carry out large sky surveys with dedicated telescopes of unusually large fields of view. These are the Javalambre Survey Telescope (JST/T250), a 2.55m telescope with 3 deg FoV, and the Javalambre Auxiliary Survey Telescope (JAST/T80), an 83 cm telescope with a FoV diameter of 2 deg.

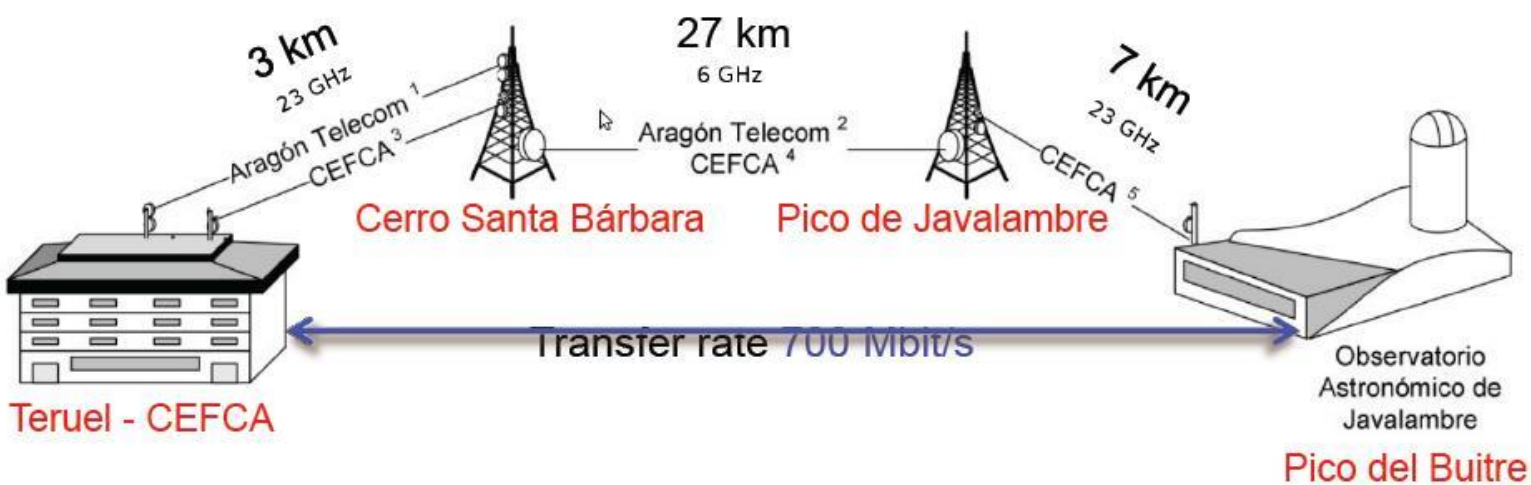


OAJ: CIVIL WORK GOAL (Aug. 2013)

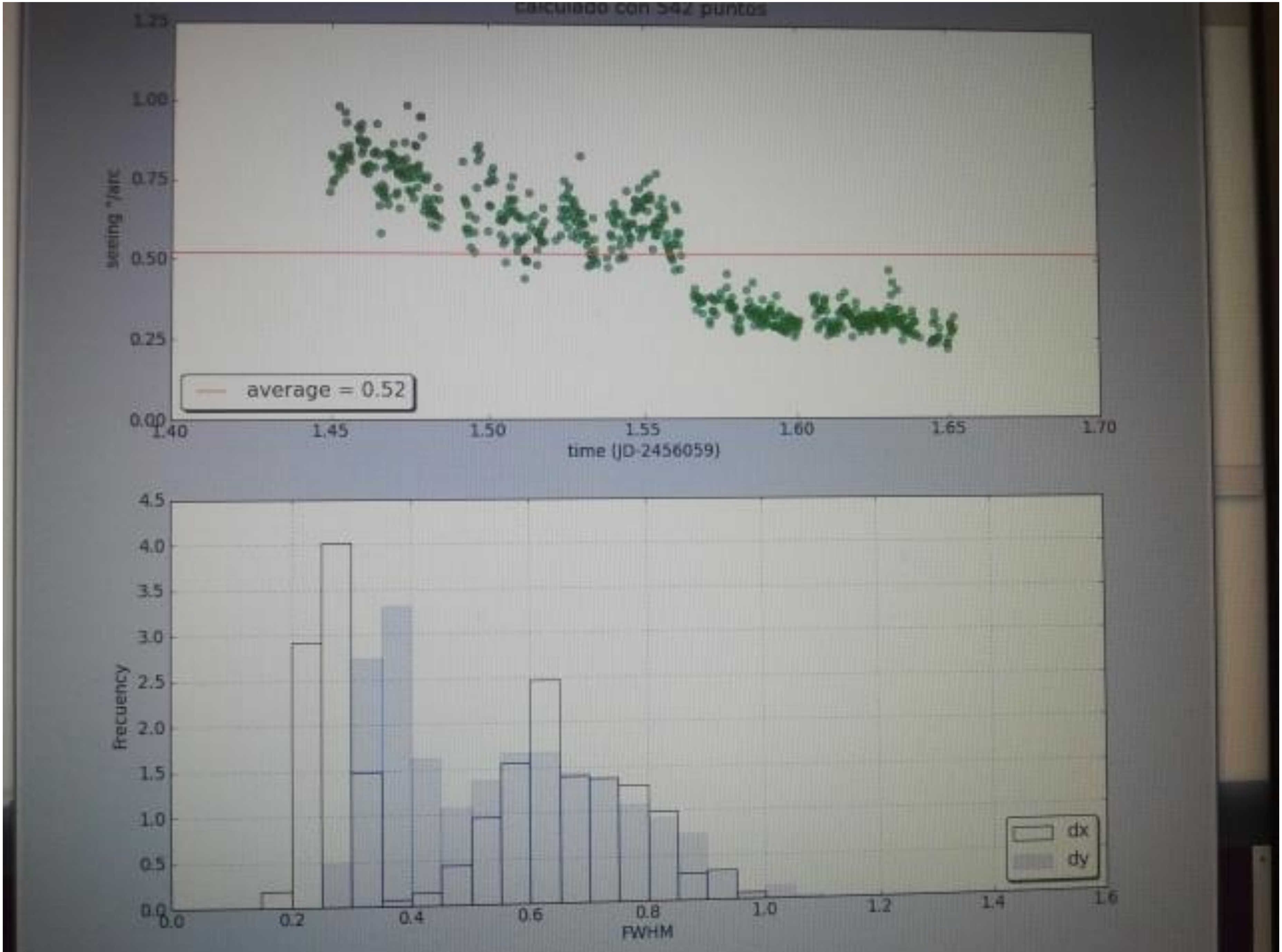


OAJ TUNNELS

OAJ GENERAL INSTALLATION AND SUPPLIES

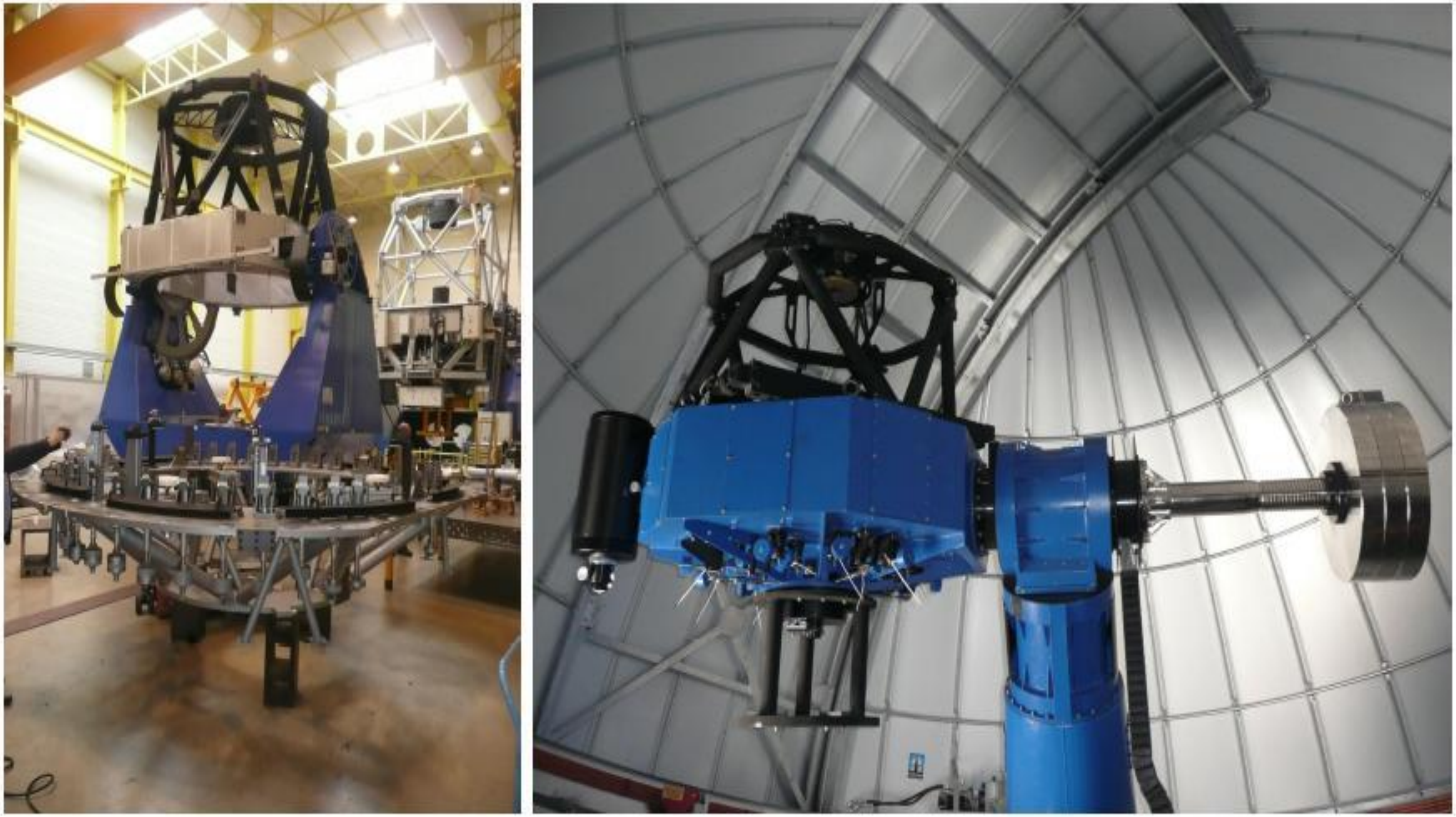


OAJ - CEFCA RADIOLINK


calculado con 542 puntos
seeing ''/arc
average = 0.52
time (JD-2456059)
Frecuency
FWHM
dx
dy

T80 is ready:
first light soon

JST&JAST at OAJ



re 3. (Left) JST/T250 at the integration hall of AMOS. In the center of the image, the telescope grou
cture, the fork, the centerpiece, the serrurier structure, the M2 top ring and the altitude and azimut
ings are already in place. At the bottom of the image, the M1 cell completely assembled before integrat
T/T80 assembled inside its building and dome at the OAJ.

Taylor et al. 2013 arXiv:1301.4175

JPCAM has the three main subsystems:

→ the non-cryogenic subsystem, mounted directly to the Instrument Support Structure (ISS), which comprises the filter exchange mechanism and shutter working at ambient temperature. In JPCam parlance, this is referred to as the filter shutter unit (or FSU);

→ the cryogenic camera subsystem (or Cryo-Cam) comprising the entrance window to the dewar; the focal plane assembly, referred to here as the focal plane cold plate (FPCP), containing the science, wave-front sensors (WFSs) and acquisition and guide sensors (AGs) and their associated controllers; the cooling and vacuum systems and the image acquisition electronics and control software.

→ The Cryo-Cam is mounted neither to the FSU nor directly to the ISS but instead is bridged to the ISS via a hexapod actuator system (HAS) which actuates the Cryo-Cam in response to the WFS signals from within the camera itself.

PLACA FRIA ~5-6 eff sq.deg. / 1.2Gpix

14 different filters per tray
Each CCD only "sees" 1 filter per tray
J-PAS requires 56 narrow band filters (4 trays x 14 CCD/tray)

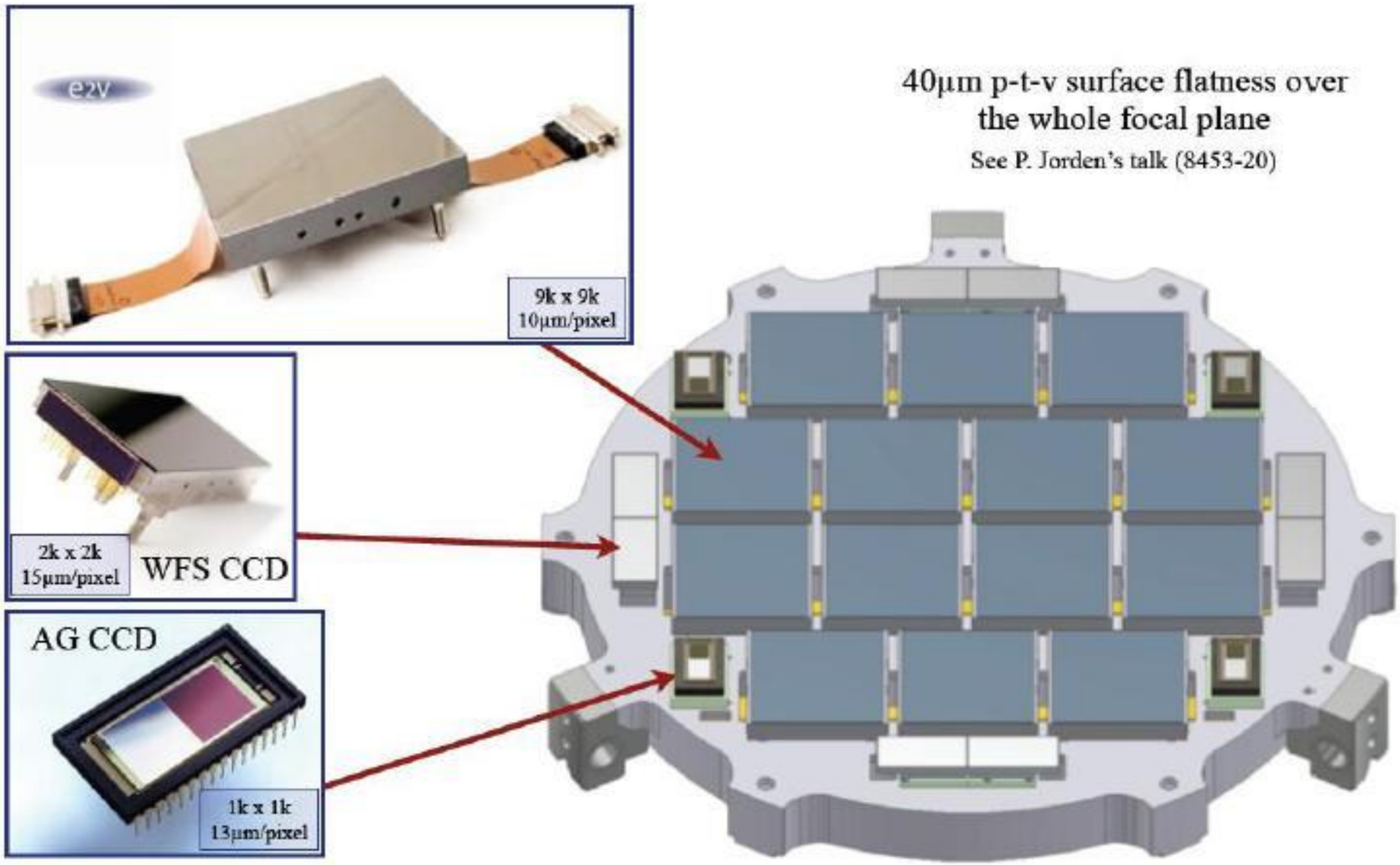
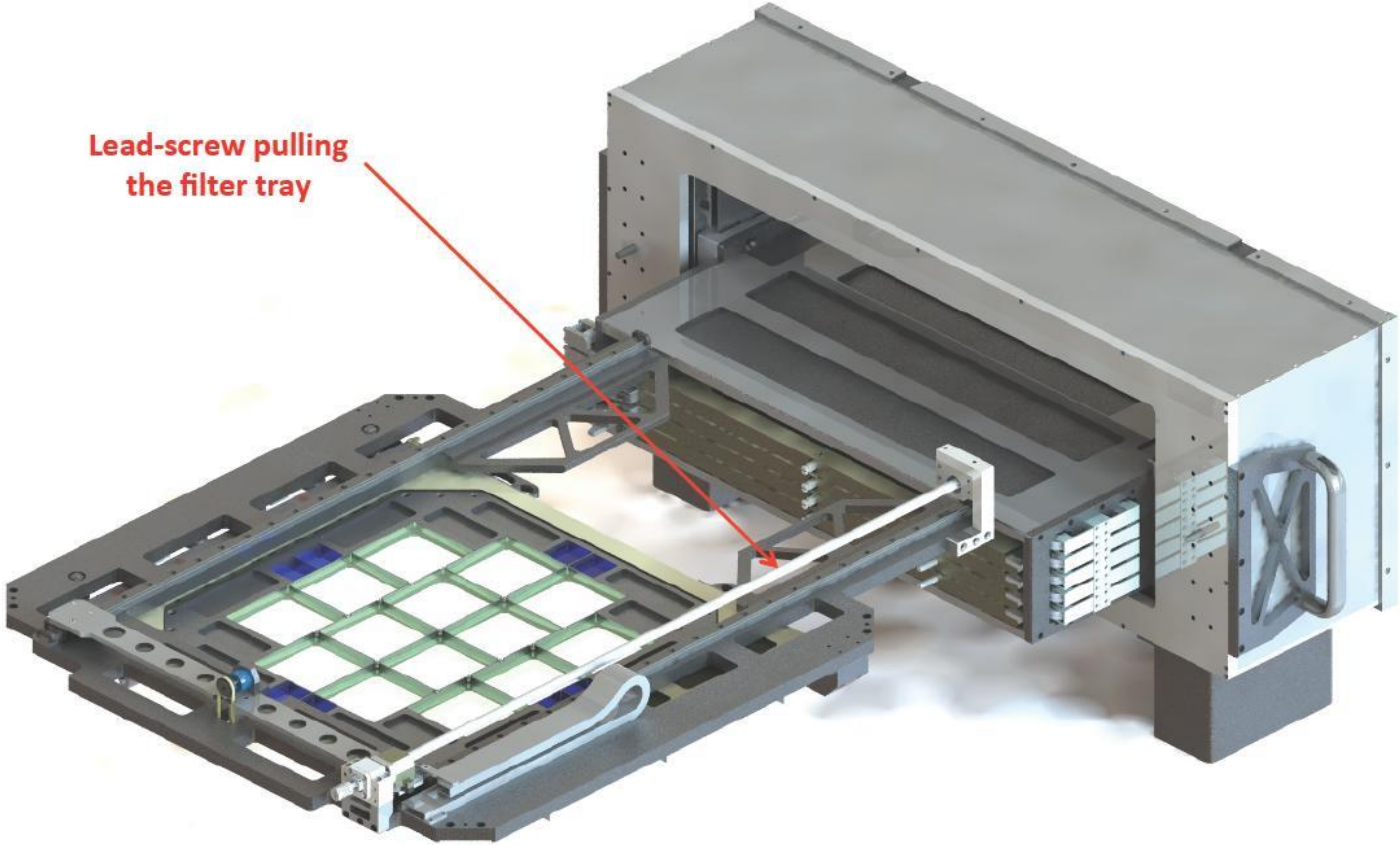
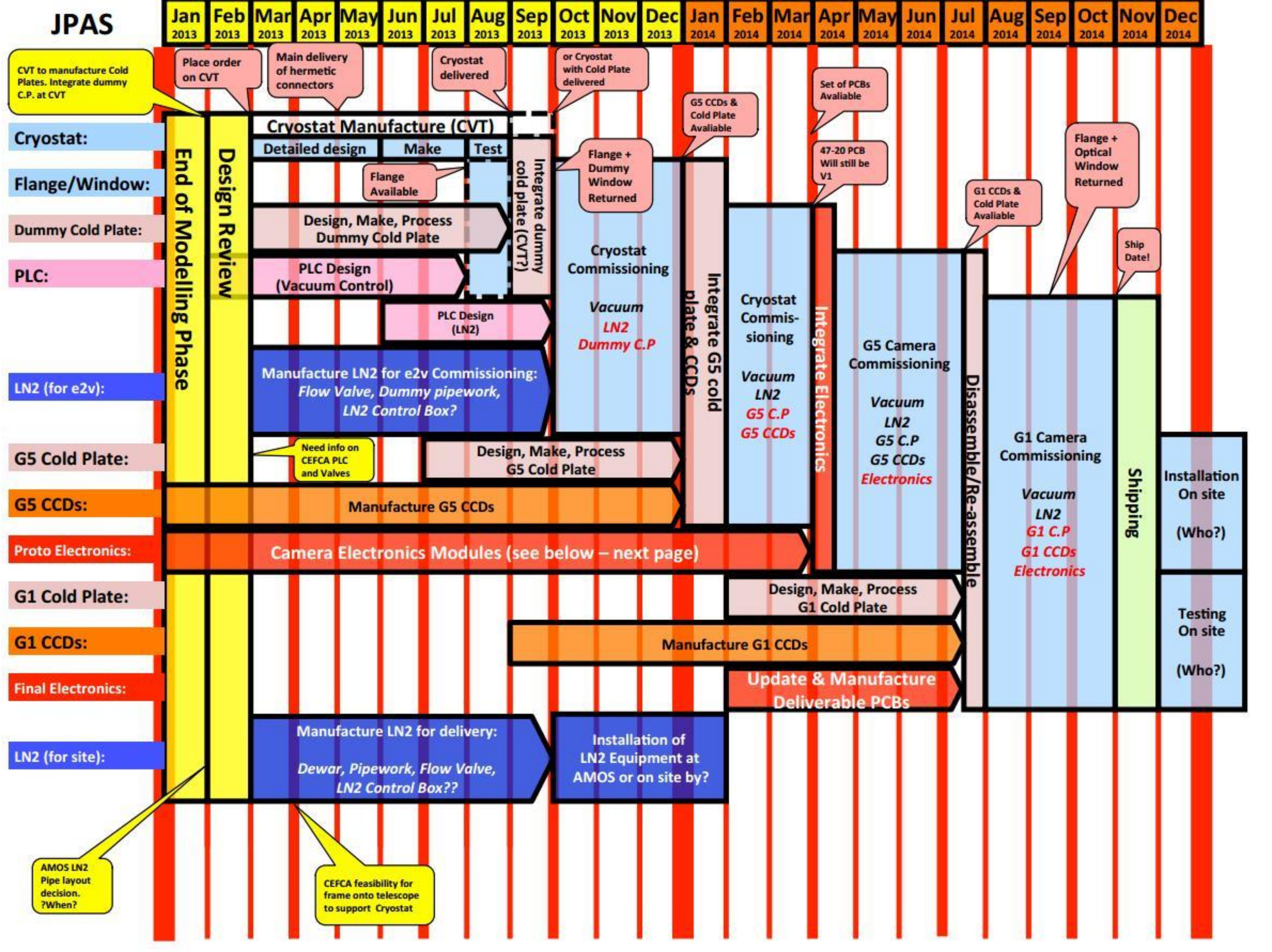


Figure 6. JPCam's focal plane layout as supplied by e2v. The 14 loosely packed, full-wafer, e2v science sensors are shown mounted on the FPCP. In the periphery are mounted 4, $1k^2$ frame-transfer (FT) guide CCDs and 4 pairs of $2k^2$ FT WFSs.

1st filter tray deployment



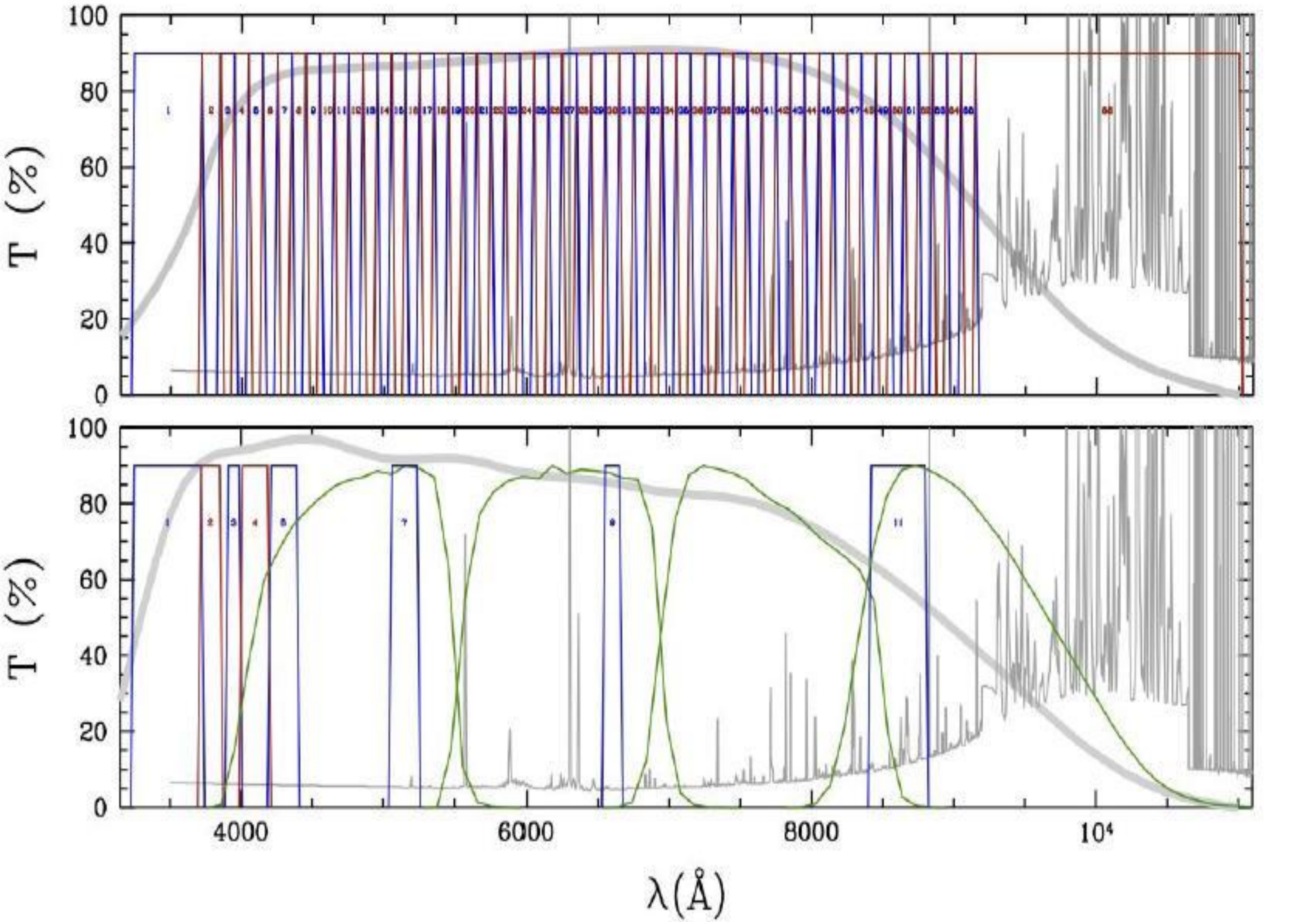

JPAS
Jan 2013
Feb 2013
Mar 2013
Apr 2013
May 2013
Jun 2013
Jul 2013
Aug 2013
Sep 2013
Oct 2013
Nov 2013
Dec 2013
Jan 2014
Feb 2014
Mar 2014
Apr 2014
May 2014
Jun 2014
Jul 2014
Aug 2014
Sep 2014
Oct 2014
Nov 2014
Dec 2014
CVT to manufacture Cold Plates. Integrate dummy C.P. at CVT
Place order on CVT
Main delivery of hermetic connectors
Cryostat delivered
or Cryostat with Cold Plate delivered
G5 CCDs & Cold Plate Avaliable
Set of PCBs Avaliable
47-20 PCB Will still be V1
G1 CCDs & Cold Plate Avaliable
Flange + Optical Window Returned
Ship Date!
Cryostat:
Flange/Window:
Dummy Cold Plate:
PLC:
LN2 (for e2v):
G5 Cold Plate:
G5 CCDs:
Proto Electronics:
G1 Cold Plate:
G1 CCDs:
Final Electronics:
LN2 (for site):
End of Modelling Phase
Design Review
Cryostat Manufacture (CVT)
Detailed design
Make
Test
Flange Available
Integrate dummy cold plate (CVT?)
Flange + Dummy Window Returned
Design, Make, Process Dummy Cold Plate
PLC Design (Vacuum Control)
PLC Design (LN2)
Cryostat Commissioning
Vacuum
LN2
Dummy C.P
Integrate G5 cold plate & CCDs
Cryostat Commis-sioning
Vacuum
LN2
G5 C.P
G5 CCDs
Integrate Electronics
G5 Camera Commissioning
Vacuum
LN2
G5 C.P
G5 CCDs
Electronics
Disassemble/Re-assemble
G1 Camera Commissioning
Vacuum
LN2
G1 C.P
G1 CCDs
Electronics
Shipping
Installation On site
(Who?)
Testing On site
(Who?)
Manufacture LN2 for e2v Commissioning: Flow Valve, Dummy pipework, LN2 Control Box?
Need info on CEFCA PLC and Valves
Design, Make, Process G5 Cold Plate
Manufacture G5 CCDs
Camera Electronics Modules (see below – next page)
Design, Make, Process G1 Cold Plate
Manufacture G1 CCDs
Update & Manufacture Deliverable PCBs
Manufacture LN2 for delivery:
Dewar, Pipework, Flow Valve, LN2 Control Box??
Installation of LN2 Equipment at AMOS or on site by?
AMOS LN2 Pipe layout decision. ?When?
CEFCA feasibility for frame onto telescope to support Cryostat

J-PLUS (T80)

The Javalambre-Photometric Local Universe Survey (J-PLUS) constitutes the second long-term objective of the OAJ.

Performed with JAST/T80 and T80Cam during the first 2 years of JAST/T80 operation. Starting in 2013, J-PLUS will cover the same sky area of J-PAS using 12 filters in the optical range. Despite the fact that the filter set is defined and optimized to carry out the photometric calibrations for J-PAS, the J-PLUS data will also allow conducting several scientific programs.

These filters are: 4 SDSS filters (g,r,i,z) , which allow to anchor the photometry to that of the SDSS, 6 filters of 20--400A width centered on key absorption features like Hδ, the G-band, Mgb/Fe lines, and the Ca triplet, for stellar classification and stellar population studies, and 2 NB filters in common with the J-PAS filter set that cover the rest-frame [OII]/λ3727 and Hα/λ6563 lines, for anchoring the J-PAS calibration and also mapping the star formation rate in nearby galaxies ($z < 0.017$). J-PLUS will reach AB~ 23 mag (5σ level) in the 4 SDSS filters, i.e., between 0.8 and 2 mag deeper than SDSS in the same bands.



1. (Top): The set of 56 J-PAS filters; (Bottom): The set of 12 J-PLUS filters. Thick grey lines in bo
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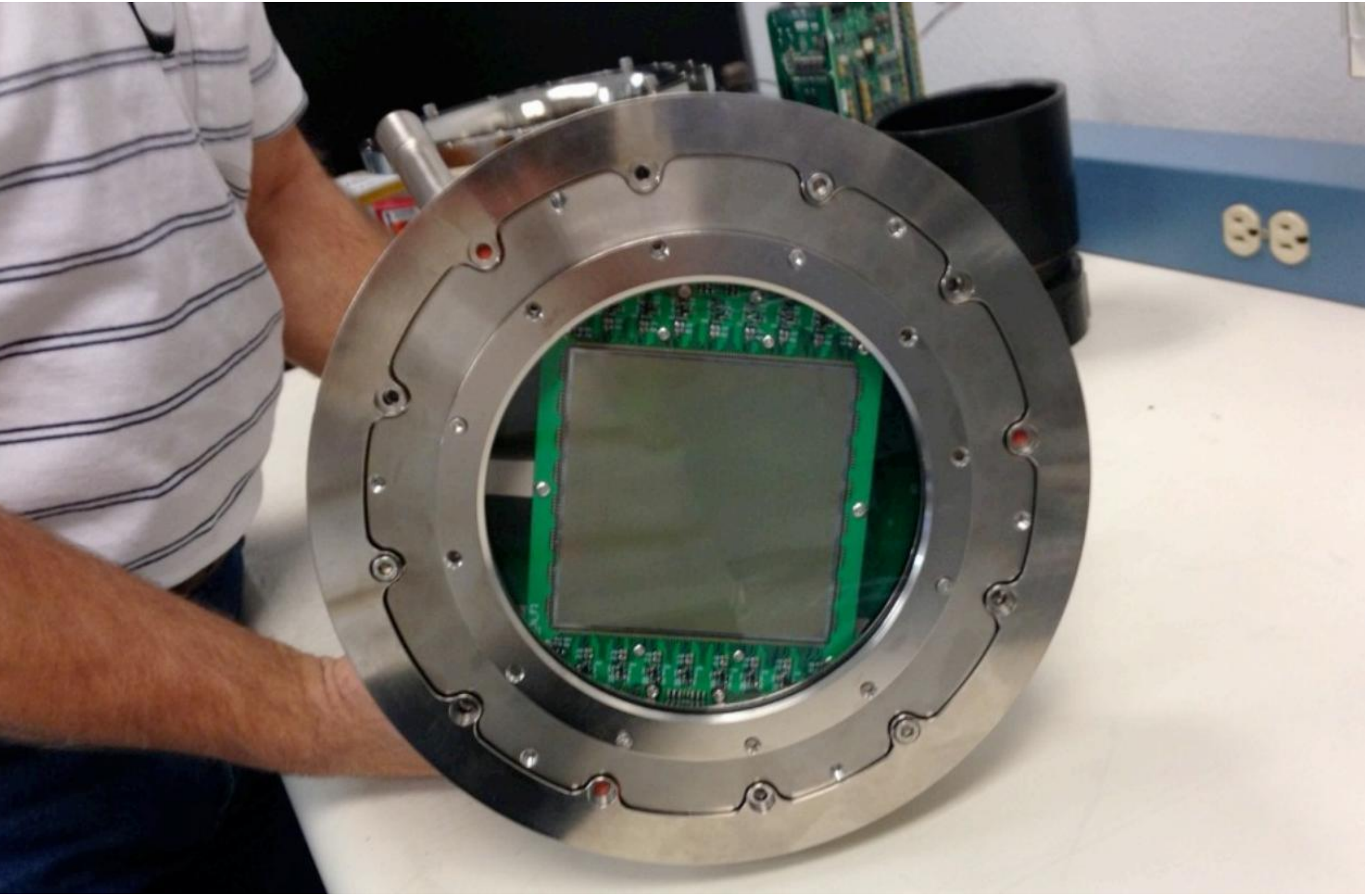
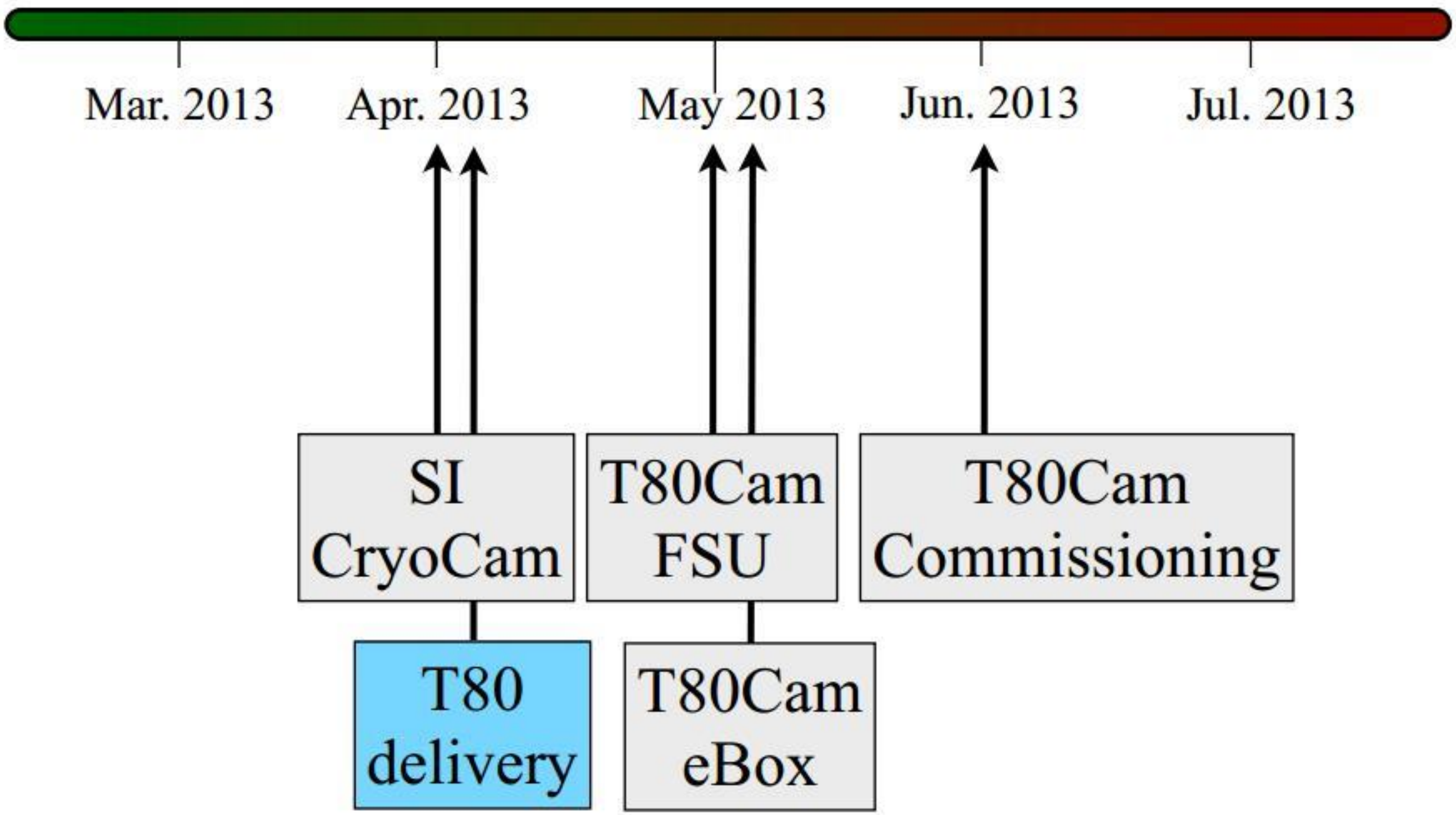




Mar. 2013
Apr. 2013
May 2013
Jun. 2013
Jul. 2013
SI CryoCam
T80Cam FSU
T80Cam Commissioning
T80 delivery
T80Cam eBox

JST/T250 First Light Instrument Proposal
- T250FLI -

Antonio Marín-Franch, Sergio Chueca, Roberto M. Luis Simoes (CEFCA)

June 22nd, 2012

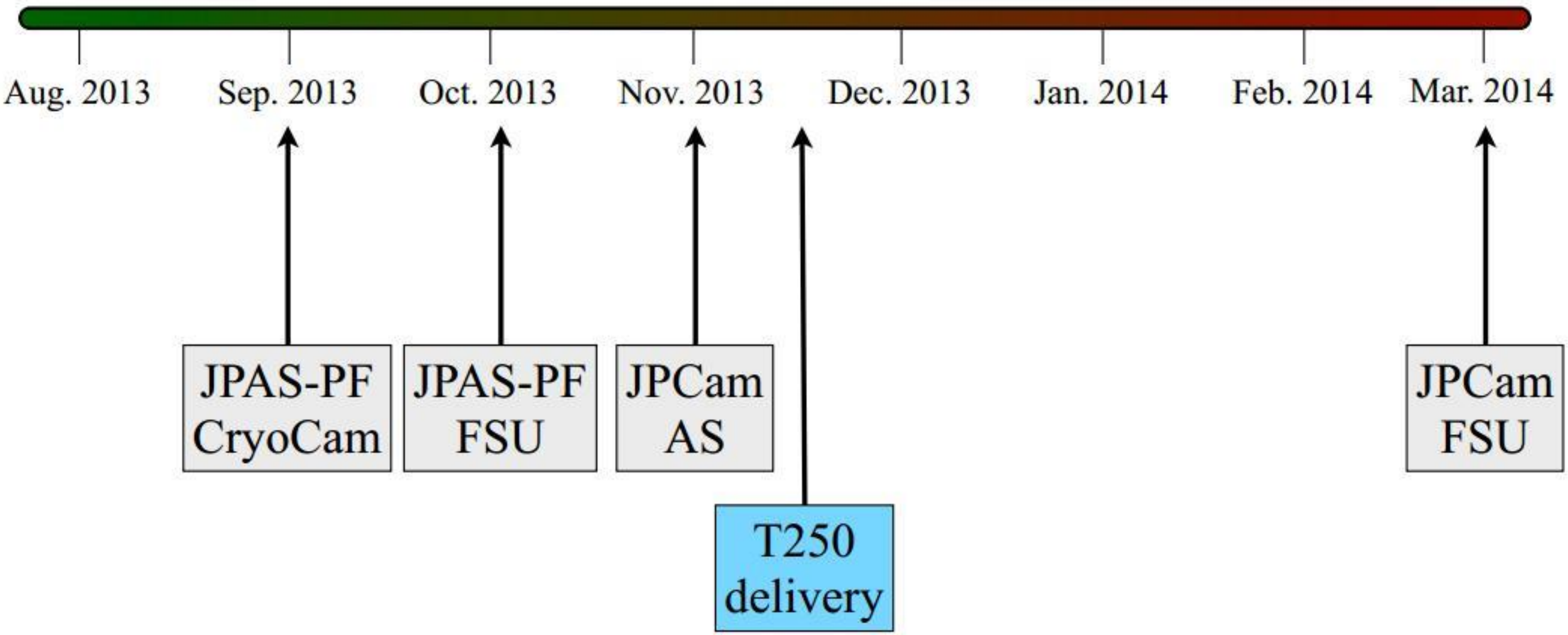
The arrival of JST/T250 telescope to the OAJ is expected for late 2012 or early 2013, depending on the level of progress in the manufacturing of the dome, as well as on the weather conditions. The telescope will be installed, accepted and therefore ready for scientific operation during the first half of 2013.

3. CAMERA PROPOSAL

The proposed T250FLI consists on an adapted version of T80Cam for its use on the JST/T250. It will an identical copy of the T80Cam-South (mounting an e2v detector) with two main modifications: (i) the dewar window has been designed to perform as the last element of the JST/T250 optical design, and (ii) a mechanical structure has been designed to attach T80Cam to the JST/T250 instrument flange. As a result, the T250FLI will be compliant with the optical and mechanical interfaces required by the telescope. The different camera components are listed below.

3.1. Detector

The J-PAS collaboration signed a contract with e2v (based on the offer ES17-1139, Sept. 7, 2010) to provide 16 science grade devices. These CCDs are for JPCam (x14) and T80Cam-South (x1). The T250FLI shall be equipped with the 16th CCD. The detector is a science grade device from e2v's existing contract. It is a 9216-by-9216 pixels detector, with 10μm pixels.


Aug. 2013
Sep. 2013
Oct. 2013
Nov. 2013
Dec. 2013
Jan. 2014
Feb. 2014
Mar. 2014
JPAS-PF CryoCam
JPAS-PF FSU
JPCam AS
T250 delivery
JPCam FSU

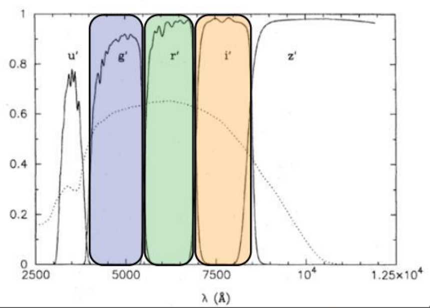





The goal for the JPAS-PF is twofold:

- to provide the JST/T250 with a scientific instrument ready to start scientific operation at the telescope's day one. The JPAS-PF covers a **0.55 x 0.55 square degrees FoV with a pixel scale of 0.2267"/pixel**.

- to proceed with the **JPCam commissioning phase**, starting with the Actuator System commissioning and the JPCam+T250 first pointing model.



CONCEPT: Modified version of the T80Cam-South (e2v CCD) adapted to be installed at the JST/T250.