GOBIERNO DE ARAGON

FONDO DE INVERSIONES DE TERUEL — PUESTA EN VALOR DEL PATRIMONIO CULTURAL Y AMBIENTAL
ARCOS DE LAS SALINAS
Observatorio astrofísico de Javalambre
Inversión: 13.200.000 €
CENTRO DE ESTUDIOS DE FÍSICA DEL COSMOS DE ARAGÓN

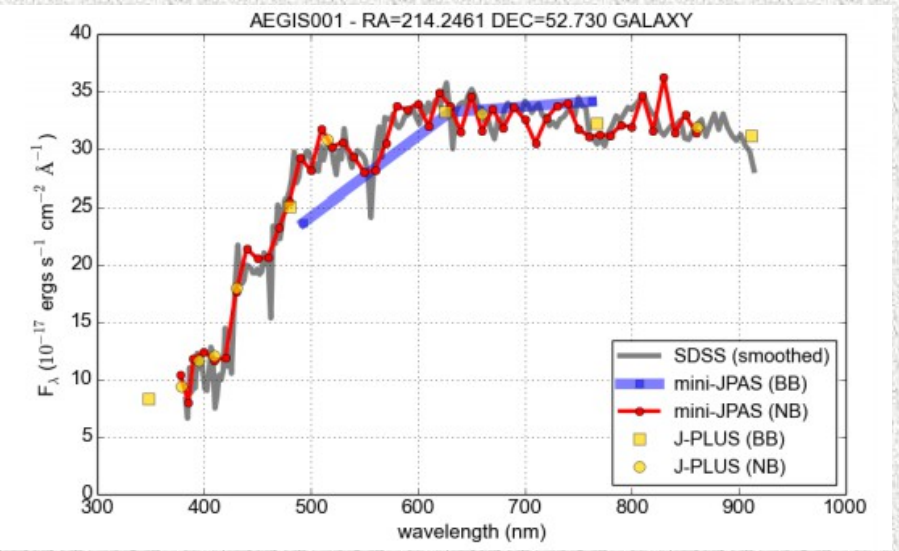
GOBIERNO DE ESPANA — MINISTERIO DE ECONOMIA Y COMPETITIVIDAD

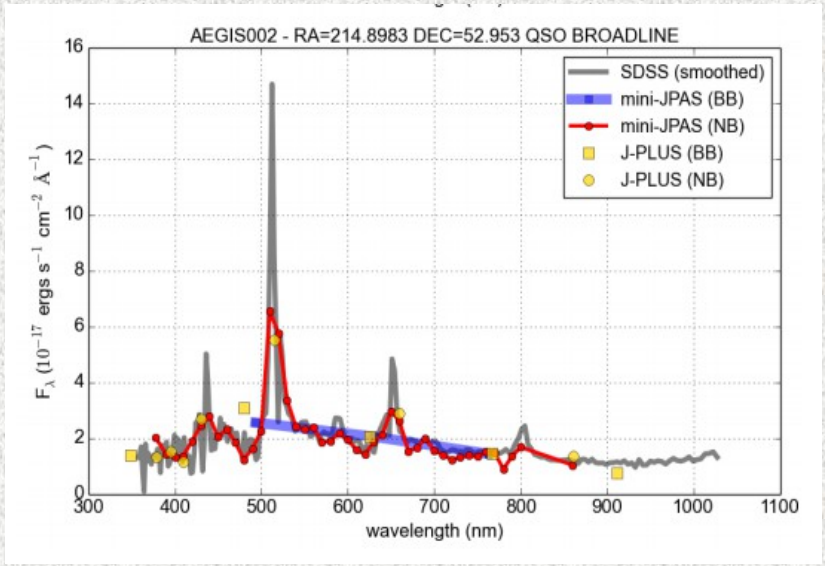
UNIÓN EUROPEA
Fondo Europeo de Desarrollo Regional
Una manera de hacer Europa

CEFCA

PGC2018-097585-B-C21

The first steps of J-PAS





Carlos Hernández-Monteagudo

Centro de **E**studios de **F**ísica del **C**osmos de **A**ragón

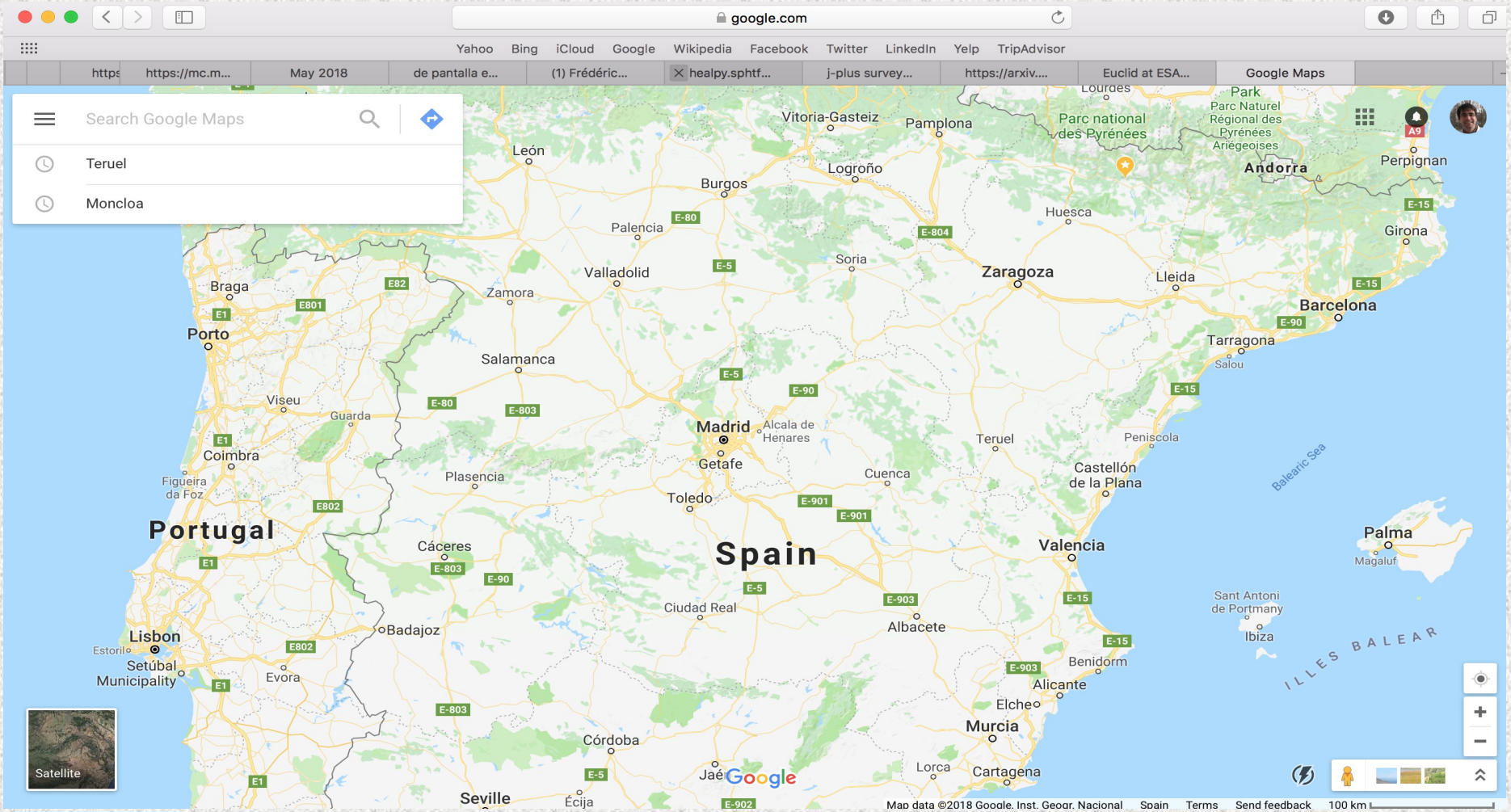
[CEFCA]

OUTLINE

- *The OAJ and the spectro-photometric approach of J-PLUS and J-PAS*
- *The m(ini/illi)-JPAS survey*
- *Possible future strategies*

The OAJ and the spectro-photometric approach of J-PLUS and J-PAS

The *Observatorio Astrofísico de Javalambre* (OAJ)



The *Observatorio Astrofísico de Javalambre* (OAJ)

Pico del Buitre (Vulture's Peak), By *Arcos de las Salinas*, about 60' from Teruel and 80' from Valencia

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The *Observatorio Astrofísico de Javalambre* (OAJ)

Pico del Buitre (Vulture's Peak), By *Arcos de las Salinas*, about 60' from Teruel and 80' from Valencia

EL PAIS ESPAÑA

ANDALUCÍA CATALUÑA C. VALENCIANA GALICIA MADRID PAÍS VASCO MÁS COMUNIDADES TITULARES »

La Laponia española The "Spanish Lapland"

La región de los Montes Universales, entre Teruel y Cuenca, tiene una densidad de población menor que Laponia. Un recorrido por esta zona permite ver cómo es la aislada vida de sus vecinos

120

NACHO CARRETERO

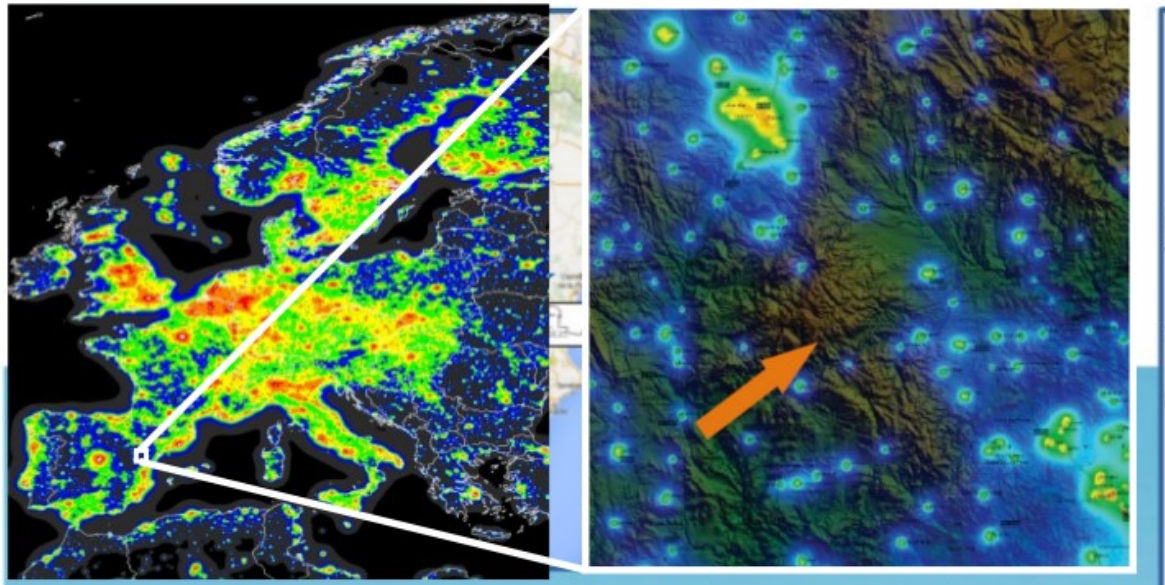
El País, 11/03/17

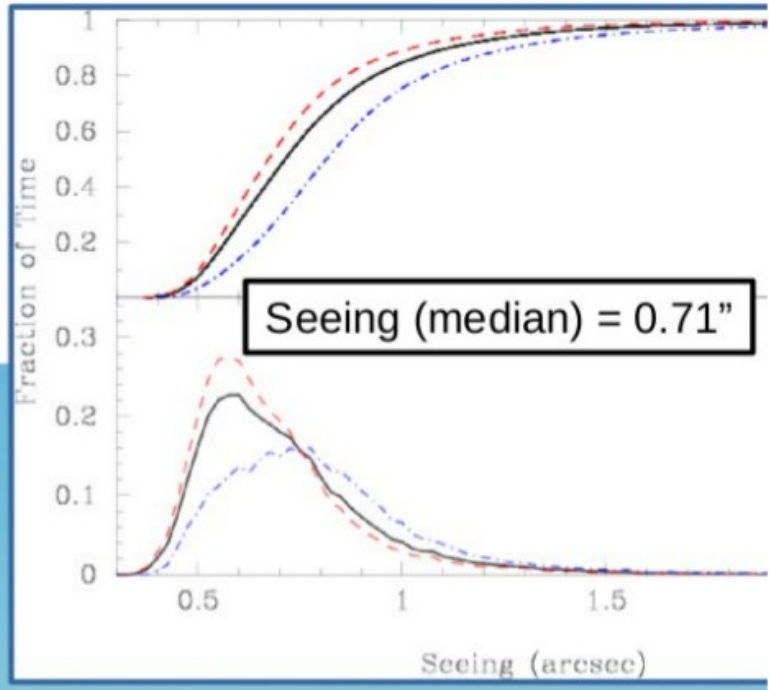
En los Montes Universales, un territorio del tamaño de Guipúzcoa, la densidad de población es de 1,63 habitantes por km². En Laponia, la región más septentrional de Escandinavia, hay 1,87.

The Javalambre Observatory (OAJ)

In the “Sierra de Javalambre” @1960m

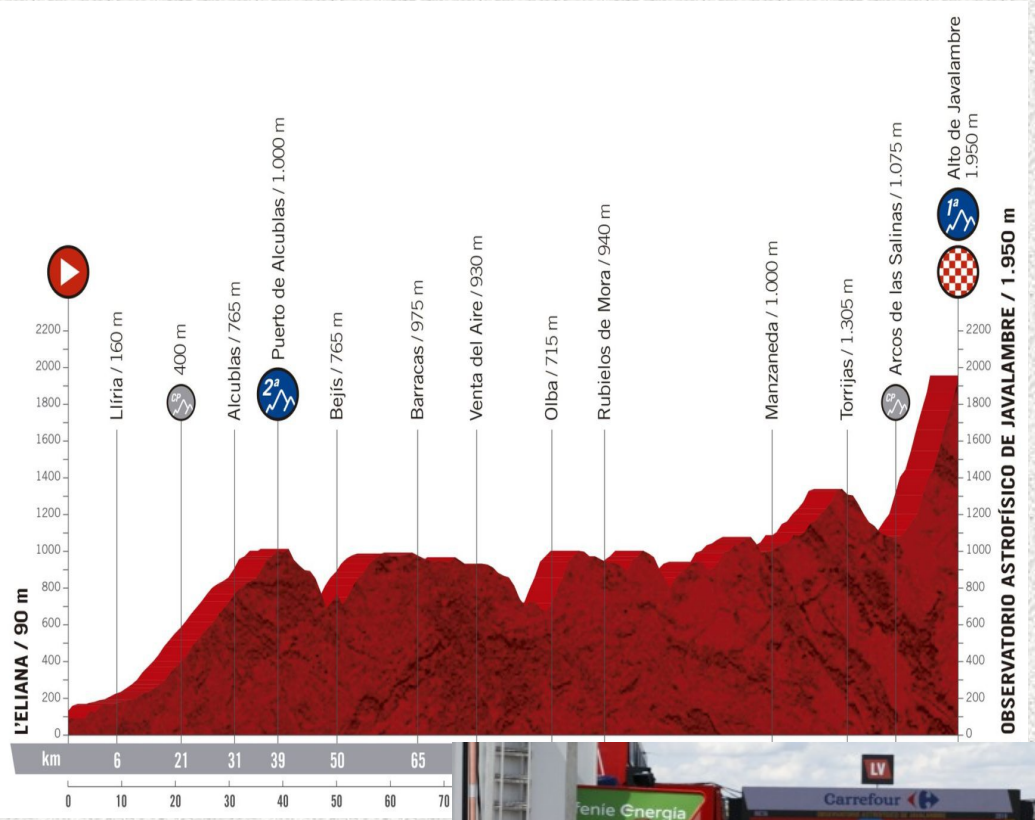
now officially a Spanish “scientific and technical facility” (20% available for open-time)

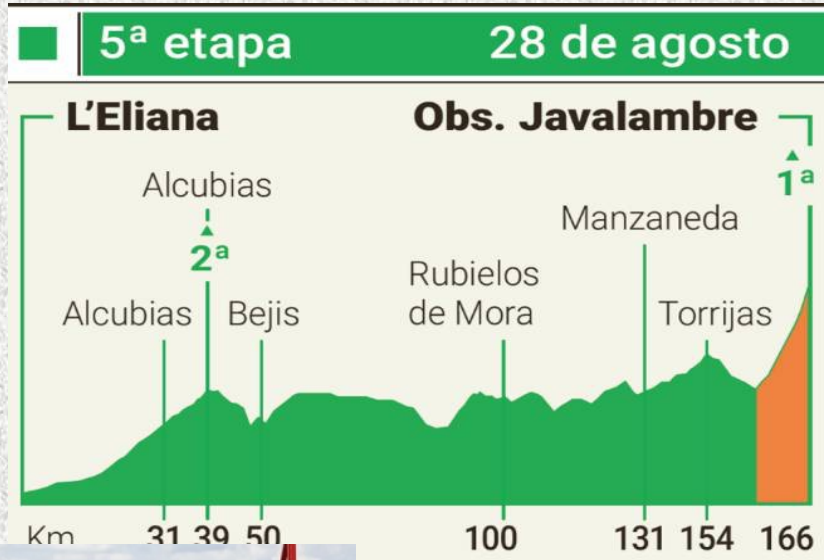




The *Observatorio Astrofísico de Javalambre* (OAJ)

The *Vuelta* ends at the Observatory, August 28th 2019





The Telescopes

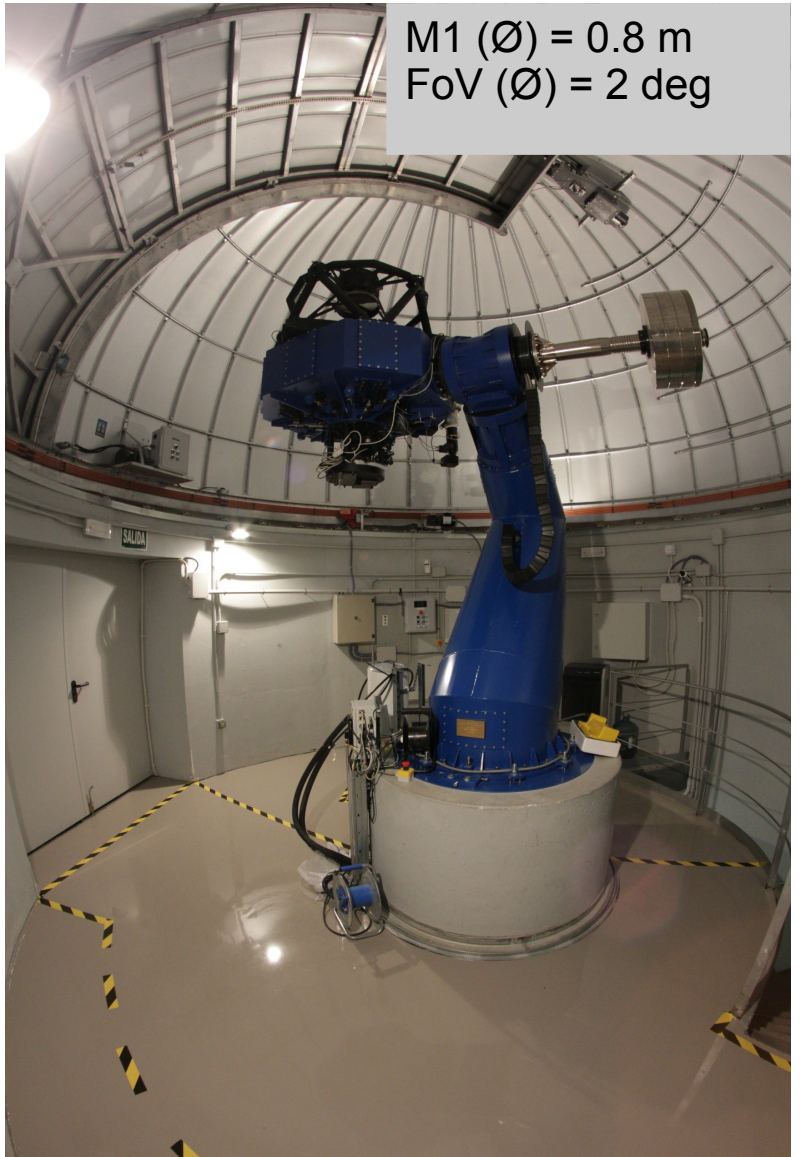
J-PAS
Javalambre Physics of the Accelerating Universe Astrophysical Survey

M1 (Ø) = 2.55 m
FoV (Ø) = 3 deg = 476 mm at FP
Etendue = 27.5 m^2deg^2

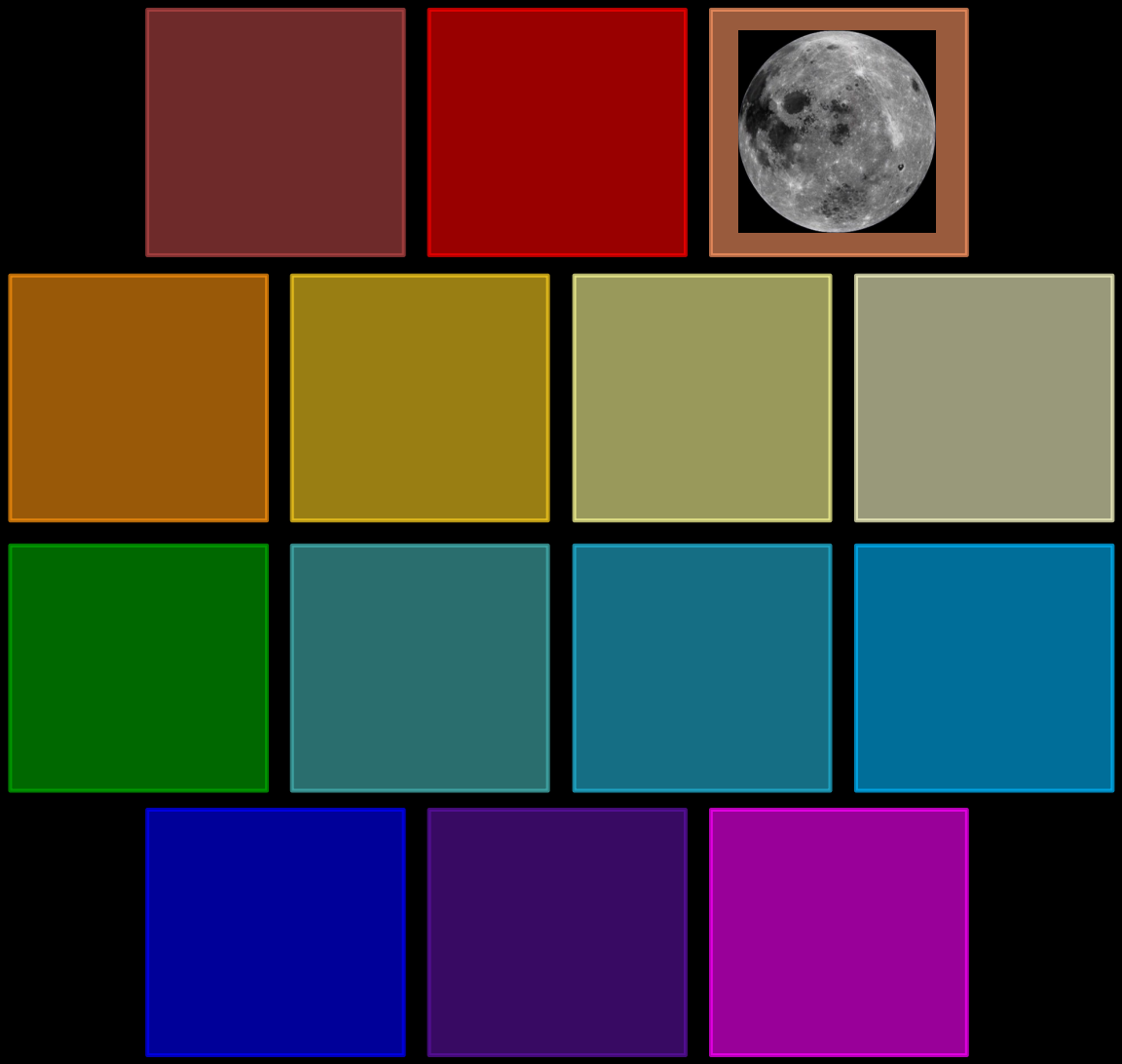
Currently equipped with the "pathfinder" camera

J-PLUS

M1 (Ø) = 0.8 m
FoV (Ø) = 2 deg



JPCam



T80Cam

The camera JPCam

1.2 Giga pixels
(14 CCD of 9200x9200)
0.22 arcsec/pixel
4.5 deg²

NTE SENER

JPCam interface with T250

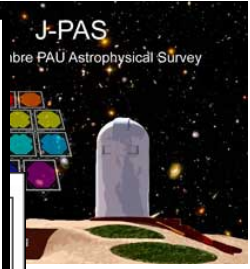
Filter and Shutter Unit
- Filter Unit
- Shutter Unit
- Anti-cond. Sys.
- e-Box

Actuator System
- ISS
- Hexapod
- CSS
- e-Box

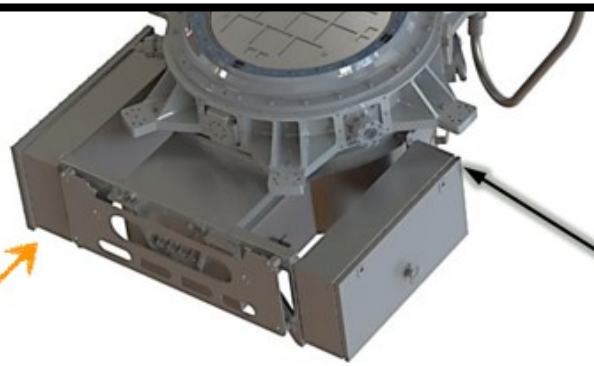
Camera e2v

e2v camera
- Cryostat
- Image acquisition system

	Telescope		Camera				
	Size	**FoV**	**# CCDs**	**CCD format**	**# of pixels**	**Resolution**	**Filters**
LSST	8.4m	9.6 sq. deg.	189	4096 x 4096	3.2 Gpixels	0.2”/pix	u, g, r, i, z, y
PanStarrs	1.8m	6.7 sq. deg.	60	4600 x 4600	1.3 Gpixels	0.26”/pix	g, r, i, z, y
JPCam	**2.5m**	**4.9 sq. deg.**	**14**	**9231 x 9216**	**1.2 Gpixels**	**0.23”/pix**	**54NB + 2BB**
HyperSuprimeCam	8.2m	1.8 sq. deg.	112	2048 x 4096	940 Mpixels	0.18”/pix	r, i, z, y
VIS (Euclid)	1.2m	0.5 sq. deg.	36	4096 x 4096	520 Mpixels	0.1”/pix	R, I, Z
DECam	4m	3 sq. deg.	62	2048 x 4096	500 Mpixels	0.27”/pix	g, r, i, z, y
Megacam	3.6m	1 sq. deg.	32	2048 x 4096	340 Mpixels	0.19”/pix	u, g, r, i, z
Omegacam	2.6m	1 sq. deg.	32	2048 x 4096	340 Mpixels	0	
JPAS-Path Finder	**2.5m**	**0.45 sq. deg.**	**1**	**10580x10560**	**110 Mpixels**	**0**	
T80Cam	**0.8m**	**2.1 sq. deg.**	**1**	**10580x10560**	**110 Mpixels**		
SuprimeCam	8.2m	0.25 sq. deg.	10	2048 x 4096	80 Mpixels		



- Hexapod
- CSS
- e-Box

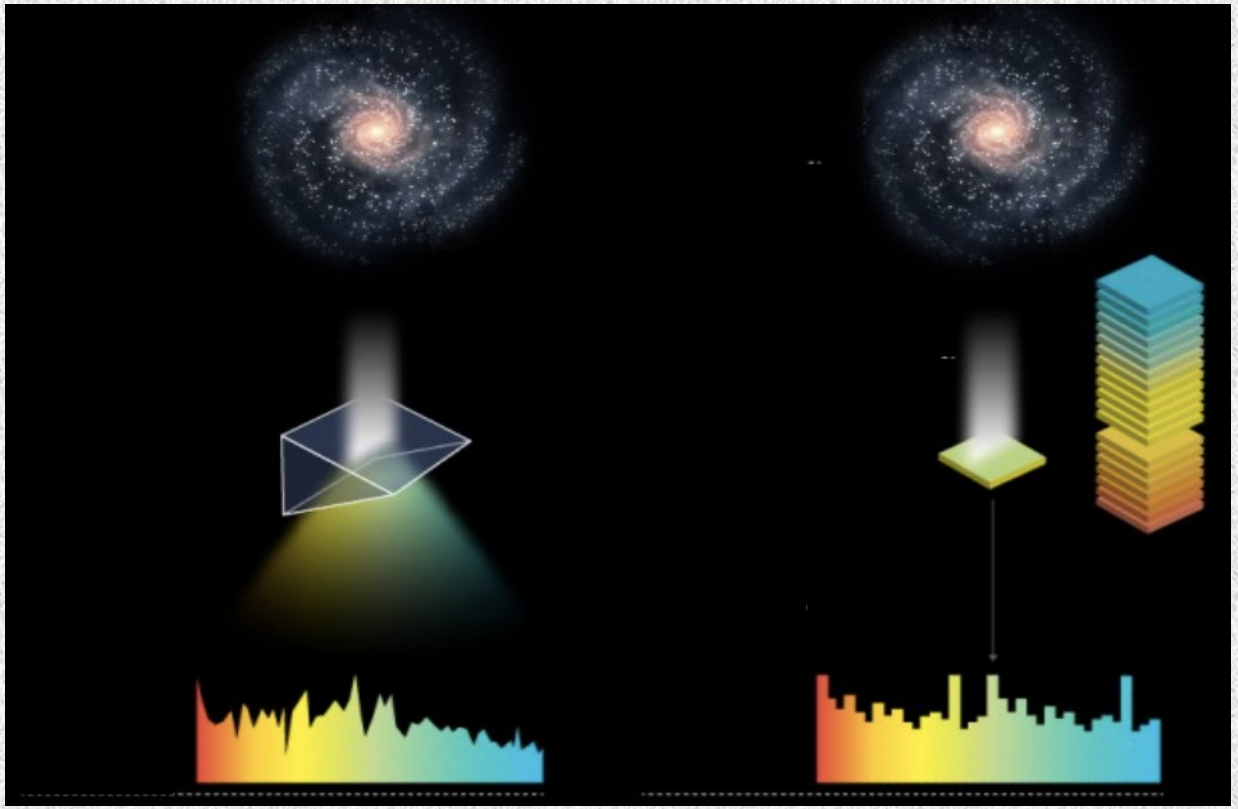


Camera e2v

e2v camera

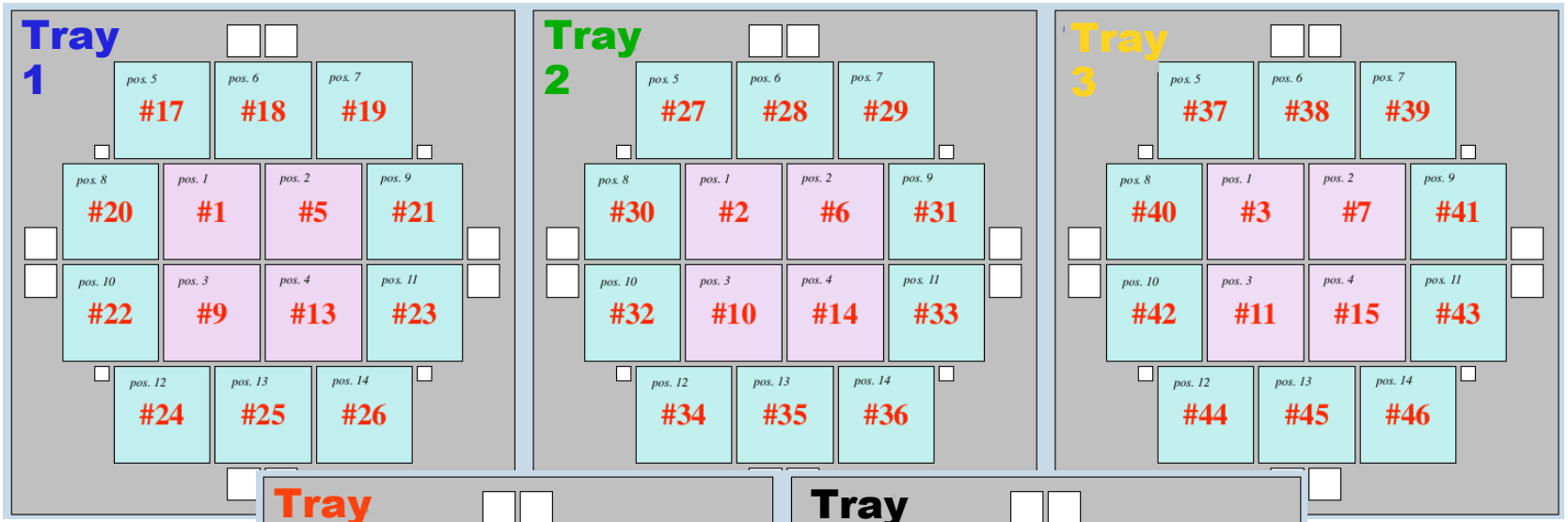
- Cryostat
- Image acquisition sy

The spectro-photometric approach



A low resolution photo-spectrum (R~50) in ***every*** pixel of the footprint

The camera + filters



The filter system

LRG @ z=1

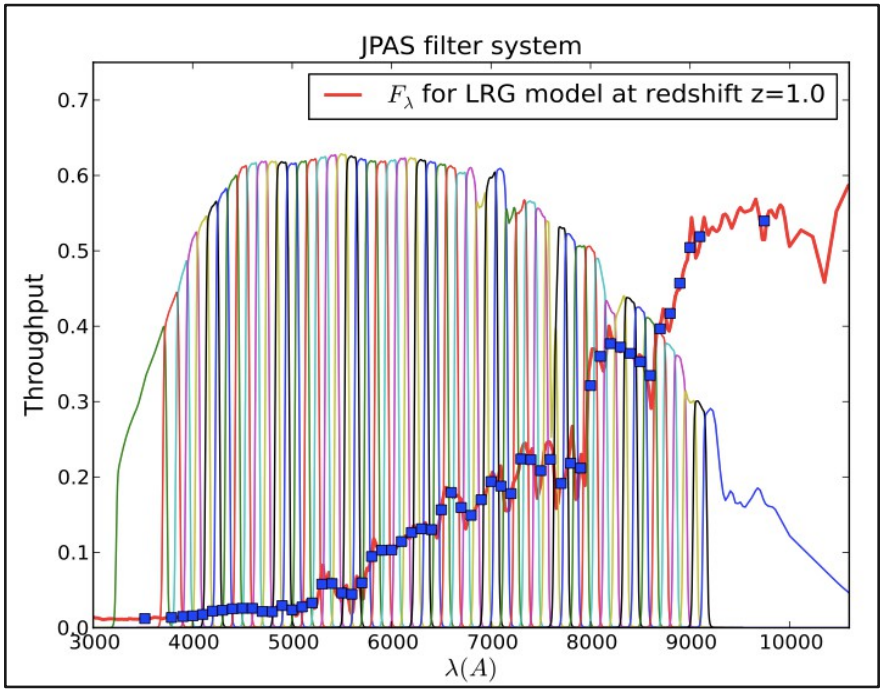
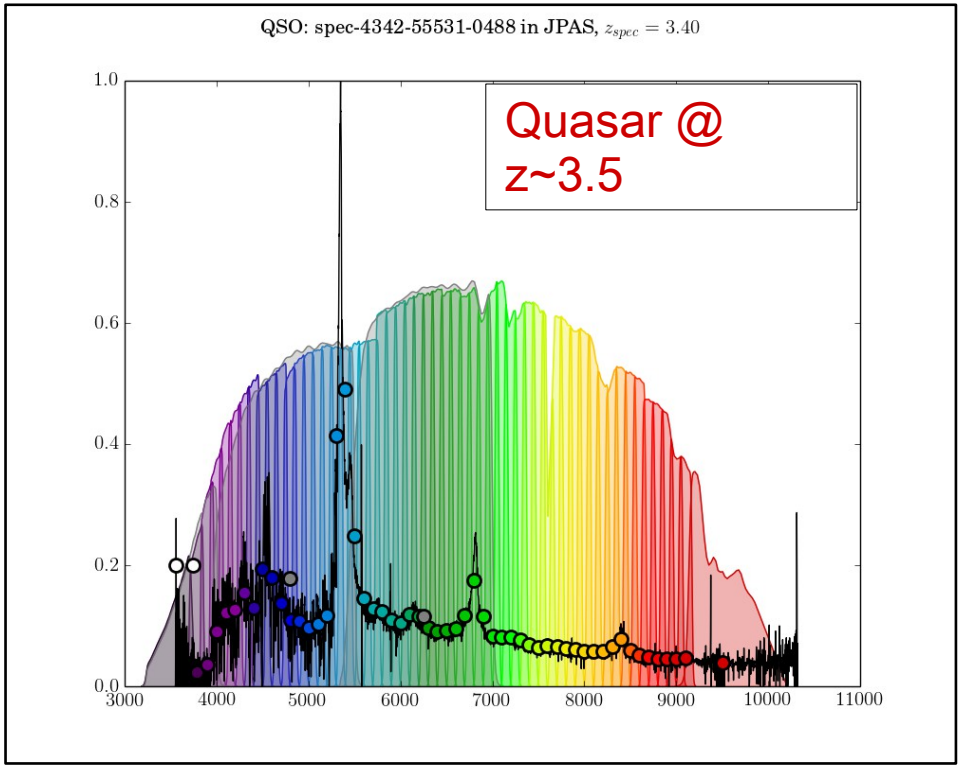


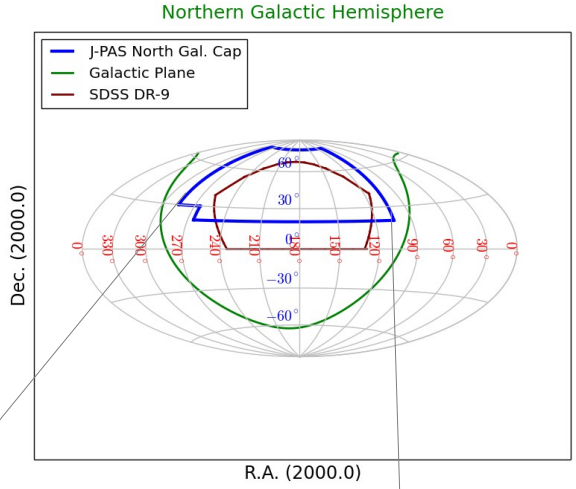
Photo-z precision as good as 0.003(1+z)

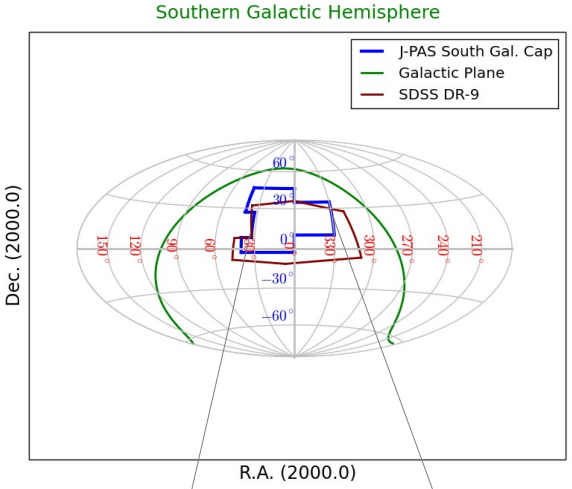


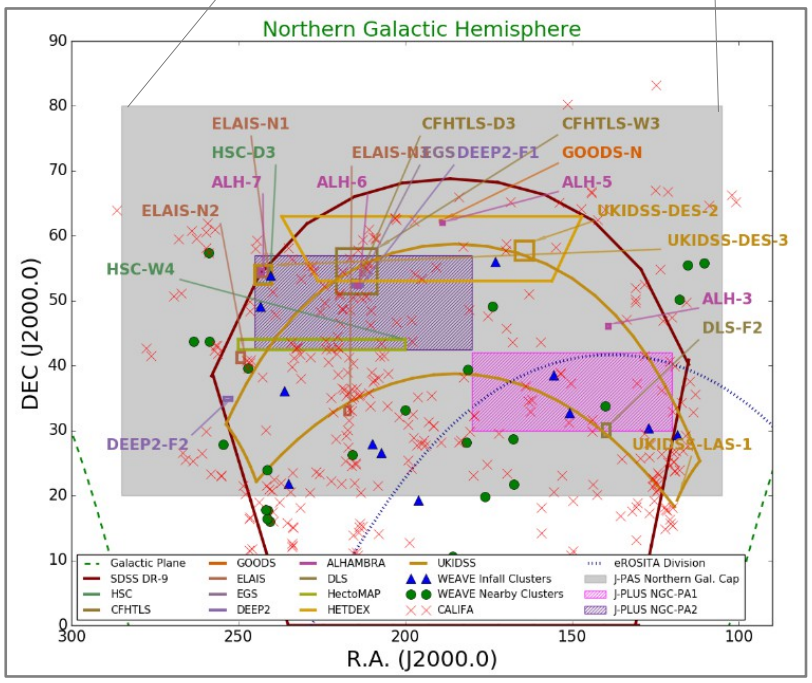
Footprint

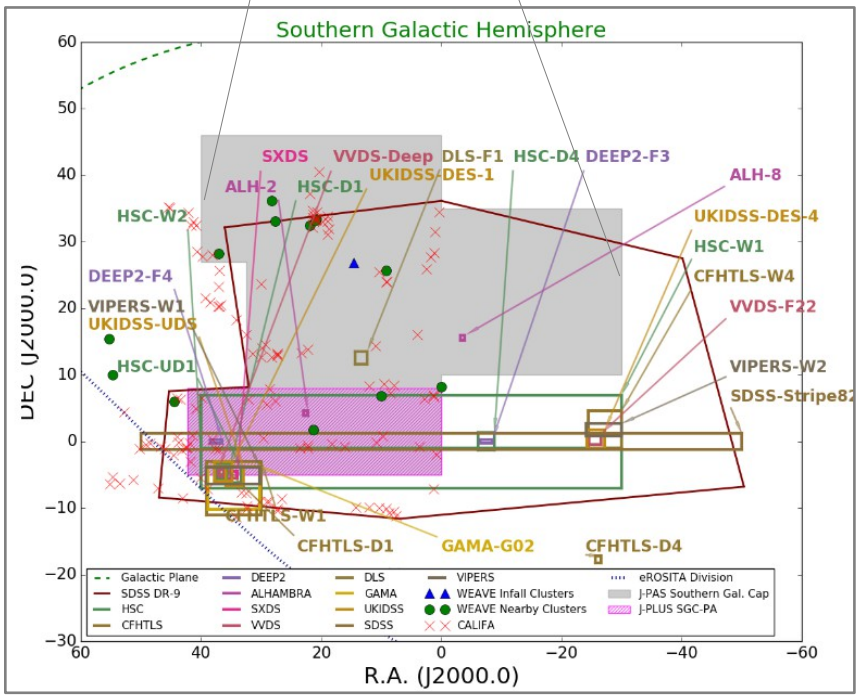
Expected initial survey speed (in all filters):
~ 700 deg² /yr

Survey strategy currently under revision!



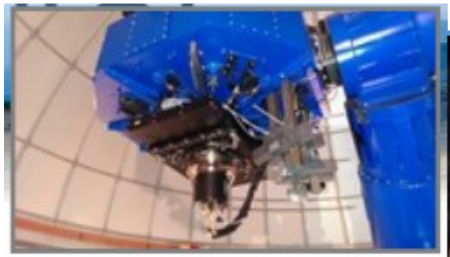


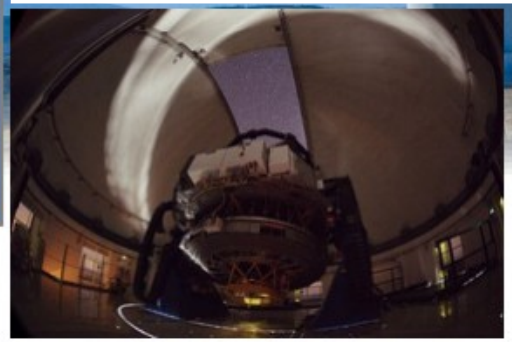




Data processing and storage

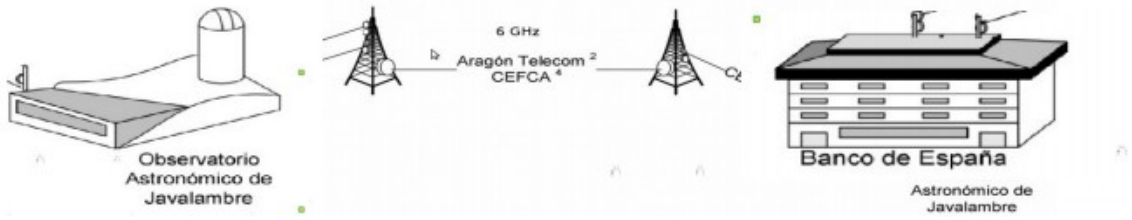
J-PAS: 1.3Tb of data per observing night





- Image acquistion
- Internal raw data publication

- Holds the 2 latest releases of the Science DBs
- Provides data access to the products
- Web services



- Handle data transference
- Do a quick data processing for QC.

- Archive data
- Process the data
- Store permanent copies of products, catalogs, DB

The filter system

- 54 NB filters
(FWHM~145Å; ∞Θ~10nm)
From 3785Å to 9100Å

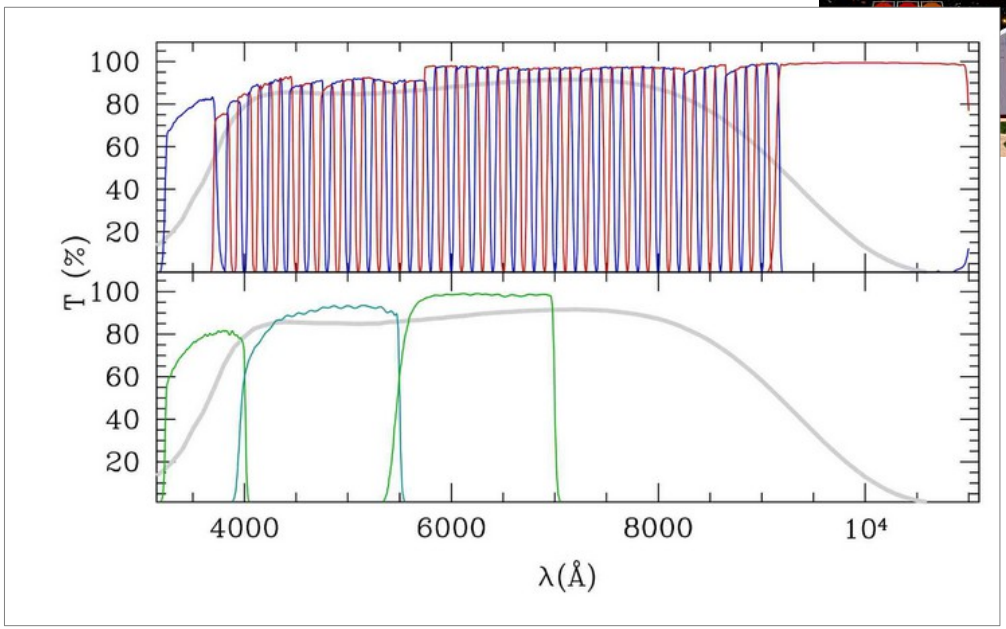
- 1 Blue MB filter
(FWHM~260Å; Θ_c~3600Å)

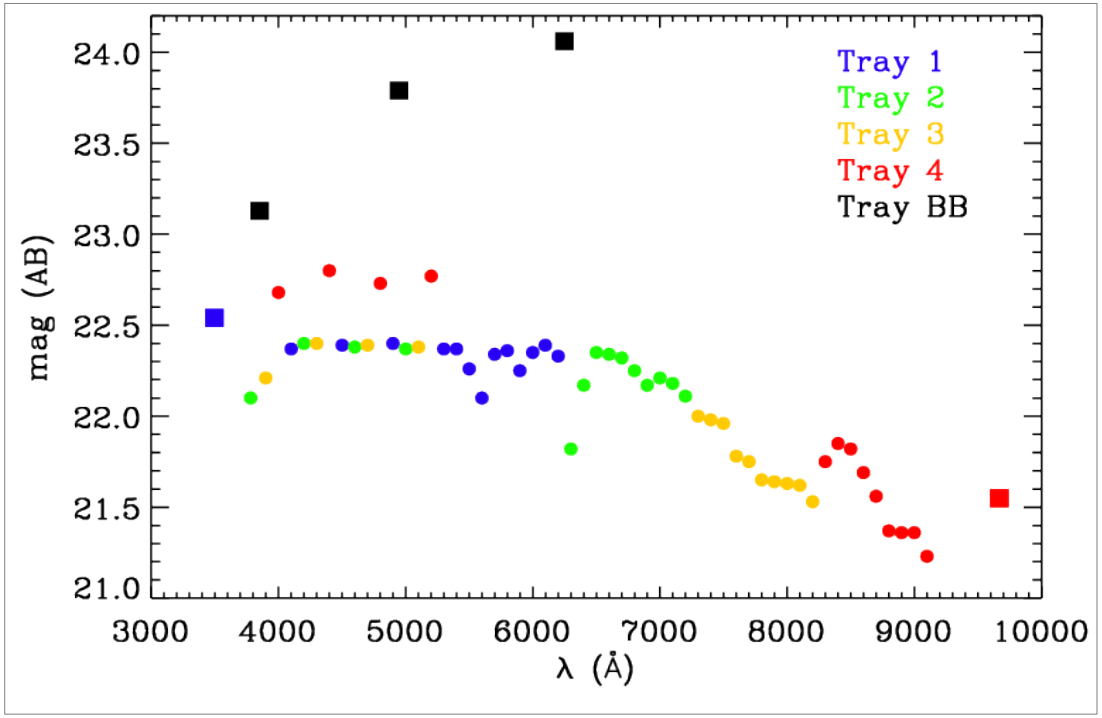
- 1 Red BB filter
(FWHM~620Å; Θ_c~9500Å)

- Sloan u, g, r (TBC)

Pseudo-spectrum (R~50) for every pixel of the sky

5σ
3" aperture

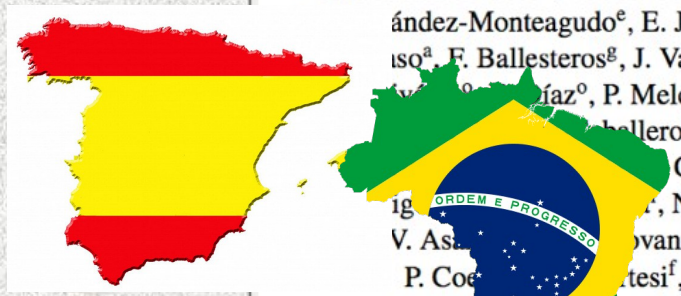




ArXiv: 1403.5237

J-PAS: The Javalambre-Physics of the Accelerated Universe Astrophysical Survey

N. Benítez[a,b], R. Dupke[b,c,d], M. Moles[e,a], L. Sodré[f], J. Cenarro[e], A. Marín-Franch[e], K. Taylor[b], D. Cristóbal[e], A. Fernández-Soto[g], C. Mendes de Oliveira[f], J. Cepa-Nogué[h], L.R. Abramo[i], J.S. Alcaniz[b], R. Overzier[b], ández-Monteagudo[e], E. J. Alfaro[a], A. Kanaan[j], J. M. Carvano[b], R.R.R. Reis[k], E. Martínez González[l], so[a], F. Ballesteros[g], J. Varela[e], H.S. Xavier[i], T. Broadhurst[n], E. Cypriano[f], R. Angulo[e], J. M. Diego[l], íaz[o], P. Melchior[p], K. Umetsu[q], P. F. Spinelli[r], A. Zitrin[s], D. Coe[an], G. Yepes[t], P. Vielva[l], llero[l], F. Shu Kitaura[v], A. L. Maroto[w], M. Masip[at], S. Tsujikawa[x], S. Carneiro[y], Carvalho[b], M. J. Rebouças[av], J. C. Carvalho[b,z], E. Abdalla[i], A. Bernui[b], , N. Chandrachani Devi[b], C.A.P. Bengaly Jr.[b], M. Campista[b], A. Amorim[g], V. As ovanni[h], S. Bonoli[e], G. Bruzual[ab], N. Cardiel[l], A. Cava[ac], R. Cid Fernandes[j], P. Coe tesi[f], R. G. Delgado[a], L. Díaz Garcia[e], J. M. R. Espinosa[h], E. Galliano[b], J. I. Gon Serrano[l], J. Falcón-Barroso[h], J. Fritz[ad], C. Fernandes[b], J. Gorgas[l], C. Hoyos[e], Y. Jiménez-Teja[a,b], A. López-Aguerri[h], C. López-San Juan[f], A. Mateus[j], A. Molino[a], P. Novais[f], A. O'Mill[f], I. Oteo[h], B. ggianti[af], R. Proctor[b], E. Ricciardelli[g], P. Sánchez-Blázquez[t], T. Storchi-Bergmann[ag], ll[a], N. Trujillo[h], A. Vazdekis[h], K. Viironen[e], S. Daflon[b], T. Aparicio[b], D. Rocha[ah], ázquez Ramió[f], T. Ribeiro[ai], M. Borges[b], S. L. Martins[ah], W. Marcolino[ah], D. aj], M.A. Pérez-Torres[f], B.B. Siffert[k], M.O. Calvão[k], M. Sako[m], R. Kessler[ak], l[b], M. De Prá[b], F. Roig[b], D. Lazzaro[b], J. Gorosábel[a], R. Lopes de Oliveira[al], vin[d], J. F. Liu[aj], E. Álvarez[t], I. Balmés[i], A. A. da Costa[f], S. Chueca[e], A. Y. Díaz[e], M. V. C. Duarte[i], J. Fabregat[g], F. Ferrari[ao], B. Gavela[t], S. G. Gracia[f], N. Gruel[ae], zmán[ap], J. D. Hernández-Fernández[e], D. Herranz[h], L. Hurtado-Gil[q], F. Jablonsky[au], M. Lima[i], E. Martín[aq], V. Martínez[g], J. J. C. Montero[f], P. Penteado[f], C.B. Pereira[b], Sacristán[f], M. Sánchez-Portal[ar], A. C. Soja[f], E. Solano[ao], J. Torra[as], L. Valdivielso[e]

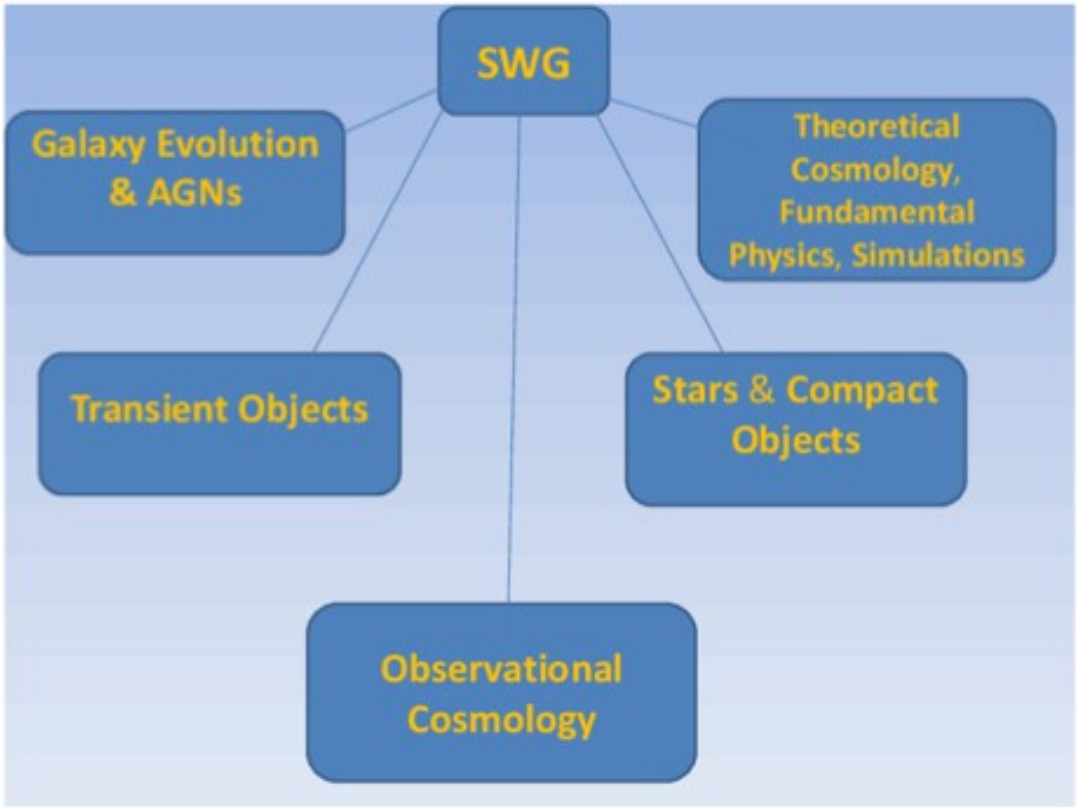


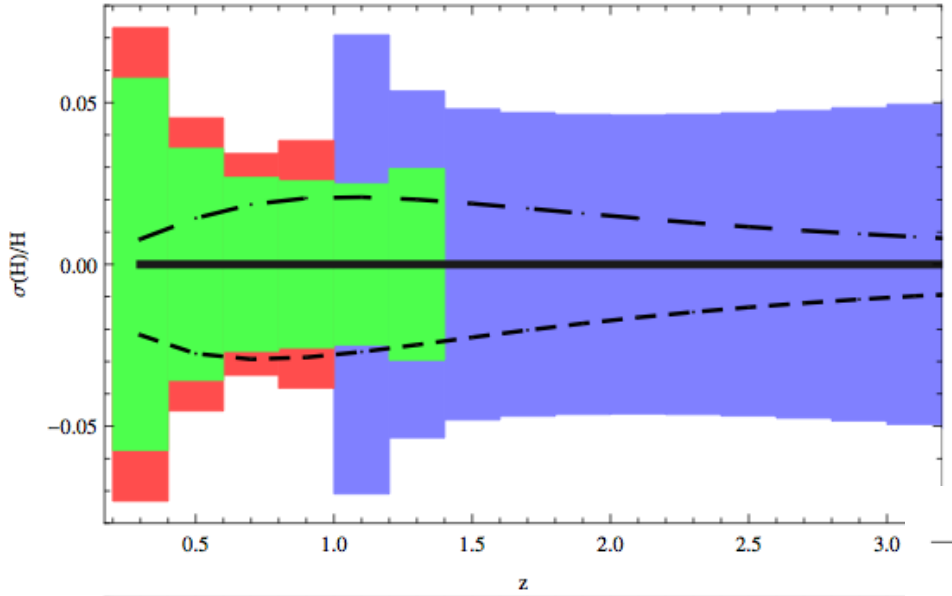
Collaboration board:
Javier Cenarro (CEFCA)
Renato Dupke (ON)
Raul Abramo (USP)
Jose' Vilchez (IAA-CSIC)

Scientific coordinators:
Silvia Bonoli (DIPC/CEFCA)
Renato Dupke (ON)

Science

J-PAS should have a significant output in very different fields of Astrophysics**:**



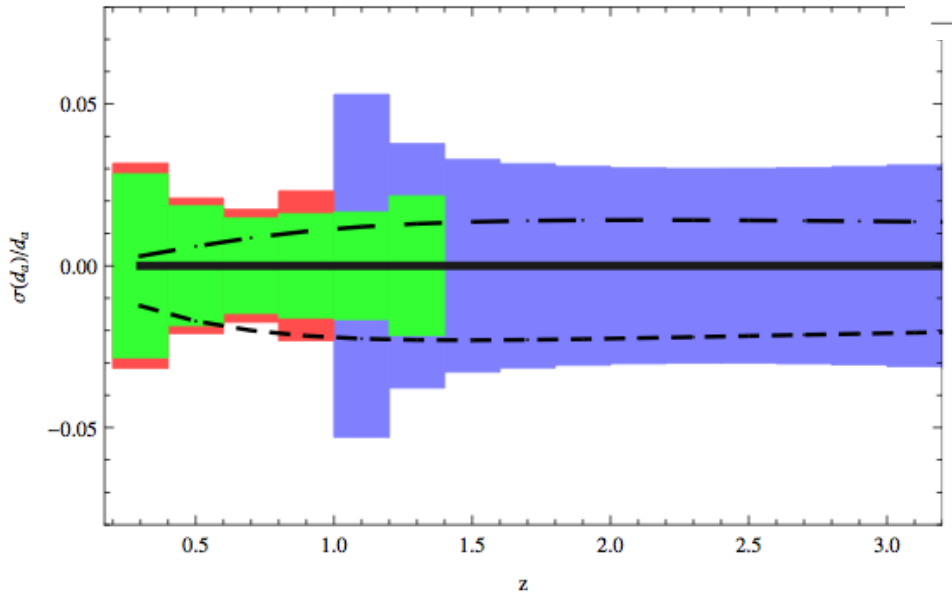


LRGs
ELGs
QSOs

Constraints on **Hubble parameter**

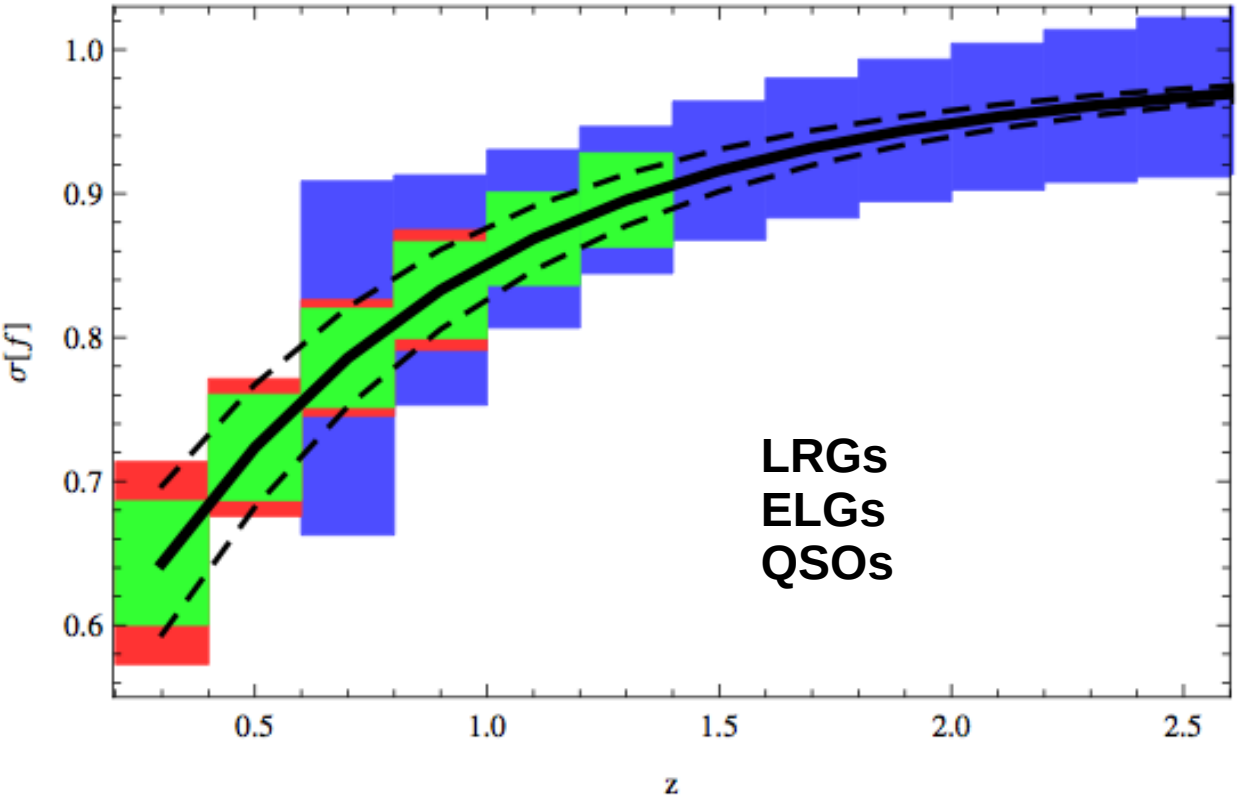
x 106

Trays	Date	N_{RG}	N_{ELG}	V_{eff}	$N_{RG}^{z>0.7}$	$N_{ELG}^{z>0.7}$	$V_{eff}^{z>0.7}$
T543	Y3	4.6	33.9	9.5	0.7	9.4	5.8
All	Y6	17.6	73.1	13.9	3.7	19.7	9.9



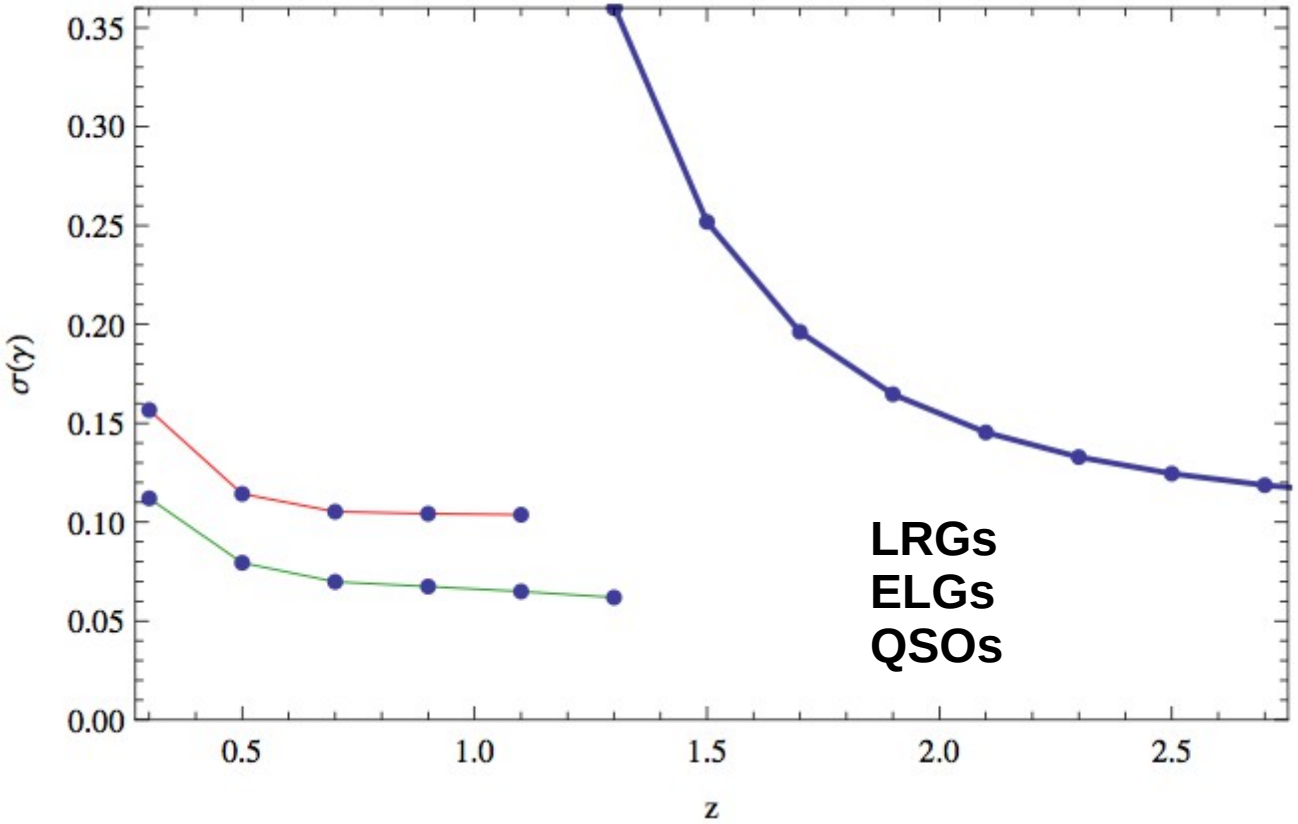
Constraints on **angular distance**

J-PAS Red book, Benítez et al., astro.ph 1403.5237



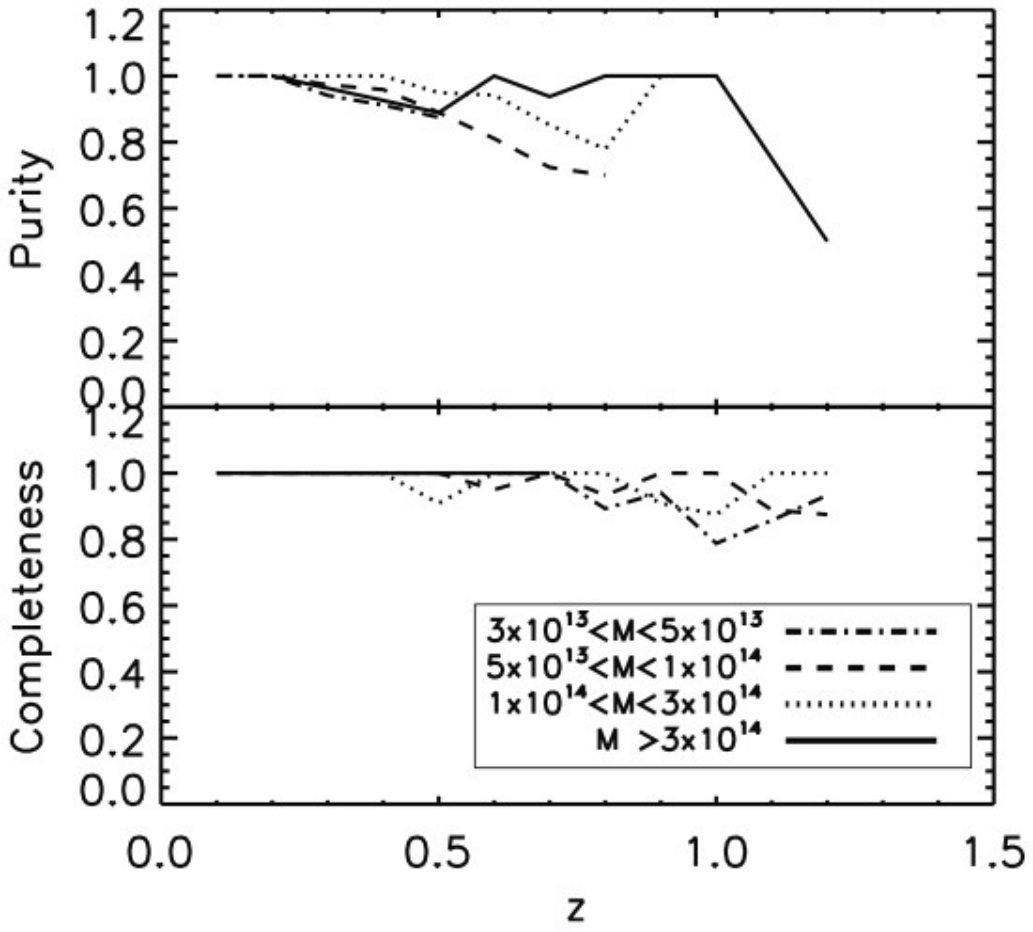
Constraints on **RSD parameter f=dlnD/dlna**, with strong implications for **Dark Energy models** and **alternative theories of Gravity** ….

J-PAS Red book, Benítez et al., astro.ph 1403.5237



Constraints on **gamma γ parameter f=Omega_mγ**, with strong implications for **Dark Energy models** and **alternative theories of Gravity** ….

J-PAS Red book, Benítez et al., astro.ph 1403.5237

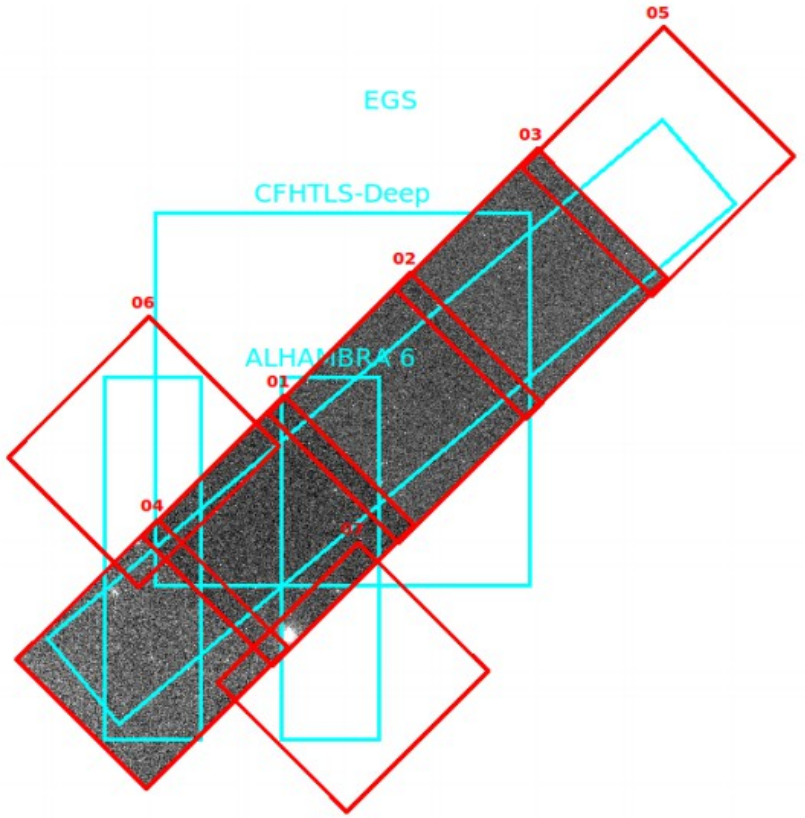


- We expect **~650e3 clusters** of masses above **3e13 Msolar** up to z~1.3 …
- These should have exquisite redshift information & even membership information
- Mass estimates based upon richness and lensing from the *r*-band (*X-ray would be great too!)*

J-PAS Red book, Benítez et al., astro.ph 1403.5237

The m(*ini-illi*)-JPAS survey

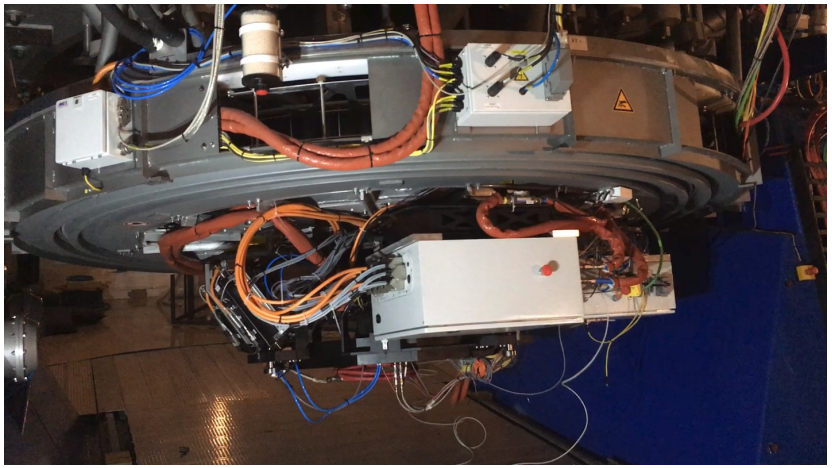
About mini-JPAS



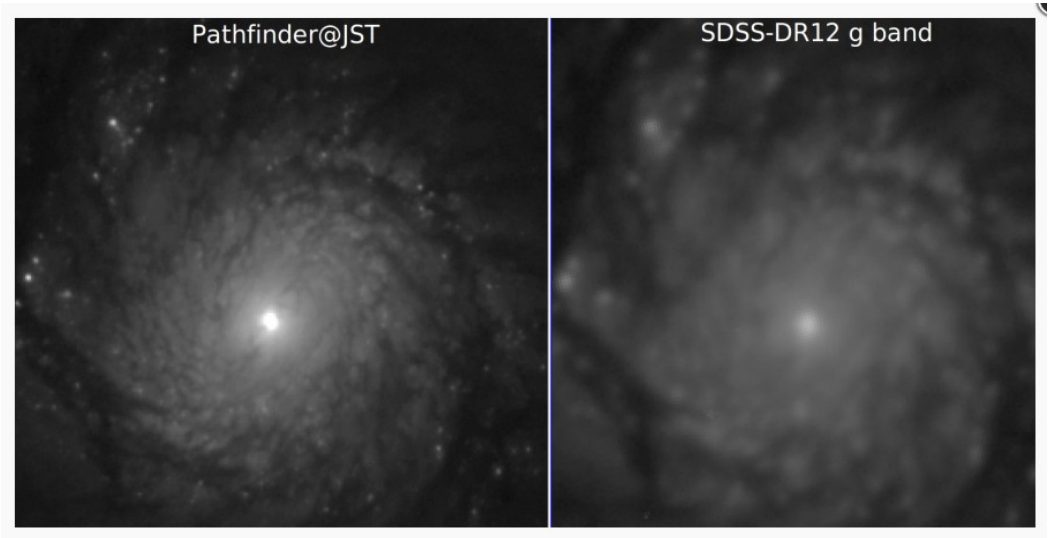
~1deg² at full-depth observed with the **PATHFINDER** camera on the extended growth strip

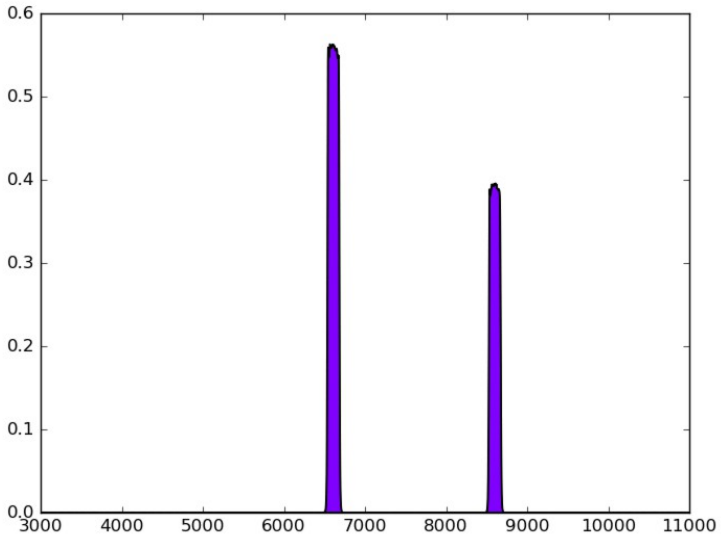
Data taken over few months during Summer 2018

About mini-JPAS

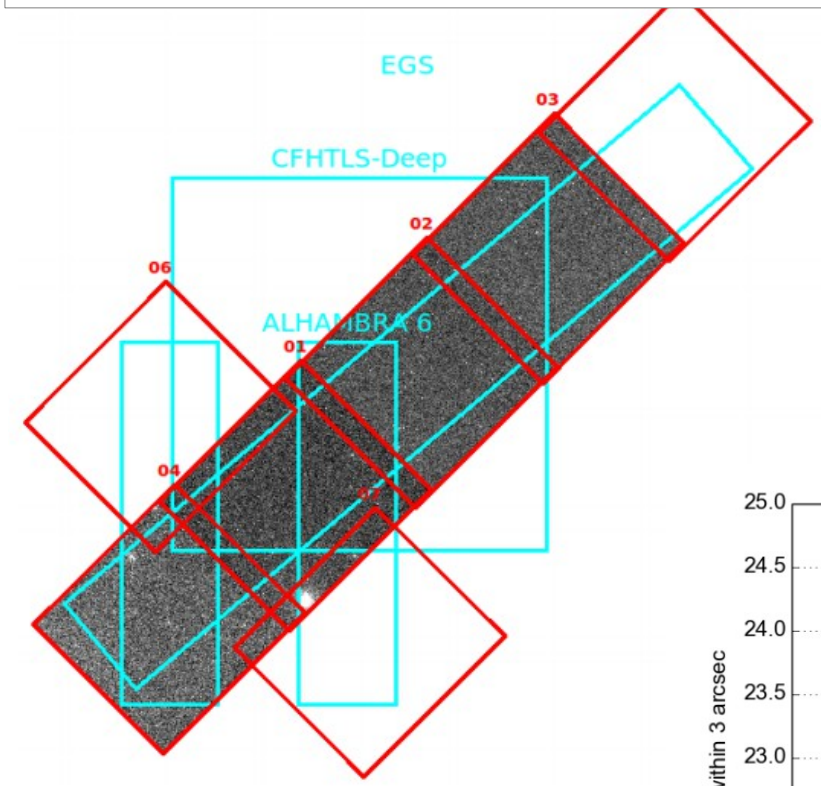


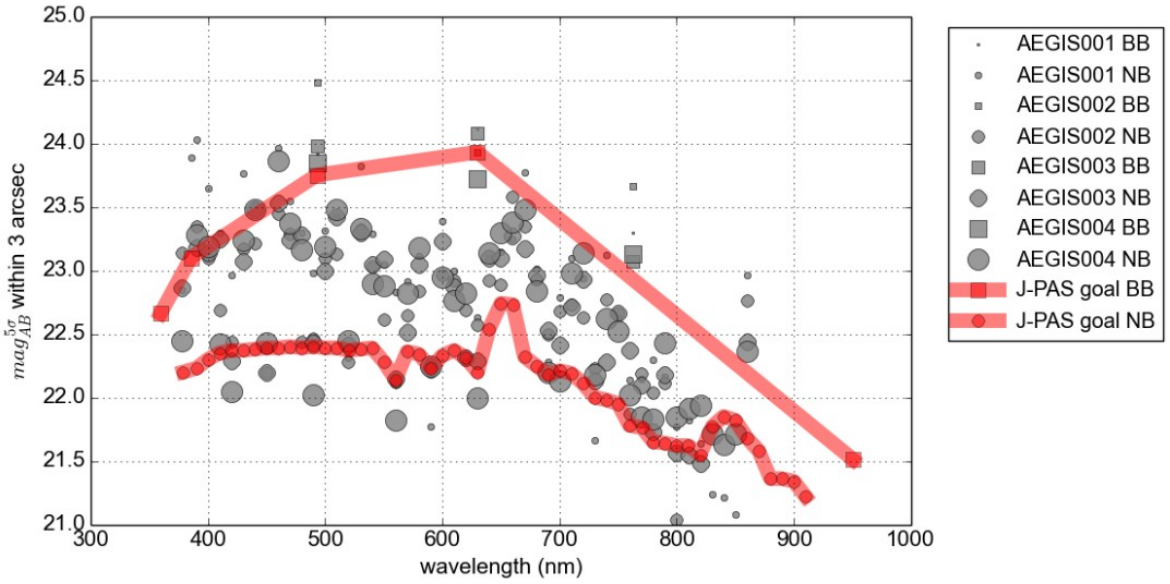
One JPCam-CCD at the center of the focal plane





About mini-JPAS





About mini-JPAS

Mini J-PAS Services

Search Data filtering

Sky Navigator search

Object name:

RA: 14:17:47.628

DEC: 52:41:43.74

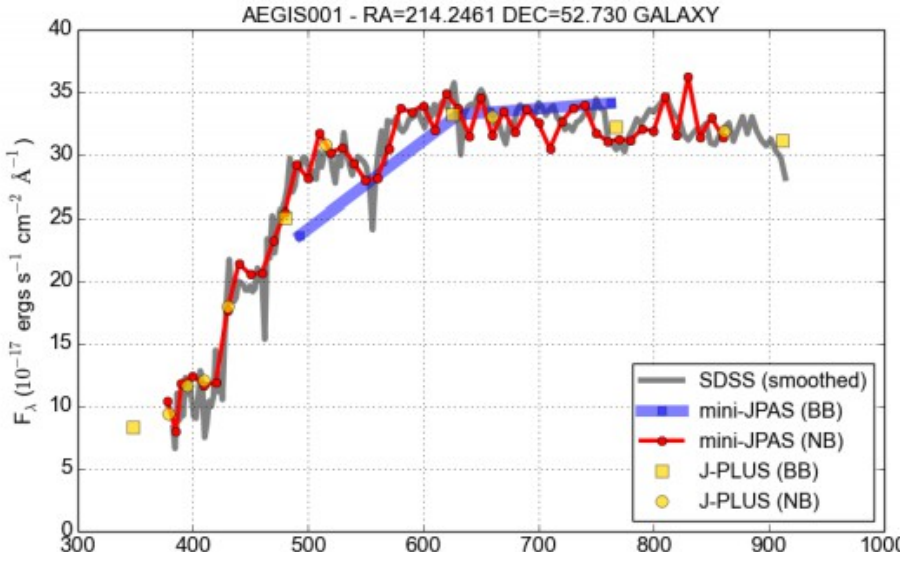
Clear Search

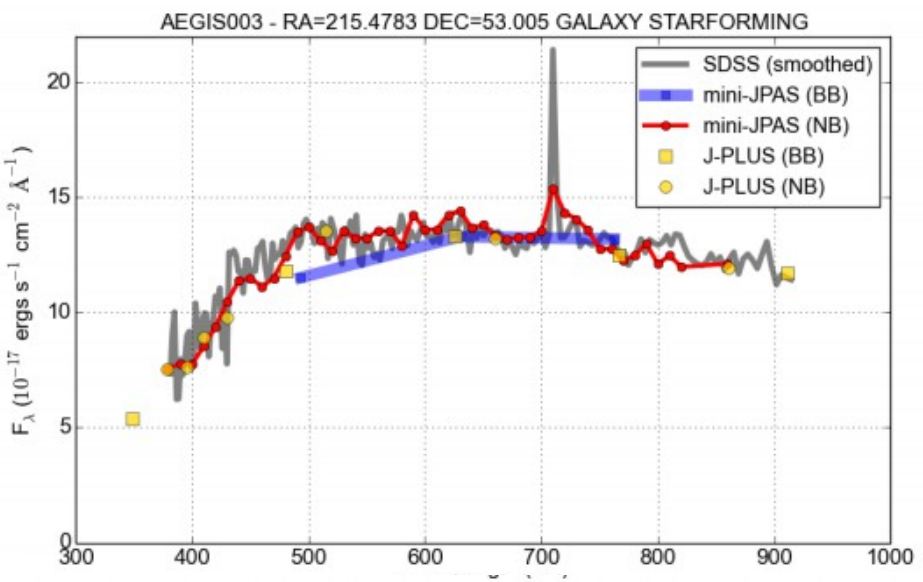
J2000 14 17 21.842 +52 38 16.34

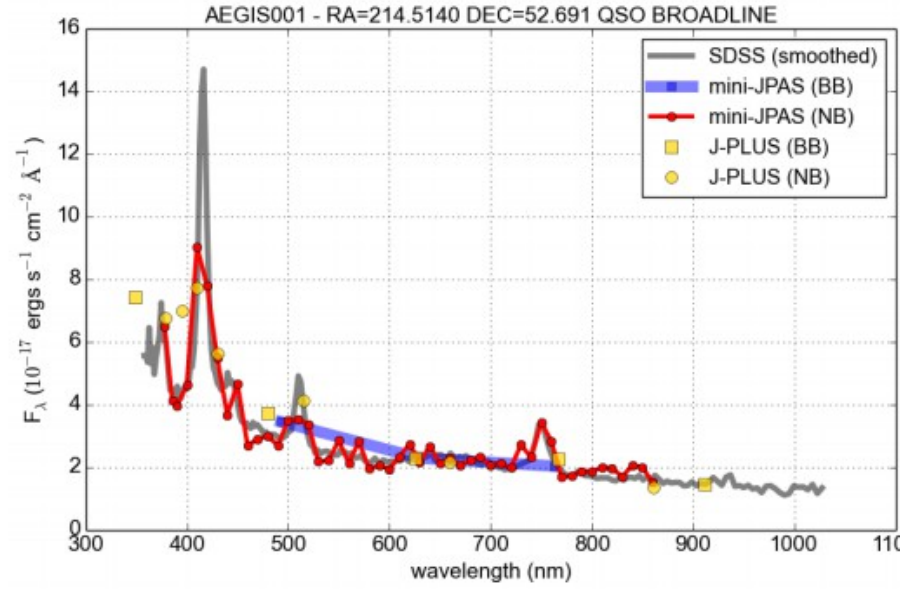
You must zoom in t

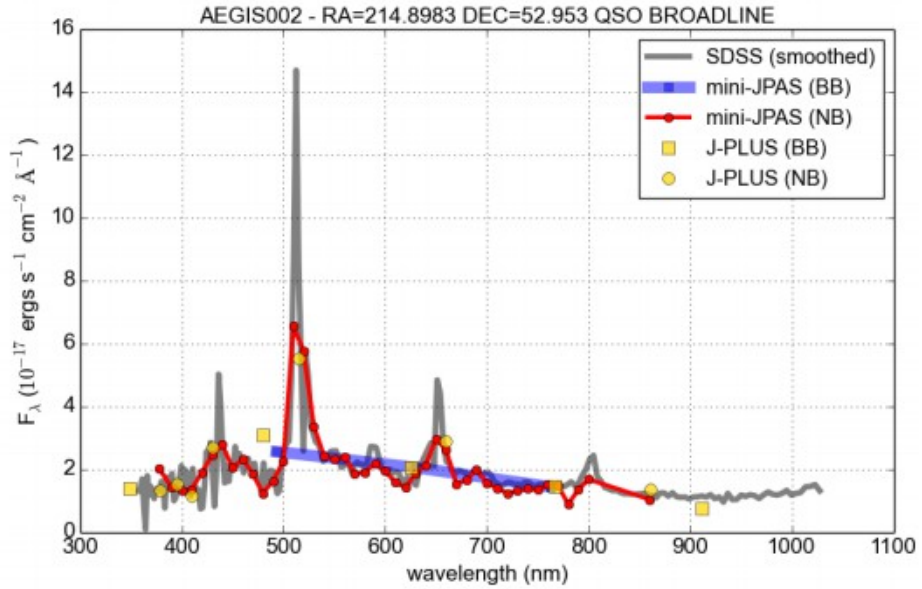
About mini-JPAS

About mini-JPAS

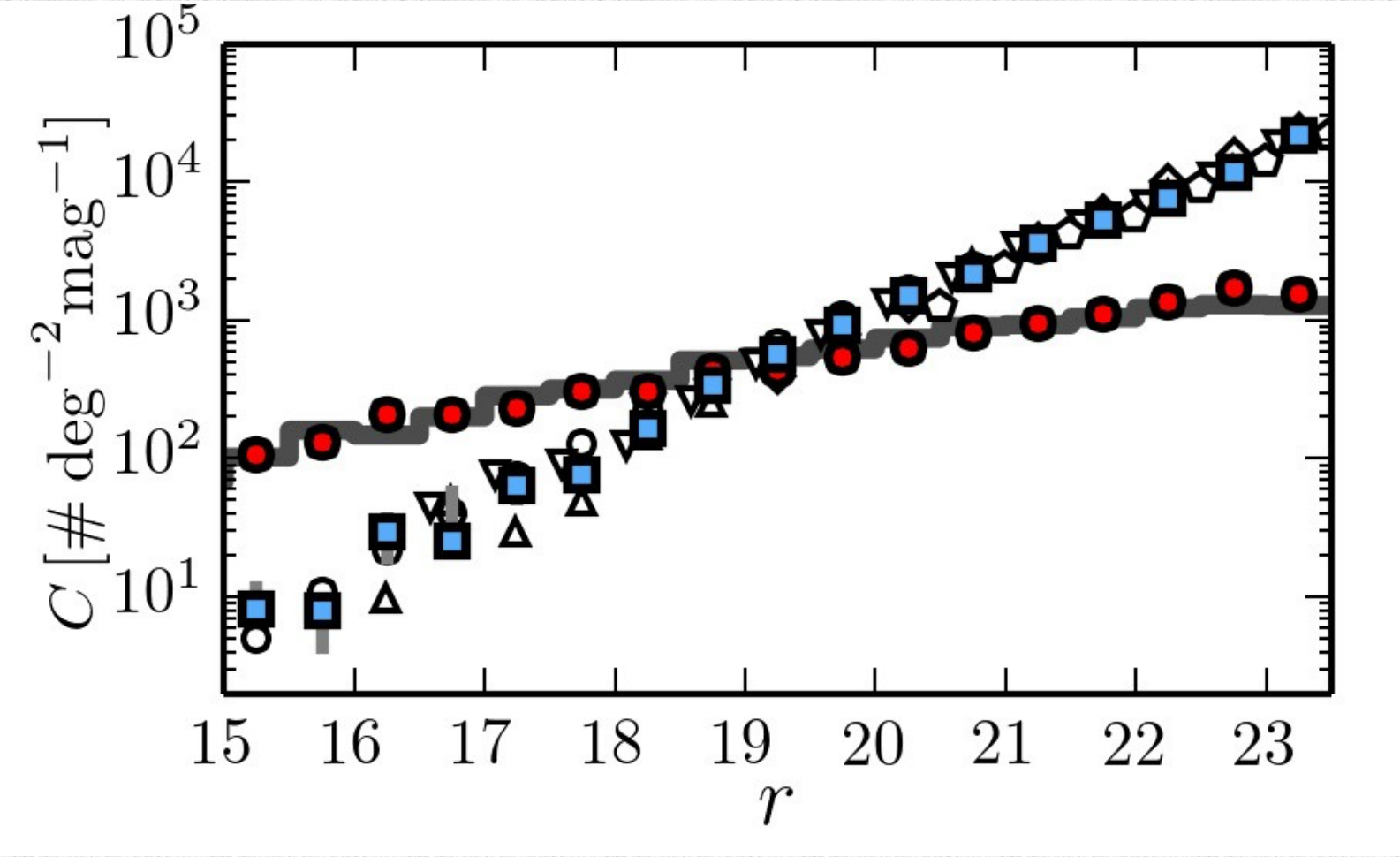








Galaxy/star counts vs magnitude

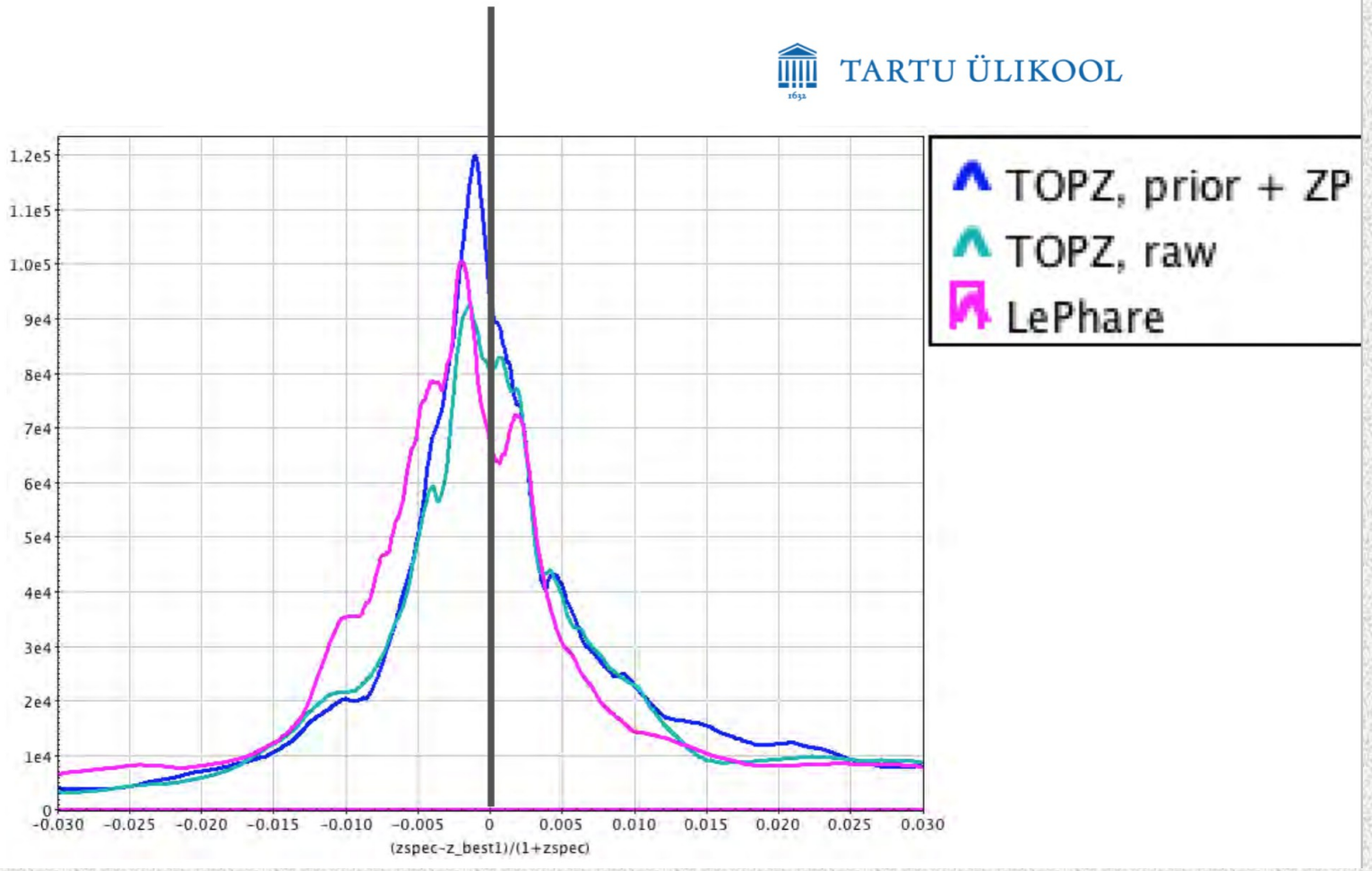


Credits: Carlos López San Juan (CEFCA)

Photometric redshifts

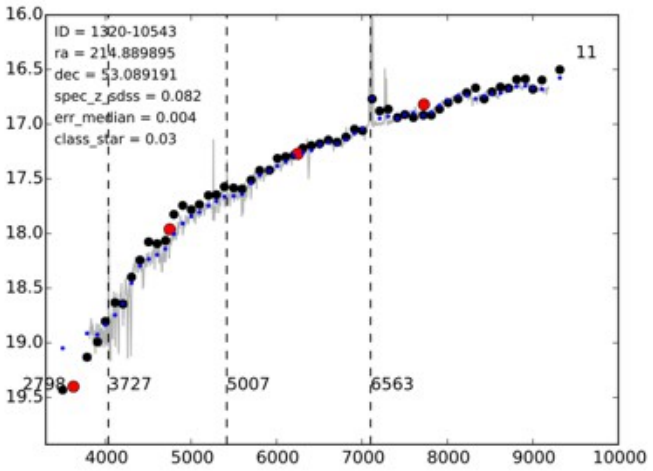
M < 22 mag

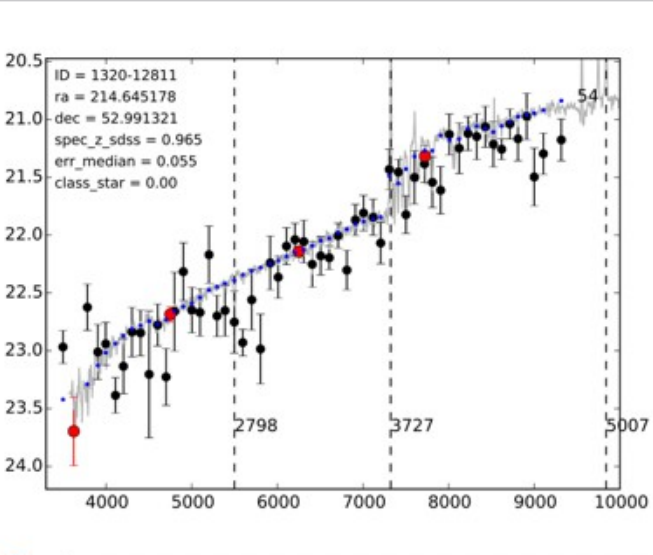
TARTU ÜLIKOOL

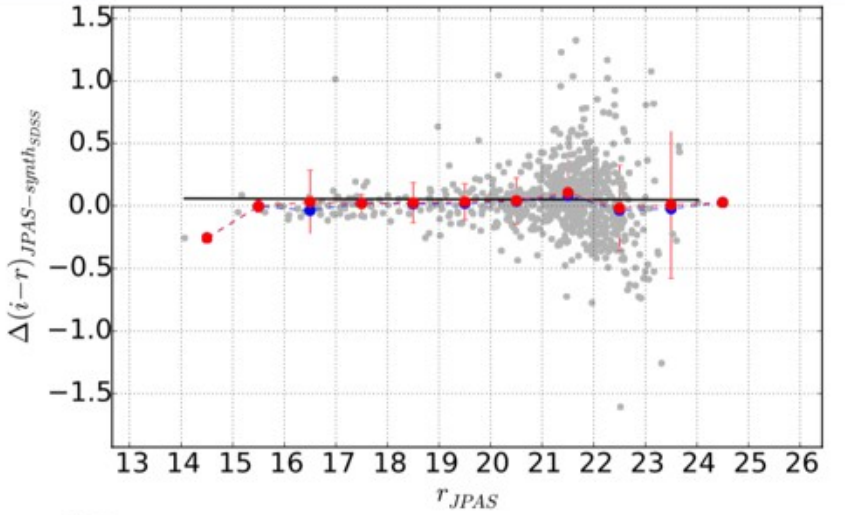


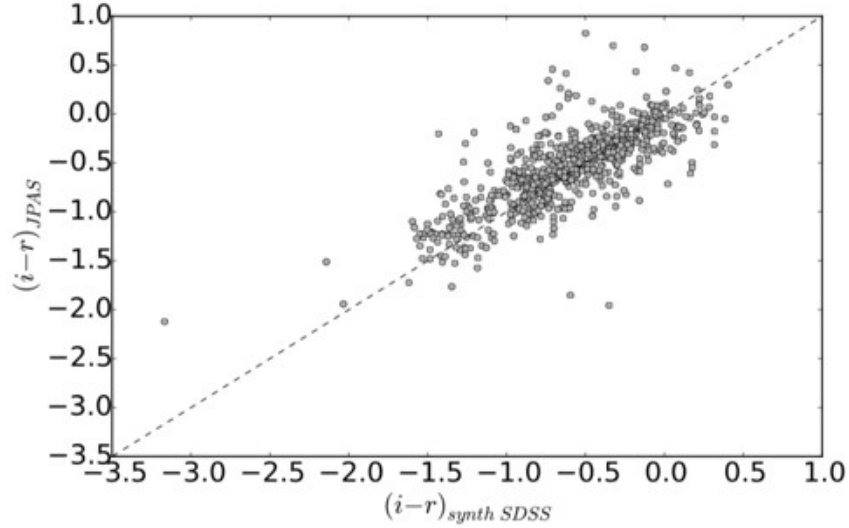
Credits: Emmo Tempel (Tartu University)

Characterization of the data: Comparison with SDSS spectroscopy









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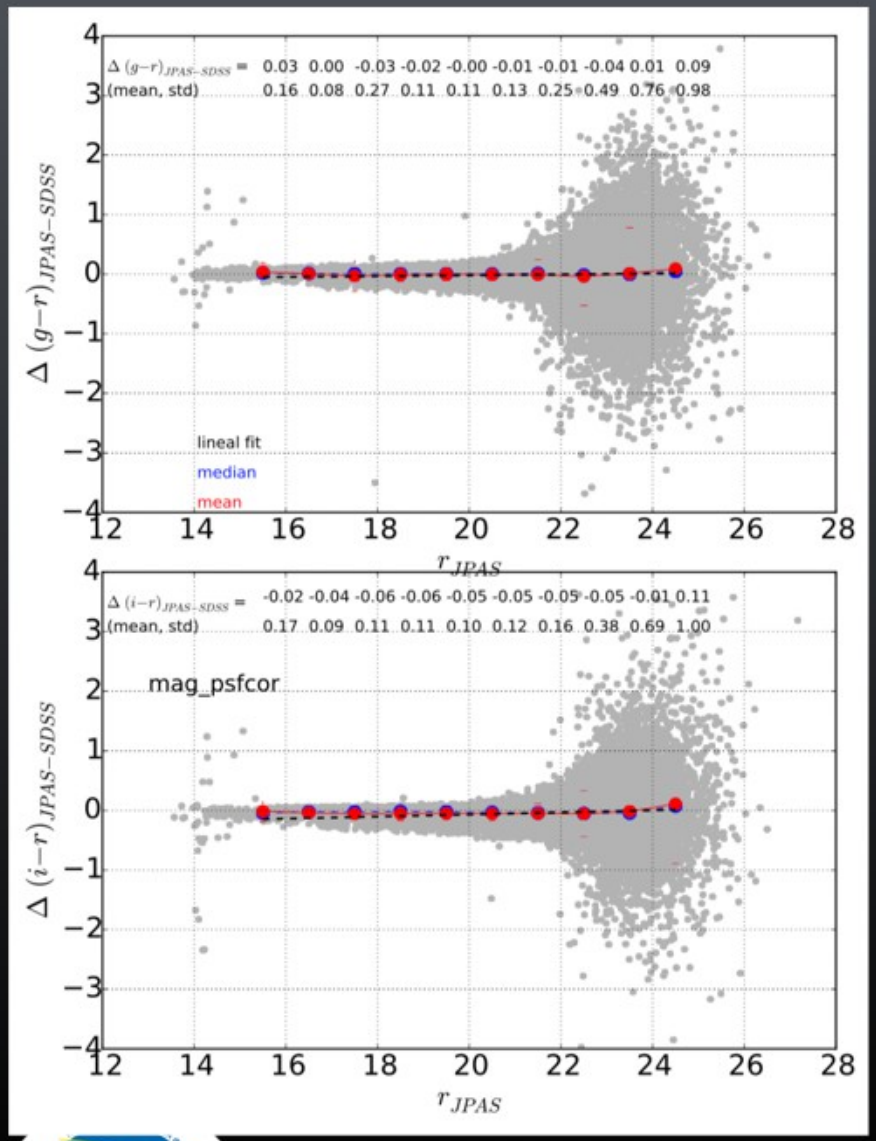
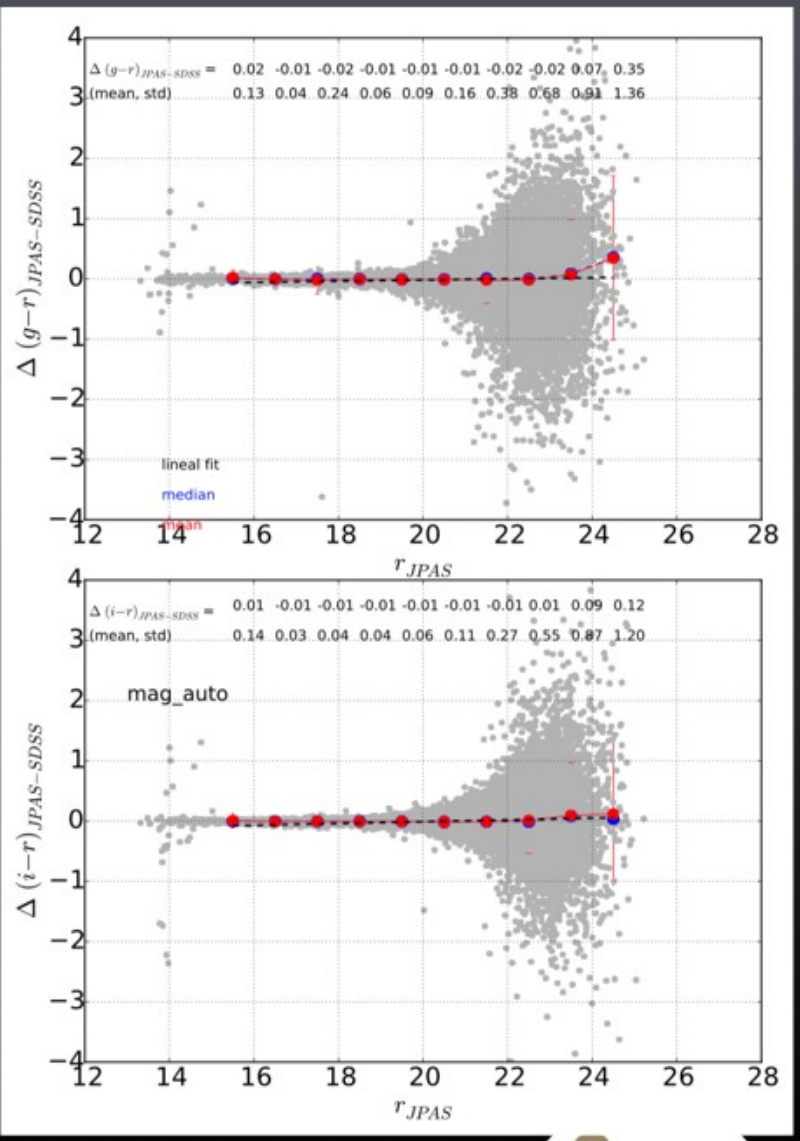
Characterization of the data: Comparison with SDSS photometry





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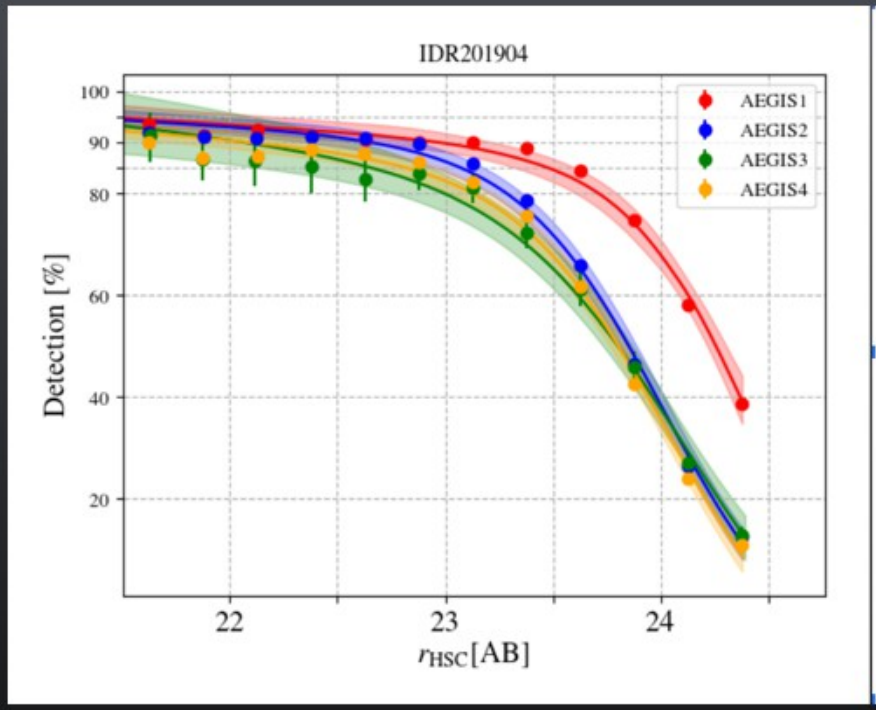
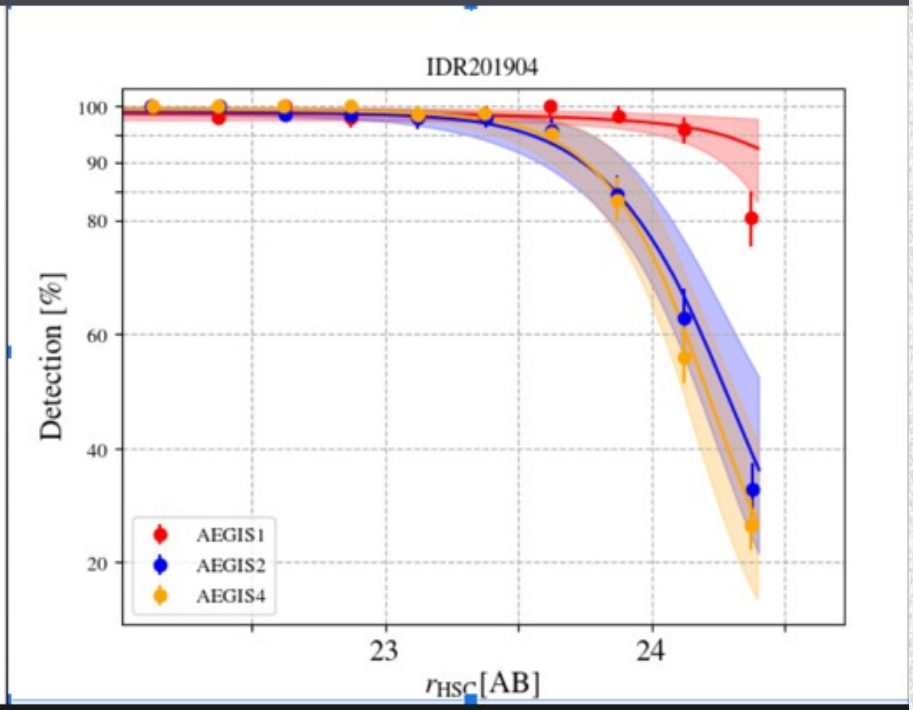
Characterization of the data: Comparison with HSC photometry
Sample size and completeness levels (Luis Díaz García)





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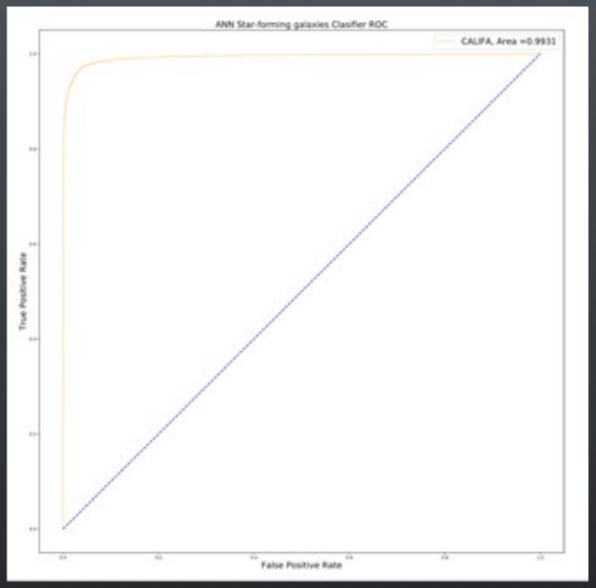
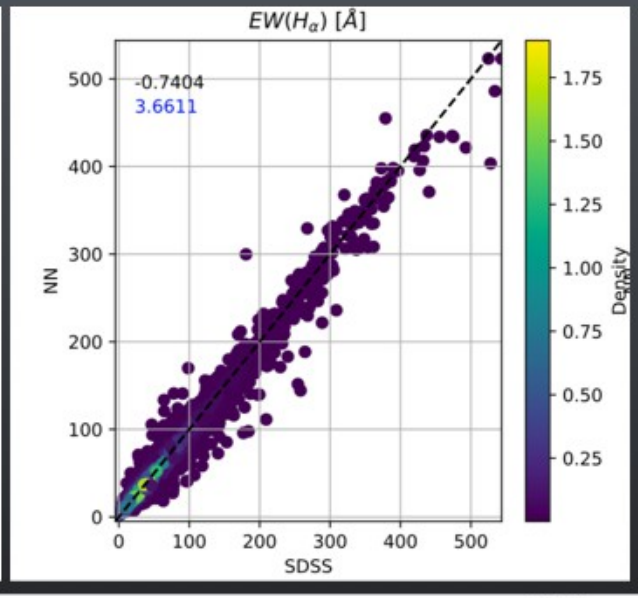
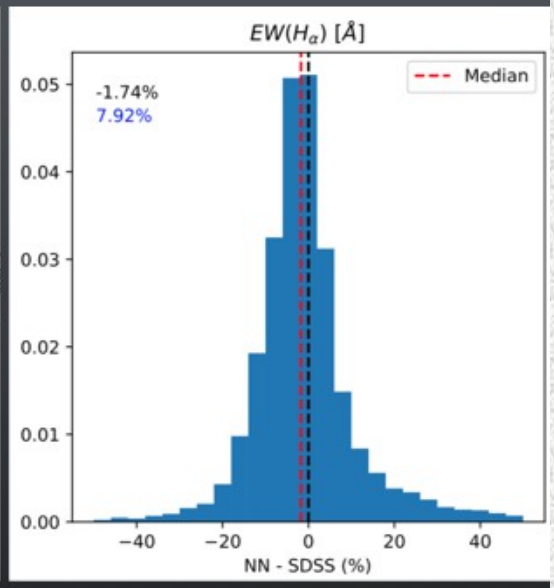
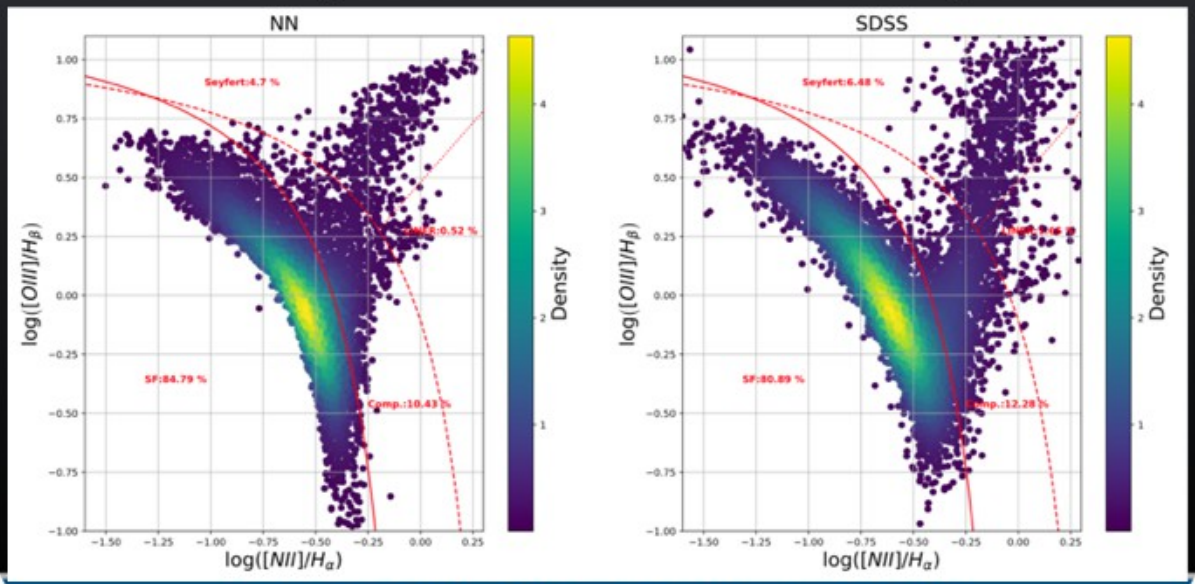
JPAS as an emission line survey: Method for Ha emitters









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EXCELENCIA SEVERO OCHOA

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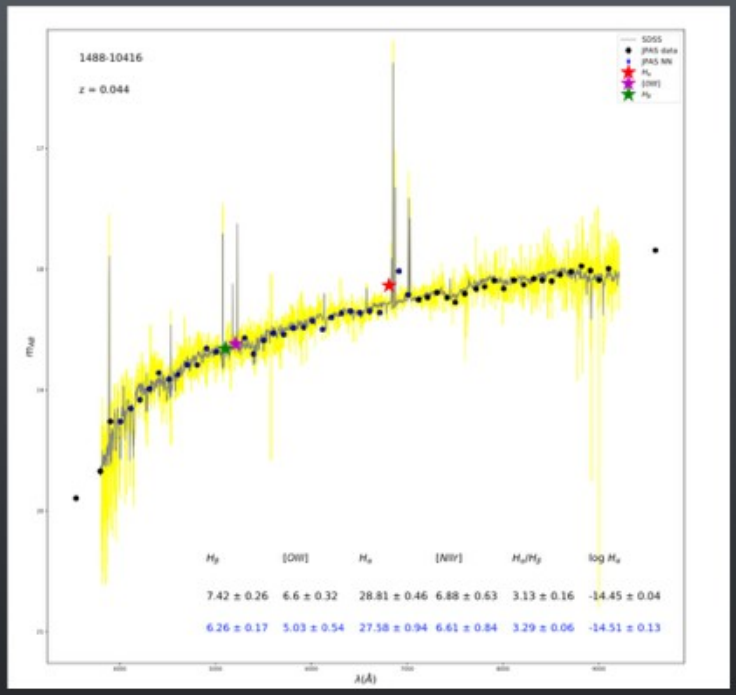
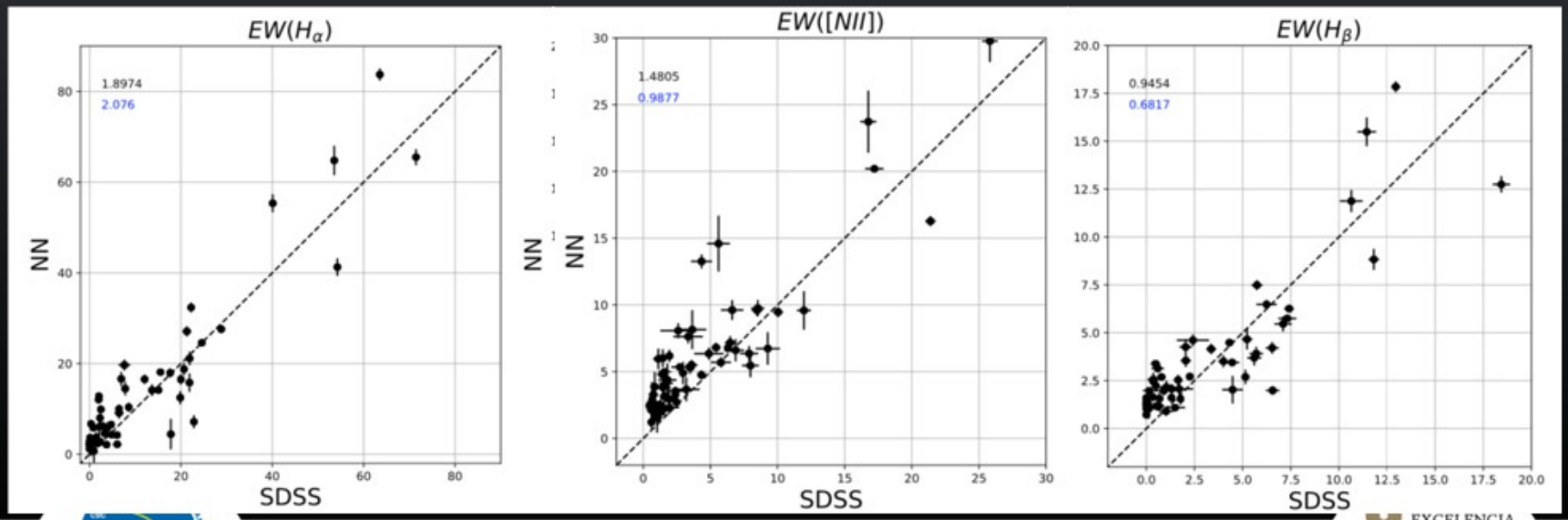
JPAS as an emission line survey (Ha emitters): Method





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EXCELENCIA SEVERO OCHOA

Rosa González-Delgado (IAA), Ginés Martínez Solaeche (IAA), André de Amorim (UFSC), Luis Díaz (Taipei), Rubén García Benito (IAA), Roberto Cid Fernandes (UFSC)

JPAS as an IFU of low spectral resolution

JPAS results: spatially resolved galaxies

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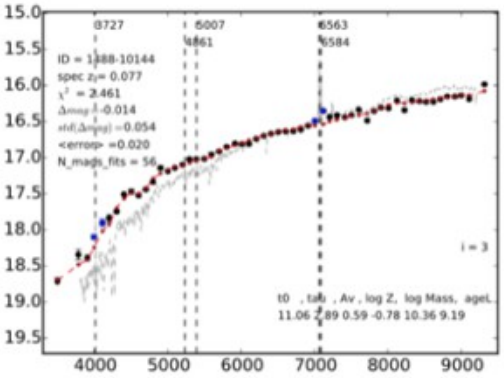

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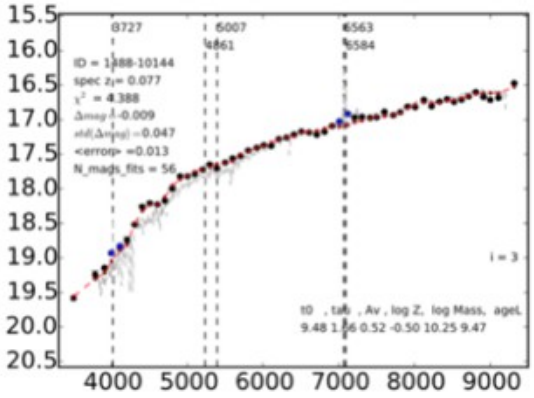

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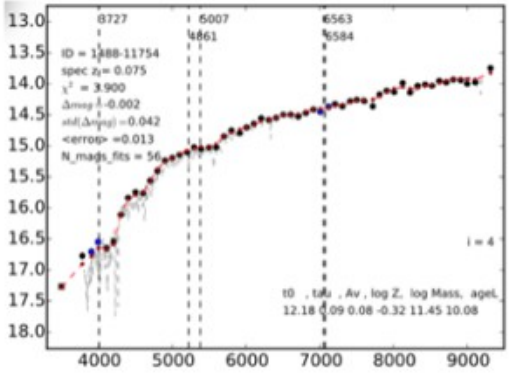
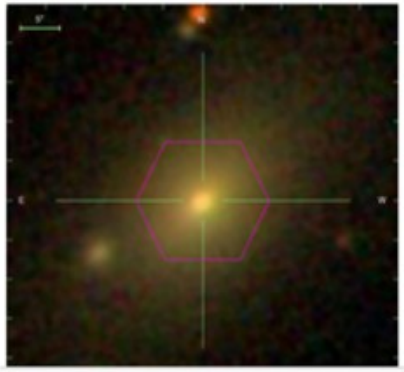


MaNGA obser



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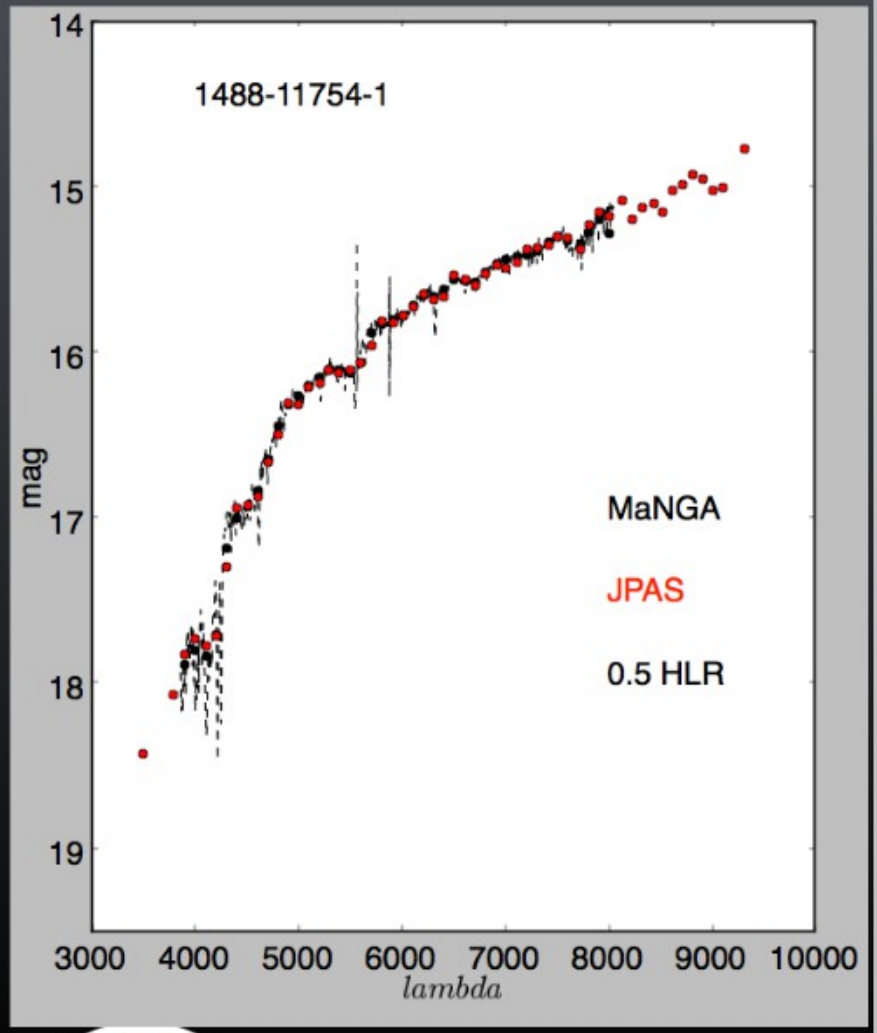
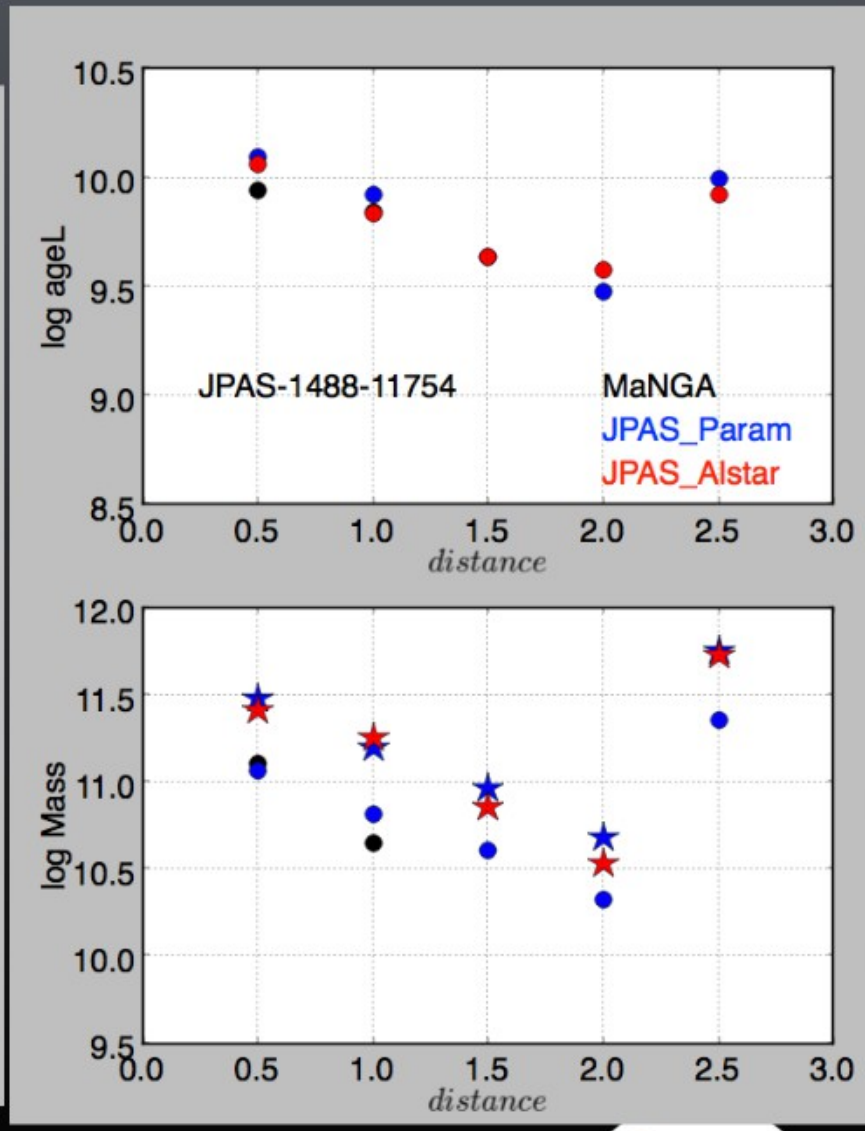
JPAS as an IFU of low spectral resolution





Rosa González-Delgado (IAA), Ginés Martínez Solaeche (IAA), André de Amorim (UFSC), Luis Díaz (Taipei), Rubén García Benito (IAA), Roberto Cid Fernandes (UFSC)

Time-line for J-PAS

Q4 2019:
Installation of JPCam

Q1 2020:
Commissioning

Q2 2020:
Start of J-PAS

December 2019

mini-JPAS

data release and open meeting in Teruel

Possible future strategies

J-PAS must be conducted under an **optimized** strategy that **maximises** the scientific output in as **many** different fields as possible

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The OAJ must **cover 5,000 square degrees** in ***g*** band at **23.8** (@10σ, 3” aperture) for the ***Euclid*** collaboration

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The OAJ must **cover 5,000 square degrees** in ***g*** band at **23.8** (@10σ, 3" aperture) for the ***Euclid*** collaboration

We are currently considering teaming up with **WEAVE-QSO** (a muti-spectroscopic survey about starting at *William Herschel Telescope* (WHT) on the Roque de los Muchachos site of La Palma, Canary Islands), in order to provide about **100 QSO targets/sq.degree** over an area of **~1000 sq.deg/year** (this would enable *very competitive* Ly-alpha forest BAO science)

However, fullfilling those requirements simultaneously is not trivial, since despite the capabilities of the OAJ, the survey speed is finite and we count with ~ 1,800 hours/years, ~1,000 of them photometric, the rest *clear* ….

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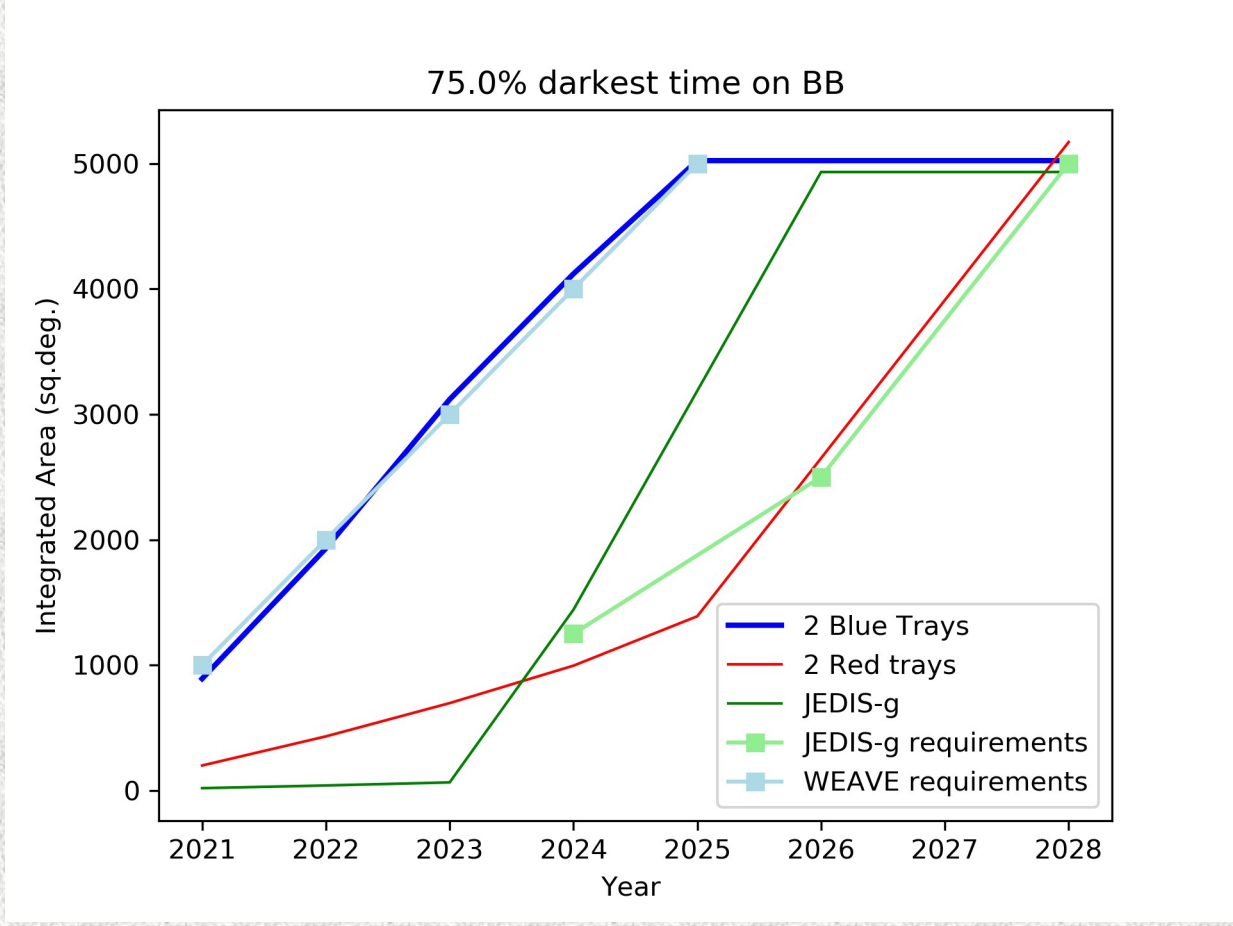
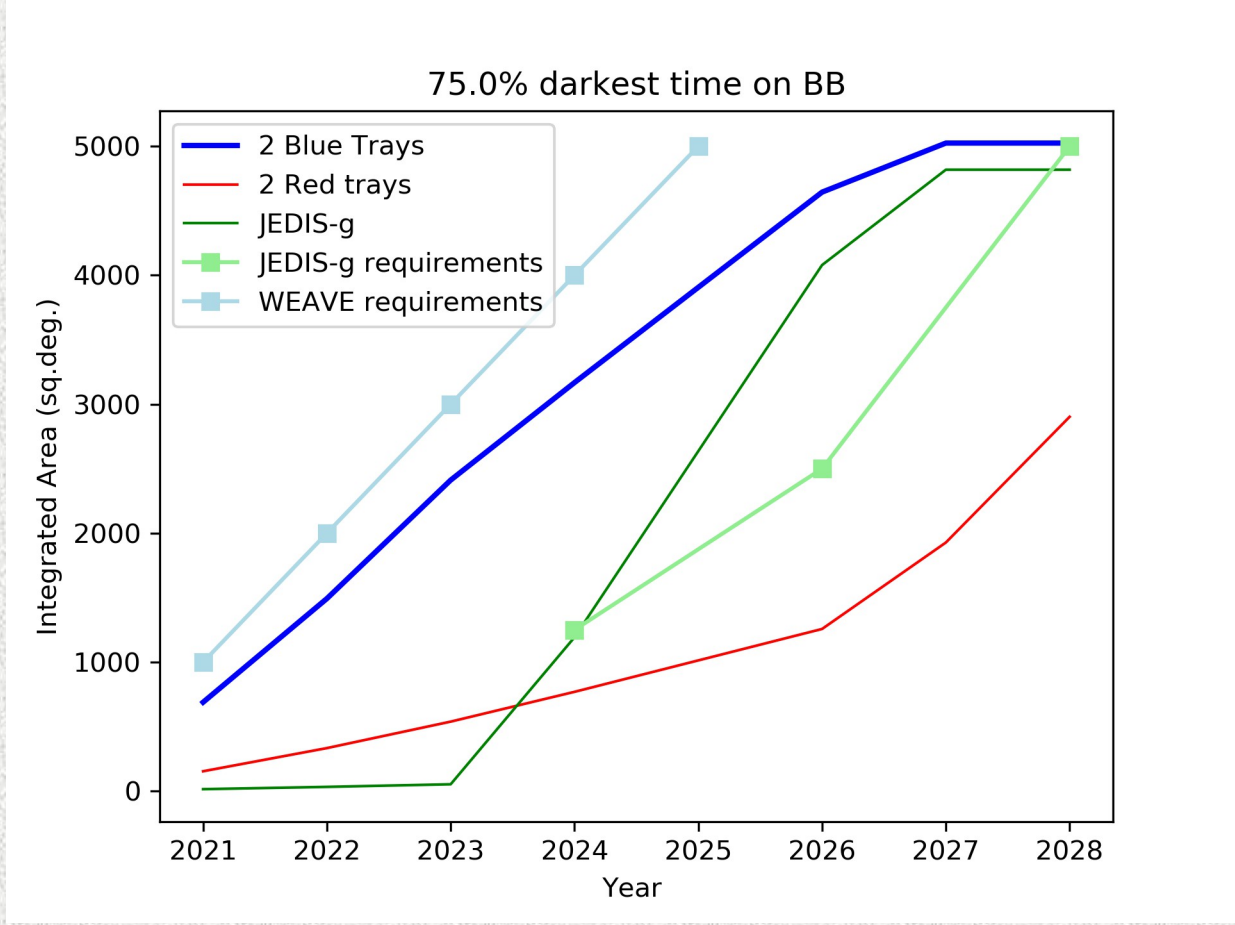
Optimistic scenario: 50% of Non-photometric time usable by J-PAS and JEDIS-g: 20% of open time usable by J-PAS and JEDIS-g



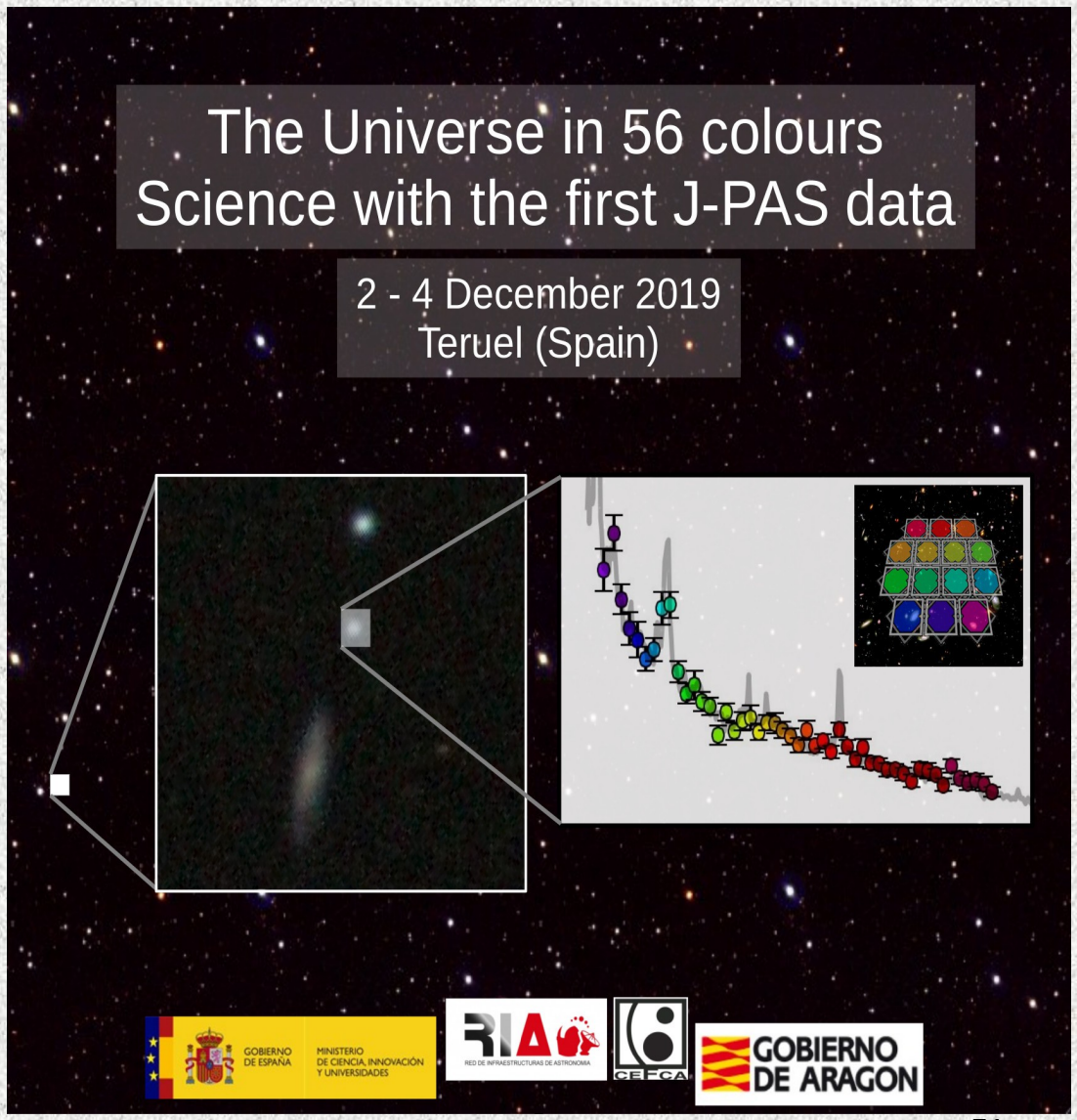
However, fullfilling those requirements simultaneously is not trivial, since despite the capabilities of the OAJ, the survey speed is finite and we count with ~ 1,800 hours/years, ~1,000 of them photometric, the rest *clear* ….

More conservative scenario: 0% of non-photometric time usable by J-PAS and JEDIS-g; 20% of open time usable by J-PAS and JEDIS-g



Discussions currently ongoing within the collaboration …

And don't forget!!



And don't forget!!